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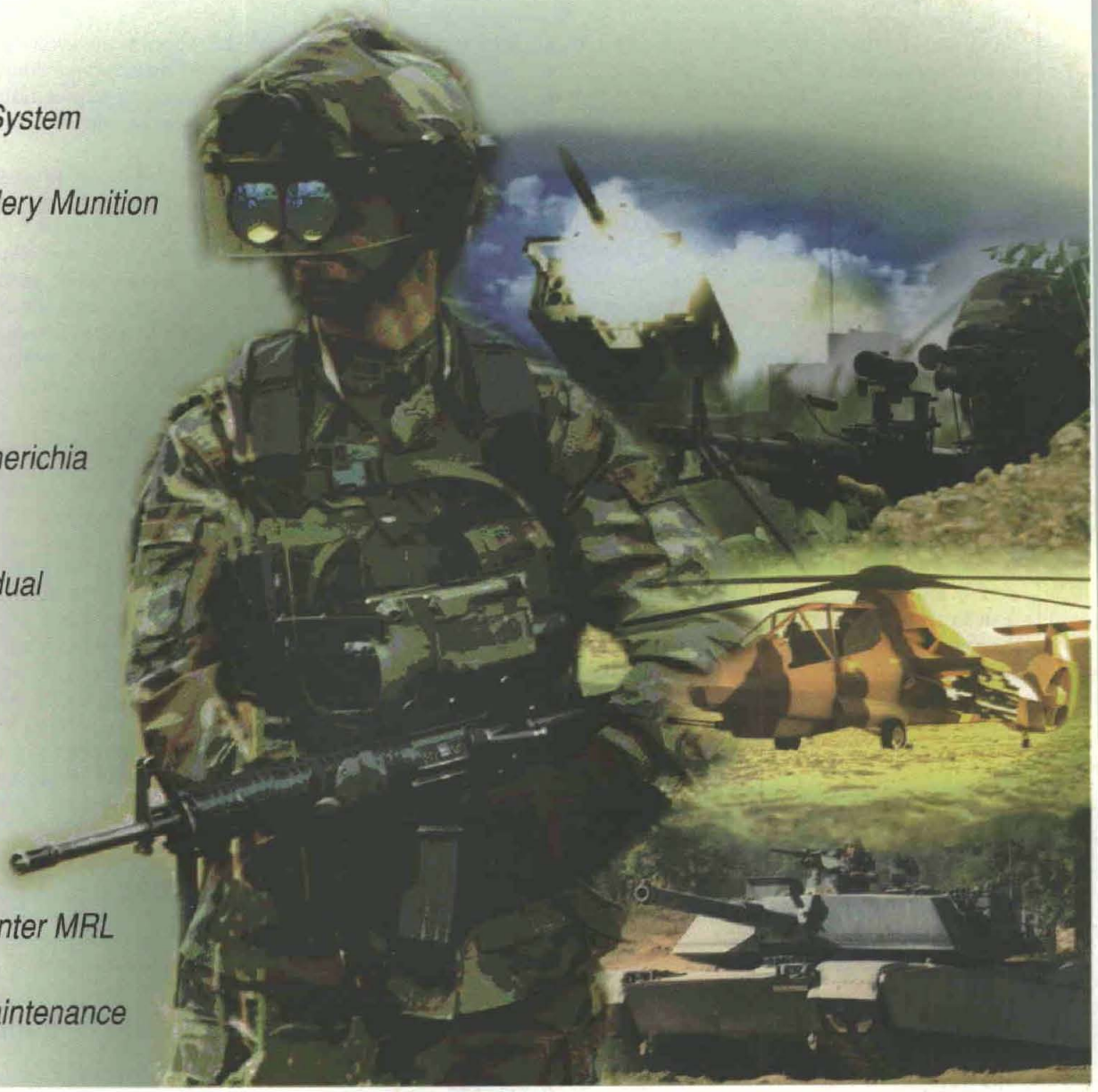
ARMY RD&A

MARCH - APRIL 1998

ARMY SCIENCE AND TECHNOLOGY



Mortar Fire Control System

Laser Igniter for Artillery Munition

Hunter Sensor Suite

Total Distribution

Enterotoxigenic Escherichia Coli Vaccine

Multi-Purpose Individual Munitions

Composite Armored Vehicle

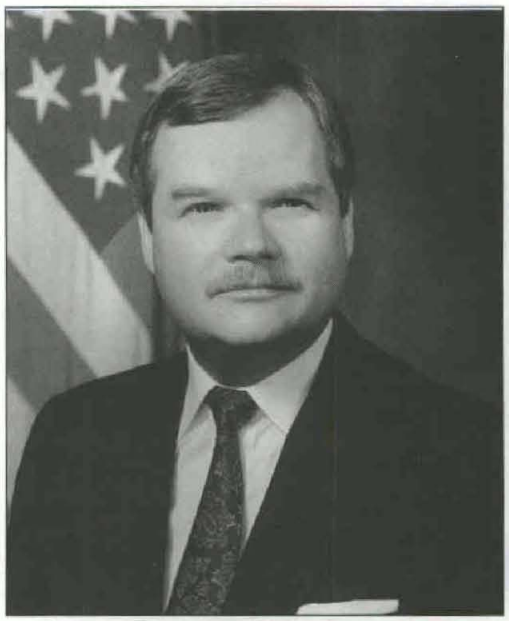
Field Fortification

Precision/Rapid Counter MRL

Large-Area Night Maintenance Shelter

FROM THE ARMY ACQUISITION EXECUTIVE

Army Science and Technology: A Corporate Investment In The Future



A strong, focused and stable Science and Technology (S&T) Program is essential to the timely development and transition of technologies into weapon systems and system upgrades. It is also essential to explore alternative concepts to provide the future warfighting capabilities needed to achieve Army XXI and the Army After Next (AAN). Army S&T is a corporate investment in our future.

In the 21st century, America's Army will face missions and adversaries that are unknown today. We will face a proliferation of sophisticated weapons. We will face new kinds of warfare and operations other than war by terrorists and hostile nations. We must be ready.

Both readiness and modernization result from long-term, cumulative efforts. It takes time and resources to build a trained and ready force with the technological edge necessary for decisive victory. Our modernization program focuses on ensuring that our soldiers remain well equipped now and in the future.

The Army's long-term vision is evolving through a process managed by the Army's Training and Doctrine Command (TRADOC). The AAN Office, under the Deputy Chief of Staff for Doctrine, is conducting broad studies of future warfare for the period around the year 2025 for the purpose of framing the issues vital to the development of the future Army. Throughout this process, the S&T community is serving a vital support role. To better appreciate the role of the S&T community, it is important to understand the four major azimuths these studies are exploring and the process for integrating the results into the evolving AAN vision.

The first azimuth under investigation involves the identification of probable geopolitical realities for the period around 2025. The purpose of this study is to establish likely threats and missions and to link these to the Army's future warfighting strategies and systems to ensure that the Army will be able to fulfill its future National Command Authority responsibilities. The second azimuth is a study of the future military art necessary to ensure that the Army has unquestionable overmatch capability against the full spectrum of potential threats. The third azimuth is the evaluation of evolving technologies and systems concepts along with the planning of the research and development investments needed to support the evolving military art and to ensure unquestionable overmatch capabilities for the future Army. And, the fourth azimuth is the exploration of approaches necessary for our forces to operate effectively at the limit of human cognitive capability.

We have developed an AAN process that incorporates input and activities from multiple sources on an annual basis. Through this process, a strong S&T investment strategy in support of AAN has begun to evolve. Given the timeframe of AAN, the 6.1 and 6.2 accounts (basic and applied research) are the most relevant. Although practically all the ongoing 6.1 and 6.2 investment has been found to be relevant to a broad definition of AAN, closely coordinated efforts with TRADOC are under way to realign the 6.1 and 6.2 accounts to obtain increased focus on those technologies where progress is most needed to enable AAN concepts of operations.

Several independent assessments of S&T opportunities in support of AAN have also been initiated. Through the National Research Council Board on Army Science and Technology, a study on logistics demand has been initiated to identify those 6.1 and 6.2 efforts that would enable system concepts and greatly reduce logistics demand in the timeframe of AAN.

This summer, the Army will hold a technology seminar game. Unlike other wargames, the focus will be on new and emerging technologies, not operational concepts. Industry and academia will participate in the wargame as full partners with the Army. The seminar results will help the Army and industry identify the future technologies of interest, and focus our research and technology development efforts for the AAN. The Army will also be able to show a direct link between the desired capabilities of AAN and the direction of the Defense industrial base.

To maintain technological superiority—a principal characteristic of military advantage—our S&T Program must continue to develop and harness technology to realize new warfighting capabilities. A sustained investment in S&T is critical to preserving our technological advantage for the 21st century force.

ROBERT M. WALKER

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Professional Publication of the RD&A Community

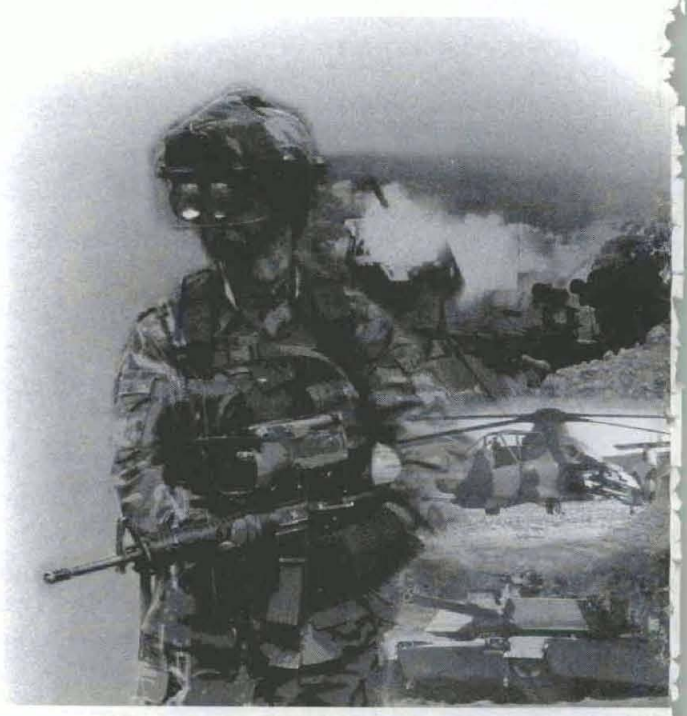
FEATURES

DEPARTMENTS

ABOUT THE COVER

The Army invests $1 billion annually in science and technology (S&T) to advance the warfighter's capabilities. This issue of *Army RD&A* highlights 10 specific S&T projects completed within the past 18 months.

ARMY SCIENCE AND TECHNOLOGY: INVESTING FOR THE FUTURE



By Dr. A. Michael Andrews II and Richard Utano

Background

The U.S. Army invests $1 billion annually in science and technology (S&T) to maintain overmatch capabilities in current systems and provide the foundation for future systems. Because S&T investments in technology occur well before the fielding of the resulting capability, the impact of these S&T efforts (successes and failures) is not always fully recognized. This issue of *Army RD&A* magazine highlights 10 specific projects completed within the last 18 months that now provide or will soon provide essential technology to advance the warfighter's capabilities. These projects are examples of the yearly returns from the broader portfolio of the Army's S&T investments. This introduction provides an overview of the Army's S&T Program, describes the warfighter/S&T partnership, and discusses the management process used to execute the S&T Program.

Budget Activities

The Army's S&T Program is comprised of three budget activities (BAs) that define progressive levels of technical maturity. Basic research (BA 6.1) provides the foundation of military relevant science by advancing our understanding of phenomena (e.g., knowledge and theory of fuel cells processes). Applied research (BA 6.2) focuses this knowledge on specific Army warfighter needs and developing new components and concepts (e.g., man-portable power packs for the individual soldier). Advanced technology development (BA 6.3) demonstrates new capabilities in the field. For example, the Composite Armored Vehicle Project explored advanced materials systems for vehicles and led to the Crusader Program incorporating composites into the turret to reduce weight, as described on page 10.

The Army's portfolio of S&T investments is balanced between essential near-term enhancements and opportunities for future "leap ahead capabilities." Today's investment is allocated among the three S&T BAs in the following percentages: 20 percent for 6.1; 40 percent for 6.2; and 40 percent for 6.3. This balance in the S&T Program provides militarily relevant technology today, maintains our technical overmatch in the near-term, and ensures the Army's lead as the world's most technologically advanced land power.

Aligning Investments With Requirements

The Army has established a process to align S&T investments with the warfighter's requirements. How the S&T Program responds to warfighting needs is defined in the following ways. First, Strategic Research Objectives (SROs) (to be discussed in a future issue of *Army RD&A*) are used in the 6.1 basic research area; second, Science and Technology Objectives (STOs) are used in both 6.2 applied research and 6.3 advanced technology areas. Finally, Advanced Technology Demonstrations (ATDs) and Advanced Concept Technology Demonstrations (ACTDs) are used principally in the 6.3 area.

STOs are expected to achieve a major technical advance and are characterized as having specific technical goals, timelines and costs. ATDs invite the integration of technologies into a demonstration system or subsystem that can be evaluated with soldiers "in the field" in a military environment. ATDs provide an opportunity to "transition" technology into specific systems and deal with the integration issues. ATDs require approved quantitative exit criteria to ensure that program goals have military significance.

ACTDs are the most mature and complex S&T endeavors. ACTDs seek to speed relatively mature advanced technology directly to the joint warfighter using near-term products and combinations of technologies that have already been demonstrated in ATD programs. These ACTDs typically lead to large-scale experiments with operational troops that develop new concepts of operation, evaluate military utility in a realistic environment, and also provide residual operational capability, i.e., fieldable pro-

totypes (described in an article beginning on page 2 of the July-August 1997 issue of *Army RD&A* magazine).

Strategic Planning

The Army Science and Technology Master Plan (ASTMP), published annually in January, describes in detail our strategy, planning process, and current STOs. The ASTMP can be accessed on the Internet at **http://www.sarda.army.mil/frame3.htm**.

Partnering with the warfighter to determine goals and objectives for the Army S&T Program is at the heart of our strategic planning. The Army's laboratories and research, development and engineering centers propose efforts that focus on the warfighter's needs, described as "Future Operational Capabilities" in the U.S. Army Training and Doctrine Command (TRADOC) PAM 525-66. The materiel developer and warfighter/user (represented by TRADOC) review and prioritize proposed STOs annually and forward these new STOs to the Army Science and Technology Working Group for approval, keeping the total at 200. All 200 approved STOs are documented (mapping warfighter requirements to technical milestones) in the ASTMP and represent the S&T communities' commitment to provide advanced technology for specific warfighting needs. The warfighter/user participates in the evaluation of potential technical solutions to field problems and in the prioritization of investments to meet current and future Army needs.

Historically, the S&T community has developed and transferred advanced technology to industry manufacturers to ensure that they can affordably produce the equipment the Army needs. This technology has resulted in smart munitions, advanced night vision equipment, improved rotorcraft, and armored vehicles. The S&T community and combat developers are challenged to maintain our overmatch capability. Specifically, TRADOC's Army After Next (AAN) project, directed at the 2025 timeframe, seeks to define future warfighting concepts and enabling technologies. (Further details on the AAN project can be obtained in the *Annual Report on The Army After Next Project to the Chief of Staff of the Army, July 1997.*) With reduced resources, increasing mission demands, and the speed of technology development, we must make prudent choices to provide sufficient and essential technology today while investing in the foundation for the AAN.

The Army's Science and Technology Program, coupled with the warfighters' needs, is providing advanced technology that enables U.S. Army soldiers to support peacetime operations, deter conflicts, and win decisively—when challenged.

Conclusion

The Army S&T response to this challenge is described in terms of SROs for 6.1 and STOs for 6.2 and 6.3. Some 40 to 50 STOs are completed annually. This article describes 10 completed STOs as a sampling of the diverse, yet focused efforts of the Army S&T community to meet warfighter needs. The STOs presented this year are a culmination of 3 to 5 years of work in most cases and include efforts in long-range sensors, improved munitions accuracy, logistics command and control, and field fortification/protection. We plan to highlight annually in *Army RD&A* magazine 10 completed efforts that represent the breadth, scope, and impact of the S&T Program. Future *Army RD&A* magazine issues will also feature a **Technology Corner** to describe what the S&T community is doing in dual use technology and manufacturing technology, and update specific technology areas. The Army's S&T Program, coupled with the warfighters' needs, is providing advanced technology that enables U.S. Army soldiers to support peacetime operations, deter conflicts, and win decisively—when challenged.

Acknowledgments

The authors acknowledge the following people who helped put this special S&T issue together: the STO project managers who successfully carried out the S&T investment; the staffs from the Army Materiel Command (AMC), the Army Corp of Engineers, and the Office of the Surgeon General, who helped obtain information from the field and put together the majority of the topics; the SARDA-ZT staff for providing helpful comments and inputs; Dennis Schmidt of DAMO-FDT for his perspectives on this introduction; and Cassie Robinette of BRTRC who helped with design and layout.

Note: Additional information on AMC STOs can be found at the following Internet site: **http://www2.brtrc.com/stos**.

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RICHARD UTANO, an electronic engineer in the Night Vision and Electronic Sensors Directorate (NVESD), is currently on assignment as the NVESD Liason in the Office of the Assistant Secretary of the Army (Research, Development and Acquisition). He has an M.S. degree in electrical systems from the University of Florida's Center for Electro-Optics and Lasers and a master's degree in engineering administration from George Washington University. In addition, he holds two patents and is the author of 15 publications and presentations.

Mortar Fire Control System

"MFCS and 120 mm is a winner ... good stuff ... need to declare success and press to the field."

- MG Ernst, CG, U.S. Army Infantry School

"MFCS is very user friendly. The system is great, turns it into a one-man operation. MFCS is totally reliable and is real easy to learn and easy to use. With this system we're saving a lot of time, it's just incredible."

- SGT Baca, Fort Irwin, CA

Objective: The objective of the Mortar Fire Control System (MFCS) is to rapidly and precisely aim the weapon. In addition, it will integrate the fire control with the digital fire support network.

Accomplishments: The MFCS was demonstrated on a High Mobility Multipurpose Wheeled Vehicle (HMMWV)-mounted 120 mm mortar at an early Rapid Force Projection Initiative demonstration. This effort integrated the following components: a Dynamic Reference Unit (DRU) for pointing the weapon (azimuth and elevation), a Precision Lightweight Global Positioning System (GPS) Receiver, and a Lightweight Computer Unit. A dismounted weapon MFCS was also demonstrated, but it used the standard sight as an optical link to the DRU since the DRU was relatively large and designed to be vehicle-mounted. In subsequent experiments, other pointing devices such as the multi-antennae GPS and fiber-optic and ring-laser gyros were demonstrated as weapon-mounted sytems to eliminate the optical link.

Military Significance: There are three highly significant military benefits to the MFCS. First, it reduces the current response time from 8 minutes to 1 minute. Second, the statistical analysis indicates that the improved locating, aiming and digital meteorology reduces the Circular Error Probable for the 120 mm mortar from 230 meters to 60 meters. Third, the system communicates digitally on the fire support network and can be integrated on the tactical Internet.

Transition Opportunity: The MFCS was selected for the Warfighting Rapid Acquisition Program in May 1997, transitioned to Engineering and Manufacturing Development (EMD), and received Milestone II approval in July 1997. An EMD contract with two production options was awarded in August 1997. The first MFCS will be fielded with the First Digitized Division in July 2000.

POC: Andy Wood, (973) 724-5802, U.S. Army Armament Research, Development and Engineering Center.

Laser Igniter For Artillery Munition

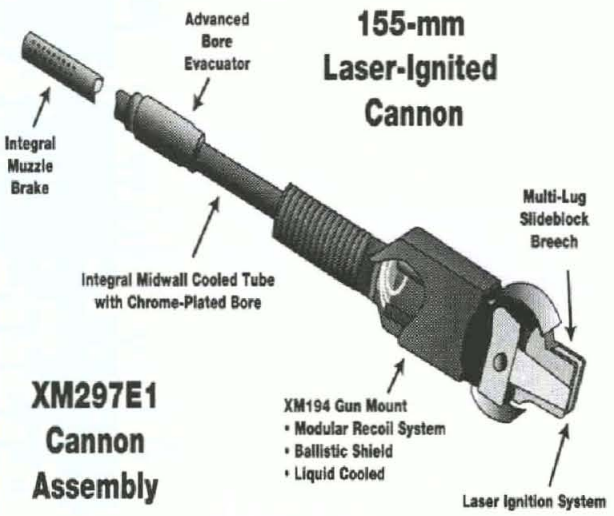
"Laser ignition ... gives the 'King of Battle' a true leap ahead technology. It provides the artillery a reliable, consistent, safe and logistically efficient means of ignition and putting steel on the target."

- COL Cuff, TRADOC System Manager-Cannon, Fort Sill, OK

"... the LIS is a whole lot safer than standing behind the cannon when a top zone charge is fired ... also, since the LIS can increase the rate-of-fire, it would let us 'shoot and scoot' faster during combat."

- SGT Boyles, Field Artillery School, Fort Sill, OK

Objective: Develop a Laser Ignition System (LIS) for large caliber artillery cannons that replaces conventional primers, allows computer control of munitions ignition, and ensures ignition even when the primary charge is far from the breach face.



Accomplishments: A center-core, direct-propellant igniter for artillery charges was developed and test fired in a large caliber cannon. More than 5,000 fielded and developmental propelling charges were fired with the primerless LIS.

Military Significance: Permits higher firing rates (50 percent faster in the light howitzer) while improving safety, reliability and durability. LIS provides full computer control of cannon firing, which eliminates the possibility of accidental firings. The vulnerability of the propelling charge being accidentally ignited from electromagnetic interference is vastly decreased with the removal of the igniter material for electrically primed guns. In addition, the elimination of lead-containing primer also provides environmental benefits.

Transition Opportunity: The LIS has been selected as the main igniter for use in the Crusader XM297 Advanced Solid Propellant Armament System. This technology is also under development for use with the M230 30 mm Automatic Cannon on the Apache helicopter.

POC: Brad Forch, (410) 278-6149, U.S. Army Research Laboratory.

HUNTER SENSOR SUITE

"It's a real force multiplier."
- COL Goodkoep, Brigade Commander for Task Force XXI

"I like the extended long range capability, [it] creates a high degree of confidence in reporting targets."
- SSG Fisher, Scout, Task Force XXI Brigade

Objective: Demonstrate a lightweight, low observable, deployable, and survivable hunter vehicle platform, with an advanced, long-range sensor suite that provides the warfighter a leap-ahead, all-weather, 24-hour target acquisition capability.

Accomplishment: The Hunter Sensor Suite (HSS) advanced technology demonstrator (ATD) integrates a target acquisition suite on an extendible mast assembly remotely operated from inside the vehicle. The HSS combines second generation thermal imaging, daylight TV, eyesafe laser rangefinder, acoustic cueing sensor, embedded aided target recognition (ATR), and image compression/transmission technology. An HSS emulator was used to perform ATR perception tests and quantify specified ATR performance. Image compression software was evaluated for image quality and transmission time. HSS was designed to operate both on-the-move and in a stationary mode.

Military Significance: HSS ATD second generation Forward Looking Infrared technology increases target acquisition ranges by 70 percent over first generation technology. The aided target recognition software reduces operator detection timelines by more than 50 percent over manual search. Advanced integrated command, control, communications, computers and intelligence allows for rapid targeting handoff to the mission commander. In addition, high accuracy positioning systems reduce errors in target location from approximately 500 meters to 30 meters at recognition ranges.

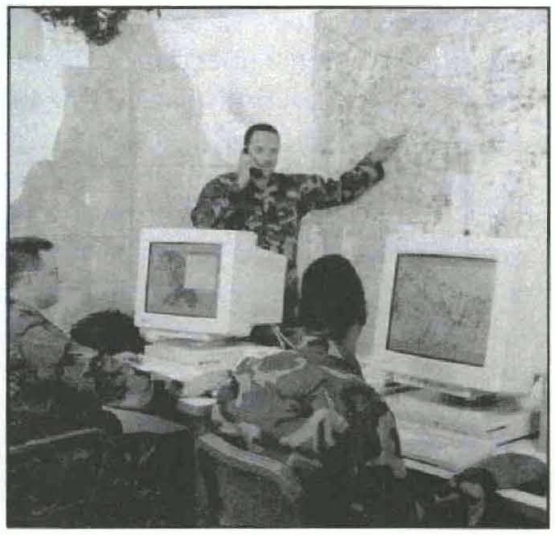
Transition Opportunity: The HSS is a key advanced sensor in the Rapid Force Projection Initiative Advanced Concept Technology Demonstration, which will demonstrate the Hunter/Standoff Killer concept in July 1998. Two sensor suites have been integrated on High Mobility Multipupose Wheeled Vehicles (HMMWVs) and will be left behind with combat units as residuals for a 2-year period for further evaluation and assessment.

POC: Michael P. St. Peter, (703) 704-1231, U.S. Army Communications-Electronics Research, Development and Engineering Center.

TOTAL DISTRIBUTION

"Great logistics tool ... we will use the Log Anchor Desk in our Redeployment Cell."
- MG Wright, CG, 21st TACOM

"This looks like the planning tool that logisticians have been clamoring for years. LAD has great promise."
- MG Smith, DCG, MARLANT



Objective: Provide commanders and logisticians at all levels improved capabilities to plan, analyze, mobilize, deploy, sustain and reconstitute materiel and personnel forces in combat or crisis response situations.

Accomplishments: The Total Distribution (TD) Advanced Technology Demonstration (ATD), in cooperation with the Joint Logistics Advanced Concept Technology Demonstration, deployed 14 secure and 14 unsecured Logistics Anchor Desk (LAD) workstations to demonstrate the latest in information technology in logistics command and control (C2). These workstations (located in CONUS, Bosnia and other European countries) were used to deploy the 1st Armored Division (AD) in support of Operation Joint Endeavor. The LAD workstation software provided enhancements in logistics situational awareness and course of action analyses supporting distribution management, in-transit asset visibility, and logistics automation and communication.

Military Significance: The TD ATD resulted in a $5 million cost savings in deployment of the 1st AD through more efficient use of logistic resources. Through improved logistics situational awareness, multinational forces attained a higher readiness capability to react quickly on a nonlinear battlefield.

Transition Opportunity: The Project Manager for Combat Service Support Command Systems is modifying the current contract to include a knowledge-based Logistics Planning Shell, which combines multiclass requirements generation and distribution planning capabilities; and the Geographic Logistics Awareness Display, which provides map-based situational awareness displays of supply, personnel and infrastructure elements.

POC: Michael Badger, (732) 532-0492, U.S. Army Communications-Electronics Research, Development and Engineering Center.

Enterotoxigenic Escherichia Coli Vaccine

Objective: Develop a vaccine capable of protecting troops against diarrhea caused by the Enterotoxigenic Escherichia coli (ETEC).

Accomplishments: A formalin-killed, whole cell ETEC vaccine was developed and is being manufactured by the Swedish National Biological Laboratory. Trials conducted to date show that it is significantly effective in preventing ETEC diarrhea.

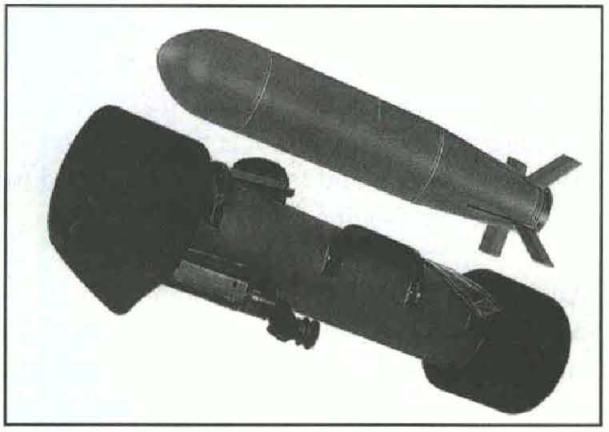
Military Significance: ETEC is the major cause of travelers' diarrhea worldwide. This infection could significantly reduce individual productivity and unit effectiveness during military deployments. An ETEC vaccine would counter the impact of illness, performance degradation, and death to warfighters infected with this agent. Currently, the only way to prevent ETEC infection is through basic field sanitation to protect food and water supplies. This is a difficult task during deployment. The use of a vaccine to prevent ETEC will also reduce the burden on the health services support system.

Transition Opportunity: The formalin-killed whole cell ETEC vaccine was transitioned to Milestone I as planned. This transition allows expanded human trials for more in-depth study of this successful vaccine.

POC: MAJ Edward Clayson, (301) 619-7560, U.S. Army Medical Research and Materiel Command.

Multi-Purpose Individual Munitions

Objective: Demonstrate an affordable, man-portable missile system that is lethal against a variety of targets, can be fired safely from enclosures, and weighs less than 20 pounds.



Accomplishments: This effort integrated the Army's Multi-Purpose Individual Munition (MPIM) warhead onto the U.S. Marine Corps (USMC) Short Range Assault Weapon (SRAW) flight module. The integrated system was successfully flight tested. The MPIM warhead was demonstrated against 8 inches of double-reinforced concrete; 12 inches of solid brick, earth and timber bunkers; and both the current (BMP-3) and future (FBMP02) Russian armored personnel carriers.

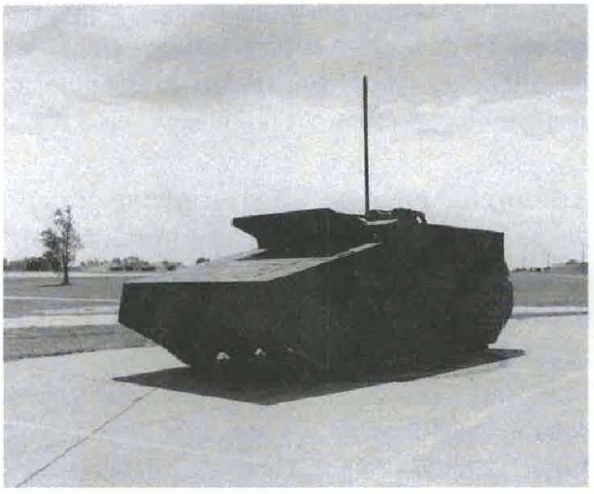
Military Significance: A single man-portable weapon is now capable of defeating a diverse variety of targets in lieu of three different types of weapons. When compared to the currently fielded systems, the MPIM offers an increased engagement range of 500 meters versus 200 meters against concrete, brick and masonry buildings; 350 meters versus 250 meters against lightly armored vehicles; and 200-plus meters versus 150 meters against small earth and timber bunkers. The MPIM improves lethality against masonry Military Operations in Urban Terrain (MOUT) structures by a factor of 3 to 5. The MPIM also increases soldier survivability because it can be fired from small enclosures and from longer engagement ranges.

Transition Opportunity: The MPIM warhead, as integrated onto the USMC SRAW flight module, was transitioned to the Program Executive Office for Tactical Missiles in August 1996. Army fielding of the weapon is planned for FY02.

POC: William Zecher, (205) 842-8769, U.S. Army Missile Research, Development and Engineering Center.

Composite Armored Vehicle

"TRADOC strongly supports the Composite Armored Vehicle demonstration as a key element of our efforts to improve deployability and lighten the force."
- MG Lehowicz, former Deputy Chief of Staff for Combat Developments, U.S. Army Training and Doctrine Command (now CG, U.S. Army Operational Test and Evaluation Command)



Objective: The Composite Armored Vehicle (CAV) Advanced Technology Demonstration (ATD) focused on demonstrating the feasibility of fabricating a combat vehicle made of composite materials to reduce vehicle weight, thereby improving strategic and tactical mobility, and to do so without sacrificing ballistic protection.

Accomplishments: Designs and methods were developed to laminate glass-reinforced polymers and ceramic tiles to create an advanced structure with integral armor. A 22-ton, C-130 transportable, tracked vehicle testbed was built to demonstrate this approach. The weight of the upper hull and skirts for the testbed was reduced by 35 percent compared to an equivalent metallic design. The ballistic armor characteristics and integrity of the design were verified against a variety of threats. The CAV provides a structure that is damage resistant and field repairable with 95 percent of all repairs performed at the unit level.

Military Significance: The composite material has an aerial density 56 percent lighter than comparable aluminum solution and 46 percent less than one using titanium. Structure weight savings of this magnitude in a typical light to medium vehicle equates to an approximate reduction of 17 percent in gross vehicle weight. Relative to weight reductions, CAV technology is applicable to new systems, as well as to component upgrades to fielded systems.

Transition Opportunity: Composite technology developed in the CAV ATD has transitioned to the Crusader Program Manager for the howitzer turret. Turret shell weight has been reduced by 1 ton (922 kg) by replacing the original aluminum baseline with composites. Composites are also under consideration for other Crusader applications as well as for its resupply vehicle.

POC: Jeff Carie, (810) 574-7715, U.S. Army Tank-Automotive Research, Development and Engineering Center.

Field Fortification

"Minimal personnel can construct the Multi-Purpose Bunker to standard without any major problems. We were able to do more with less stress on the soldiers."
- SSG Powers, 864th Engineer Battalion

"For air assault operations, all equipment must be airlifted to the battlefield. The reduced equipment and airlift requirements for the Concertainer system are a plus in our combat capabilities."
- MSG Walker, 326th Engineer Battalion

Objective: Update and develop materials to ensure ballistic and explosive protection for troops and other critical assets.

Accomplishments: A new bunker design (Multi-Purpose Bunker) was developed using curved, corrugated aluminum. This bunker requires less logistical resources than the standard timber bunkers, and can be built by non-engineer troops in one-fourth the time. The bunker provides protection from artillery rounds when covered with the proper amount of soil. In addition to the Multi-Purpose Bunker, a British designed erosion control device called a Concertainer, constructed of geotextile-lined, wire mesh has been adapted for protection of high-value military assets. Expanded from its shipping configuration, a Concertainer forms a wall of linked, self-supporting cells that are filled with earth, snow, rubble or whatever is locally available. A typical Concertainer wall (4.5 feet high by 3.5 feet wide by 32 feet long) is equivalent to approximately 1,500 stacked sandbags, but takes only 20 minutes to deploy and fill using three soldiers and one front-end loader.

Military Significance: These capabilities increase survivability, reduce logistic resources for deployment, and reduce engineer troop and equipment requirements.

Transition Opportunity: The Multi-Purpose Bunker was demonstrated in FY96 and FY97 training exercises conducted by the 326th Engineer Battalion and the 555th Engineer Group. Both engineer units have purchased additional Multi-Purpose Bunkers for future use. U.S. and NATO forces are using Concertainer revetments in Bosnia to protect aviation and other critical materiel assets.

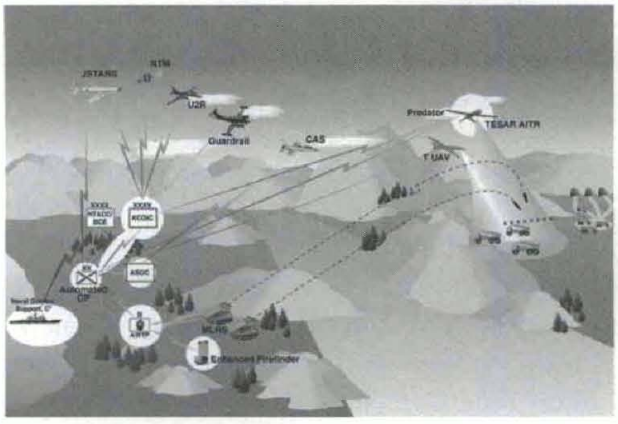
POC: William Huff, (601) 634-2755, U.S. Army Corp of Engineers.

PRECISION/RAPID COUNTER MRL

"The way we need to put technology into the Army for the future is just the way we did it for this Counter MRL ACTD. The soldiers have had a chance to play with it and influence the outcome ... this is all about the user being involved upfront. It's evolutionary ... we've automated an intellectual process with some high speed automation capability.

- MG Franks, CG, 2nd Infantry Division (now LTG and CG, 3d U.S. Army/DCG, U.S Army Forces Command)

Objective: Develop and demonstrate an effective adverse weather, day/night, sensor-to-shooter, precision-deep, strike capability to neutralize threat 240 mm multiple rocket launchers (MRLs) and 170 mm howitzers deployed north of the Korean demilitarized zone.



Accomplishments: For the first time, the Precision/Rapid Counter MRL Advanced Concept Technology Demonstration provided a joint counterfire capability at division echelon. This effort also resulted in the design, integration, and delivery of an automated division command post and supporting nodes with interactive intelligence, fire support, and command and control functions; an advanced suite of automated Intelligence Preparation of the Battlefield tools; and improved access to intelligence products produced by national technical means and theater assets. In addition, this effort demonstrated unmanned aerial vehicle sensor capabilities and an Automated Weapon Target Pairing capability to pass Firefinder Radar-derived fire missions to the most appropriate counterfire system nine times faster than currently possible.

Military Significance: The Counter MRL automation tools enable the 2nd Infantry Division (2ID), U.S. Forces Korea, to have Multiple Launch Rocket System (MLRS) counterfires in the air before the incoming MRL threat rounds impact. For the first time, a common operating picture is available to all elements within the division command posts. Digital connectivity with the Navy and Air Force provides shared situational awareness, enables Naval fire support to be applied to the counterfire battle, and provides highly synchronized Air Force close air support.

Transition Opportunity: The 2ID in Korea has integrated the Counter MRL warfighting enhancements into their training, operations and exercise schedule to include Ulchi Focus Lens 97, Warpath II, Foal Eagle and Warfighter, and these enhancements will remain in place until baseline acquisition systems are fielded beginning in FY00.

POC: CPT Wil Riggins, (703) 704-1527, U.S. Army Joint Precision Strike Demonstration Project Office.

LARGE-AREA NIGHT MAINTENANCE SHELTER

"This technology has great potential for shelters, not only for maintenance but for personnel, command and control, and medical functions."
- LTG Glisson, Defense Logistics Agency

Objective: Develop high-pressure inflatable arch (known as "airbeam") technology by constructing a rapidly deployable, lightweight maintenance shelter.

Accomplishments: Two new techniques to braid and weave kevlar to produce seamless, high-pressure arches (30 to 80 pounds per square inch) have been demonstrated. These airbeams are lighter, less expensive, more reliable, and more durable than traditional low-pressure inflatables. Curvature required for structural frames is obtained by using high-tenacity fibers in a flexible matrix and by controlling fiber orientation. Pressurization pre-tensions the fibers, creating a structure that is rigid under design loads, but deflects without damage when overloaded. The result is a 3-D structure with improved quality and cost effectiveness at reduced weight and cube.

Military Significance: New sophisticated equipment such as composite structures and advanced electronics require rapidly deployable, environmentally controlled shelters for field logistics. Airbeam technology allows these shelters to be set up in two-thirds the time with less manpower than currently fielded aluminum frame shelters. The elimination of solid frames also allows for compact storage and a 50 percent reduction in weight.

Transition Opportunity: Airbeam technology will be transitioned into the Aviation Maintenance Shelter Engineering Development Program that begins in FY99. Also, the technology has been inserted into the production contract for the Chemically and Biologically Protected Shelter, a highly mobile, emergency medical treatment shelter. This technology provides cost savings of 50 percent compared to current inflatable shelter technology.

POC: Jean Hampel, (508) 233-4692, U.S. Army Natick Research, Development and Engineering Center.

DEFENSE CONTRACT MANAGEMENT COMMAND TEAM STREAMLINES BRADLEY CONTRACTING

By MAJ Robert Schumitz

The Defense Contract Management Command is an invaluable resource for program managers engaged in acquisition process efforts ranging from pre-award to contract close-out.

Introduction

The Defense Contract Management Command (DCMC) provides customer-focused contract management services throughout the acquisition life cycle. DCMC performs this mission for the Department of Defense (DOD) from more than 1,000 locations worldwide. Geographically based offices manage contracts covering a broad range of contractors within the geographic area. Other DCMC offices are located in contractor facilities and only manage contracts being performed in that facility.

DCMC is an invaluable resource for program managers. DCMC is engaged throughout the acquisition process; from pre-award to contract close-out. For example, DCMC's early contract administration services (CAS) personnel participate in the development of the acquisition strategy, contract formation, and source selection. After contract award, DCMC's experienced CAS professionals perform contract management functions that include pricing and negotiation, product surveillance, property management, engineering and software support, cost and schedule analysis, program support, quality assurance and contract close-out.

There are 41 Army Command-Designated Position List authorizations in DCMC; 18 at the colonel level, and 23 at the lieutenant colonel level. The DCMC commanders pictured on pages 17-19 are all located at either geographically based offices or contractor facilities. There are 75 such offices in DCMC. All of these offices, led by an Army, Navy, or Air Force commander, provide acquisition managers world class contract management services.

The Army is taking advantage of DCMC's unique knowledge and experience and in doing so has saved the DOD time and money.

Army/DCMC Team's Bradley Success Stories

As a result of teaming relationships brought about by acquisition reform, program offices for the Bradley Fighting Vehicles are proudly reporting a number of success stories. The Bradley Fighting Vehicle System Program Management Office (BFVS PMO), DCMC, the Defense Contract Audit Agency (DCAA), the U.S. Army Tank-automotive and Armaments Command's (TACOM) Procurement Activity, and United Defense Limited Partnership (UDLP) formed strong teaming alliances that have brought significant cost and contract schedule reductions to each program that has used the early CAS integrated product team (IPT) approach to pricing. The most striking story so far, discussed later in this article, involves a reduction of 64,000 hours from the initial proposal estimate.

Early CAS is DCMC's initiative to save time and money for its customer—the DOD. By bringing DCMC into the acquisition process upfront, prior to awarding the contract, customers such as the BFVS PMO and TACOM benefit from DCMC's unique in-plant experience, its vast glob-

ally based network of information about DOD contractors, and its in-depth contract management expertise.

LTC Ted Johnson, Product Manager for the Army's M2A3 Program (Acquisition Category I) said of IPT pricing, "The [IPT] contracting process and its execution by the government/contractor team has facilitated the growth of the M2A3 Program. If we had executed the contract formulation process in the traditional manner, I don't believe we would have a low rate initial production [LRIP] contract award today." Rodney Gelhaus, the procuring contracting officer (PCO) for the M2A3 and M6, echoed Johnson's praise, saying, "I strongly believe the process is well suited for the Bradley Programs and the incorporation of DCMC's on-site expertise in the area of the contractor processes and the manufacturing aspects of building major weapon systems. DCMC's participation in the process upfront has reduced negotiation time and provided for supportable settlements. I also see continued improvements in the process. We are learning, but learning for the better."

The BFVS PMO used IPT pricing for the M2A3 Infantry Fighting Vehicle, the M6 "Linebacker" (a Bradley-based Stinger-equipped air defense system), and the M7 BFIST (a Bradley fire-support vehicle for the field artillery). Each time the IPT process was used, it worked better than the time before, benefiting the contracting process and the system under development.

The involvement of DCMC UDLP throughout the IPT pricing process was instrumental to each of the successes. DCMC UDLP's participation in the BFVS contracting processes was considerably greater than more traditional approaches. In the past, DCMC was asked by the buying command to provide, in general, only technical support to negotiations based on a previously submitted contractor proposal. Now, with IPT pricing, DCMC has input to the request for proposal and the statement of work (SOW). IPT pricing provides "real-time" analysis and feedback on the proposal as the contractor develops it.

The old process was iterative, sequential and extended. It sometimes took a year or longer before contract award. The IPT method, on the other hand, uses an aggressive and proactive teaming approach that involves all parties (buying command, program office, contractor, DCMC and the DCAA) working on the contracting process concurrently, ultimately leading to an accelerated contract award.

Using IPT Pricing

The most critical elements for successful IPT pricing are the willingness of the government and contractor to work together in a teaming environment throughout the contract formulation process (SOW development through contract award); and management support of the team. Teaming is the single largest factor contributing to the success of the IPT pricing process. However, an important distinction needs to be made. Teaming does not mean DCMC relinquishes the responsibility to ensure the government's interests are protected. In fact, DCMC remains the guardian of the government's interests even as DCMC forms working teams with contractors and other parties. Additionally, successful teaming in this environment takes more than just the willingness of the parties to sit down and jointly develop and refine the SOW. It also requires government involvement during development of the contractors' cost estimate. Finally, and perhaps most importantly, it takes management support of the IPT process and the product generated by the team.

A firm foundation for success in IPT pricing is built through empowerment of the team members. For the M2A3 effort, as well as the others, management representatives from each of the participating activities (including the contractor) signed an agreement. (See sidebar below for a copy of the teaming agreement.)

The approach taken on the M2A3 was organized around a small core of individuals from UDLP, DCMC and DCAA. Their responsibilities included reaching agreements, if possible, on all manufacturing aspects associated with the M2A3 production quantities. All results from this core group were funneled to the buying command and to UDLP's management to track program affordability.

The team included three DCMC mem-

Teaming Agreement

DCMC, UDLP, TACOM and DCAA

United Defense Limited Partnership (UDLP), the U.S. Army Tank-automotive and Armaments Command (TACOM), the Defense Contract Management Command (DCMC) UDLP, and the Defense Contract Audit Agency (DCAA) hereby agree to support our mutual customer, the Bradley Fighting Vehicle System Program Management Office (BFVS PMO), by working together in a concerted effort to provide a timely, evaluated cost proposal by July 1997 to facilitate contract definitization by the end of the fourth quarter, 1997, of the U.S. Army requirement for the Bradley M6 Linebacker requirement as described in the Statement of Work (SOW) added to contract DAAE07-96-C-XO36 by Modification POOOO8.

1. UDLP agrees to include DCAA, DCMC and TACOM in the development of cost and technical information as it is formulated for the Bradley Linebacker proposal. DCAA, DCMC UDLP and TACOM agree to participate in efforts sponsored by UDLP in the development of the proposal.

2. DCAA, DCMC UDLP and TACOM agree to analyze cost and supporting data as it is developed in an effort to reach accord with UDLP prior to formal development of the SF 1411 package. DCAA, DCMC UDLP and TACOM agree to include UDLP in their process of reviewing and analyzing recommendations in the areas where there is disagreement with UDLP's estimates/rationale. UDLP agrees to consider recommendations made by DCAA, DCMC UDLP and TACOM.

3. UDLP, DCAA, DCMC UDLP, and TACOM agree to attempt resolution of differences prior to finalization of the SF 1411 provided that agreement on specific issues by DCAA, DCMC UDLP and TACOM shall not be binding upon the government without the prior written consent of the Procuring Contracting Officer (PCO). The PCO agrees to consent to any reasonably documented agreements negotiated by UDLP, DCAA, DCMC UDLP, and TACOM, so long as the agreements are consistent with applicable statutory and regulatory requirements.

4. This agreement may be rescinded at any time by UDLP or the government. This agreement does not alter the contractual rights of the government or UDLP including, without limitation, the government's right to rely upon certified cost or pricing data submitted by UDLP.

DCMC Customer Liaisons

DCMC has customer liaisons at the following Army buying commands. Please contact them if you have any questions or need assistance with DCMC services.

• ***Marya R. Davis***—U.S. Army Tank-automotive and Armaments Command (TACOM), DCMC-LNO Building 231, Warren, MI 48397-5000; (810) 574-7077, DSN 786-7077; FAX (810) 574-7552, DSN 786-7552; e-mail: **davisma@cc.tacom.army.mil**.

• ***Douglas G. Skolski***—Communications and Electronics Command Source Selection/PRAG Branch, Building 1208, ATTN: AMSEL-ACSP-D (D. Skolski), Fort Monmouth, NJ 07703; (908) 532-3929, DSN 992-3929; FAX (908) 532-3046, DSN 992-3046; e-mail: **skolski@doim6.monmouth.army.mil**.

• ***Bruce Whitaker***—U.S. Army Aviation and Missile Command (AMCOM), AMSAM-AC (DCMC-Bruce Whitaker), Redstone Arsenal, AL 35898-5280; (205) 876-0620, DSN 746-0620; FAX (205) 842-2621, DSN 788-2621; e-mail: **bwhitaker@redstone.army.mil**.

bers: the program integrator, the engineer, and the administrative contracting officer. A DCAA representative rounded out the government's core team. UDLP's core team included the production program manager, the senior contracts specialist, and the proposal manager. Subject matter experts from the PMO, the DCMC program support team, and the contractor were included on an as-needed basis.

IPT Pricing Eliminates 64,000 Proposed Hours

The M2A3 IPT effort saved approximately 64,000 hours from initial functional manager estimates to the point of final agreements in all areas. To reach the reduction number, the members of the core team from UDLP, DCMC and DCAA went through every estimate, assumption, and process (even to task levels) to reach a mutual understanding. The 64,000-hour reduction is attributable to estimate reviews, followed by major scope and quantity changes, and subsequent estimate reviews that led to agreement in all areas.

The total process took a little less than 4 months, from mid-November 1996 to the first week of March 1997. During that time, the team remained flexible to scope and quantity changes, as well as holiday leave periods. UDLP's management and the PCO consented to and used the decisions reached by the team, thus reinforcing the empowerment of the process oriented CAS agreement. The award of the M2A3 LRIP contract occurred 2 weeks following the PMO's LRIP go-ahead decision.

IPT Pricing Shortens M6 Contract Award Time

The IPT pricing process was also used with success to negotiate the M6 Linebacker's LRIP contract. From the M2A3 experience to the M6 experience, the core team and the process evolved. The M6 Program benefited from the team's M2A3 experience—resulting in a shorter time to award the contract. Because there were no changes in the team's membership, process understanding time was spent solely on dealing with the unique aspects of the M6 Linebacker. Also, because the team already had a detailed understanding of the award process, its estimate review level could be elevated. The bottom line: the Linebacker yielded a negotiated settlement within 4 months of the inception of the cost estimate proposal process.

M7 Labor Costs Hammered Out Early

The contracting process for the M7 BFIST was built on the successes of the M2A3 and the M6. In addition, the approach to manufacturing labor estimates was negotiated before the usual IPT pricing process began. In the earlier situations, the manufacturing labor estimate came to the core team and was subsequently discussed and modified. However, for the M7 BFIST, the DCMC engineer and UDLP's manufacturing labor estimator sat down in advance of the estimate and agreed on both the estimating methodology and the basis of estimate for manufacturing labor. Following these agreements, the estimate was developed and quickly agreed to by each party.

Ensuring IPT Pricing Success

The ingredients for successful IPT pricing on each of the Bradley directives include:

• *Teaming.* The "we" vs. "they" must be tossed out. The process and product must be viewed as "ours"—joint ownership is crucial to team success.

• *Management Support.* Equally crucial is management support for the process and the team's credibility.

• *Communication.* Open and honest communication in the team environment frequently entails a willingness to understand all positions.

• *Knowledge.* A clear understanding of the requirements of the SOW, regulations, and statutes is necessary.

• *Flexibility.* The team must recognize there will be changes.

• *Dedication.* This contracting process is time-intensive and iterative. In the Bradley case, a small core team (of both contractor and government employees), and other subject matter experts as needed, proved to be a successful approach. In the case of the M2A3, M6 and M7, the core team members from DCMC, DCAA and UDLP-York remained constant.

Summary of IPT Pricing Benefits

The benefits of using the IPT pricing process are shared by all parties. Some of the benefits are:

- Reduced time to award contract
- More consistent approach to issues
- Understanding and agreement that eliminate contingencies from the final proposal and minimize post-award questions
- Flexibility to react to changes prior to contract award
- Reduced contract price
- Reduced contract modifications

Future Bradley Teams

Based on the success of the Bradley Fighting Vehicle IPT Pricing Team, all participants—the Bradley Program Management Office, TACOM, UDLP, DCAA, and DCMC—are looking forward to future teaming efforts. The innovative contracting process saves time and money by using DCMC's subject matter experts from each program support team, opening up and enhancing the lines of communication between the government and contractor. This innovative process also leverages DCMC's knowledge base on contract administrative services, and most importantly, allows all interested parties to provide input into the contract's scope, estimate, and method of execution before the contract is awarded.

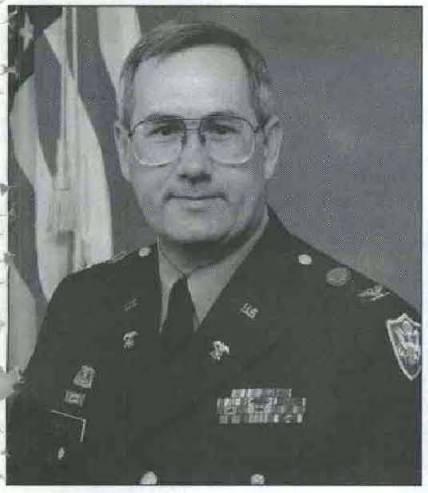
MAJ ROBERT SCHUMITZ, a member of the Army Acquisition Corps, is the Program Integrator for the Bradley Family of Vehicles within DCMC UDLP, York, PA. He holds a B.A. degree from Syracuse University and an M.S. degree in systems acquisition from the Naval Postgraduate School, Monterey, CA.

DEFENSE CONTRACT MANAGEMENT COMMAND ARMY COMMANDERS

The Defense Contract Management Command (DCMC) is headed by BG Timothy Malishenko (U.S. Air Force). Photographs of the DCMC Army commanders are shown below.

BG Timothy Malishenko, *U.S. Air Force, Commander, Defense Contract Management Command.*

DEFENSE CONTRACT MANAGEMENT DISTRICT EAST



COL William MacKinlay, *Commander, Defense Contract Management District East.*

COL Anthony Love, *Commander, DCMC Atlanta, GA.*

COL J. Craig Walsh, *Commander, DCMC Baltimore, MD.*

LTC R. Mark Brown, *Commander, DCMC Clearwater, FL.*

COL Joseph Paddock, *Commander, DCMC Cleveland, OH.*

COL Brian Davenport, *Commander, DCMC Detroit, MI.*

LTC John Merkwan, *Commander, DCMC Indianapolis, IN.*

COL Robert Brown,
Commander, DCMC
Long Island, NY.

COL James Washington,
Commander, DCMC
New York, NY.

COL Alvin Cantrell,
Commander, DCMC
Philadelphia, PA.

COL Peter Kafkalas,
Commander, DCMC
Springfield, NJ.

LTC Michael Padgett,
Commander, DCMC
Syracuse, NY.

LTC Frank Petty,
Commander, DCMC
Boeing Helicopters, PA.

LTC Kim Leach,
Commander, DCMC
General Dynamics Defense Systems Pittsfield, MA.

LTC Alvin Leonard,
Commander, DCMC
General Dynamics Lima, OH.

LTC Kenneth Polczynski,
Commander, DCMC
Lockheed Martin Orlando, FL.

COL Edward Cerutti,
Commander, DCMC
Raytheon, MA.

DEFENSE CONTRACT MANAGEMENT DISTRICT WEST

COL Maurice Petterson,
Commander, DCMC
Chicago, IL.

COL Richard Morris,
Commander, DCMC
Dallas, TX.

COL Greg Cannata,
Commander, DCMC Phoenix, AZ.

COL Sheila Toner,
Commander, DCMC San Francisco, CA.

LTC Kurt Heine,
Commander, DCMC St. Louis, MO.

LTC Gregory Miller,
Commander, DCMC Seattle, WA.

COL James Kortz,
Commander, DCMC Bell Helicopter Textron, TX.

LTC Scott Wilson,
Commander, DCMC Boeing Huntington Beach, CA.

LTC Milton Lewis,
Commander, DCMC Lockheed Martin Vought Systems, TX.

LTC August Mancuso III,
Commander, DCMC Stewart and Stevenson Services, TX.

LTC Paul McQuain,
Commander, DCMC Texas Instruments, TX.

DEFENSE CONTRACT MANAGEMENT DISTRICT INTERNATIONAL

COL David Brown,
Commander, DCMC Americas.

COL Robert Jeska,
Commander, DCMC Pacific.

COL John Jeong,
Commander, DCMC Southern Europe.

THE FORCE XXI DIVISION ARMY WARFIGHTING EXPERIMENT

A Vision Of Future Warfare

By Richard J. Hyde

Introduction

The Army took another step to define its requirements for the future battlefield with the latest in a series of Advanced Warfighting Experiments (AWEs) conducted at Fort Hood, TX, Nov. 5-13, 1997. As a follow-on to the Task Force XXI AWE, the Division AWE (DAWE) explored the concepts and materiel that will shape the future capability of a Force XXI Division. Under the aegis of the U.S. Army's Training and Doctrine Command (TRADOC), the DAWE proved to be a very successful effort to assess emerging technologies and warfighting concepts for assimilation into Army XXI.

Once again, the 4th Infantry Division (4th ID), the Army's Experimental Force (EXFOR) supported the experiment with its units and soldiers. In addition, the III Corps Headquarters participated as the controlling headquarters. During the DAWE, brigade, division and corps Tactical Operations Centers (TOCs) were upgraded with the latest digital computer and communications technology, with the Army Battle Command System (ABCS) being the primary automation system. In all, there were 14 TOCs participating in the command post exercise-like environment. The exercise was driven by the Corps Battle Simulation, Firestorm and other simulations to provide both the friend and foe pictures. The result was a highly realistic environment for the battle staffs inside each of the TOCs.

The Tactical Setting

The tactical setting was provided by the Battle Command Training Program (BCTP) scenario team. The DAWE was set in 2003 on the imaginary continent of Lantica, in the north Atlantic Ocean. Lantica's geography is based on the current western European land mass stretching from France to Poland. Two western Lantican countries, Biscanya and Donaulia, were invading U.S. Allies, Vistulia and Baltonia, to the east. The invaders were trying to gain land and control of mines containing a valuable element, VI-237—a newly discovered fictional mineral expected to make all other fuels obsolete.

The United States, as part of a multina-

Like all experiments,
the Division Advanced Warfighting Experiment
had a formal hypothesis:
If the Force XXI
operational and organizational concept
enables information dominance
and enhanced battle command capabilities,
then increases in lethality,
survivability, sustainability and tempo
will be gained across the force.

tional force, was in Lantica supporting a U.N. resolution aiming to restore Lantica's stability, re-establish pre-2003 national borders, and ensure the free flow of VI-237 to the world.

Like all experiments, the DAWE had a formal hypothesis: If the Force XXI operational and organizational concept enables information dominance and enhanced battle command capabilities, then increases in lethality, survivability, sustainability and tempo will be gained across the force. More specifically, the DAWE served as a mechanism to allow the Army to make decisions in the following areas:

- Force XXI Division organizational structures (i.e., Division force design and Division TOC structures and functions)
- Force XXI Battle Command and Information Operations requirements
- Force XXI Division operational concept
- Force XXI combat service support concept

To collect the data and assess the results of the DAWE, TRADOC used the services of the TRADOC Analysis Center (TRAC), the Battle Command Training Program, and the Army's Operational Test and Evaluation Command (OPTEC). This observation and analysis team observed and critiqued every phase of the exercise. Three after action reports and nightly staff update sessions provided timely feedback to the III Corps participants on their warfighting capability. In a few months, TRADOC will release a detailed analysis on the conduct of the DAWE.

Spiral Development

One of the keys to the success of the AWE process was the spiral development process of materiel that permitted rapid engineering and prototyping of Force XXI systems in preparation for the Task Force XXI and DAWE. Spiral development is an evolutionary approach to development of complex systems, where a solution that is very basic may be initially proposed, and then later releases of software or hardware add new features. The process is composed of four phases:

1. *Planning:* determination of objectives, alternatives and constraints
2. *Risk Analysis:* analysis of alternatives and identification and resolution of risks
3. *Engineering:* development of the "next-level" product
4. *Customer Evaluation:* assessment of the results of engineering

At Fort Hood, spiral development took on additional meaning as the entire doctrine, training, leader development, organizations, materiel, and soldier process was integrated. "When you say spiral development, you're talking more than just hardware and software," said COL Joe Leigh, Director of the Digital Force Coordination Cell at Fort Hood, TX. "You're talking about the development of hardware, software, training, leader development, TTP [tactics, techniques and procedures] development and, to some degree, doctrinal development. That spiral development is very powerful."

The spiral development process meant soldiers from the 4th ID received systems very early in the development cycle and provided feedback to their TRADOC system managers and program managers. This allowed for the type of early insights that industry appreciates in honing a battlefield-ready system. "Spiral development brings all of the parties together, from user to developer to industry," said Peter Hellman, President and Chief of Operations, TRW, one of the contractors involved in the Force XXI programs.

The bottom line for spiral development is that the soldier receives the combat ready system much faster than in previous years. As noted by GEN William Hartzog, Commander, TRADOC, "Rather than go with a linear process of having a concept, building one of something, trying it out, building a few more and all of the different things that you go through with a 7-year or 8-year development cycle, we put all of that into a holistic 2-year process."

Key Successes

The preparation by the 4th ID and III Corps, the materiel development progress achieved using spiral development, the exercise control by BCTP, and the analysis by TRAC and OPTEC resulted in a highly successful AWE for the Army. While the official results will not be released for a few months, the AARs and nightly updates highlighted several key successes for the DAWE.

First, the DAWE offered a tremendous training experience for the 4th ID and III Corps. Program Executive Office, Command, Control and Communications System's Consolidated Technical Support Facility, provided very reliable software and hardware ABCS systems for the exercise. The availability of the systems was well above 90 percent. The National Simulation Center's Simulation Support Modules likewise held up well, offering an immensely realistic training environment. The communications infrastructure, Mobile Subscriber Equipment, Near Term Data Radio, and the Asynchronous Transfer Mode kept data connections open throughout the DAWE. The TOC staffs received 8 great training days during the experiment and, as a result, they learned a great deal about Digitization Doctrine and TTPs.

Second, the simulation demonstrated the radical warfighting advantages of using year 2003 digitization technology and weapons systems. The units were able to maneuver over extended distances with brigades operating almost independent of the division. Through digitization and situation awareness, the EXFOR was able to get inside the enemy's decision cycle and stay there. The Corps and 4th ID demonstrated lethal shaping and decisive operations throughout the expanded battlespace. Sustaining this rapidly moving force was facilitated by the use of anticipatory logistics and information dominance. Advanced sensors such as the Commanche, Apache Longbow, Unmanned Aerial Vehicle and Joint Surveillance Target Attack Radar System provided valuable sensor-to-shooter links for the EXFOR, which they were able to use to great advantage.

Finally, the DAWE provided much useful information for the senior Army leadership to make decisions in a number of areas in the near future. First, the Army must decide issues concerning the future division design, which is smaller but enabled by much information technology. Second, some information from the DAWE will be used to assess the Warfighting Rapid Acquisition Program candidates. In addition, the Army will use the DAWE to assess the implications of fielding new weapons and systems such as Commanche, Crusader and Digitized Command Posts.

Conclusion

The Army has now concluded its most complex and successful AWE. That success was directly attributable to the teamwork and diligence of all the contractors, government civilians, leaders, and the 3,000 soldiers who participated in the preparation and execution of the event. While the Army can take pride in the accomplishment of a successful AWE, it is just another waypoint on the road to the future. As Army Chief of Staff, GEN Dennis Reimer noted in his visit to the DAWE, "What this is about is changing an Army ... from a Cold War status into an Army that is needed in the 21st century, that process of change is Force XXI."

RICHARD J. HYDE is the Quantum Research International Site Manager for the Army Digitization Office at Fort Hood, TX. He is a graduate of the U.S. Military Academy and has an M.A. degree in history from Cornell University. He is also a graduate of the Command and General Staff College.

AN UPDATE ON MODERNIZATION THROUGH SPARES

By Lynn S. Mohler

Author's Note: This is the second article on the "modernization through spares" concept. The first article reported on the initial development phase and appeared in the November-December 1997 issue of ***Army RD&A*** *magazine.*

Introduction

The technology revolution continues to surpass the capabilities of Army systems produced in the 1980s, but designed in the 1970s with 1960s technology. This revolution has created amazing new technology and, as an unintended byproduct, the unavailability of older technology. The net result is increasingly older systems that must be technologically upgraded to meet the demands of the new battlefield. Experience shows that aging systems, without upgraded technology, experience stagnated capabilities, greater failure rates, unobtainable spare parts, and increasing maintenance costs.

The modernization through spares (MTS) concept was introduced Jan. 22, 1996, in a joint memorandum issued by the Assistant Secretary of the Army (Research, Development and Acquisition) (ASARDA) and the Commanding General of the Army Materiel Command (AMC). It stated in part:

> *The Army spends several billions of dollars annually on the procurement of spare parts. In most cases, these procurements are repetitive, build-to-print acquisitions. They result in the replenishment of current part numbers, but with little improvement in the part itself or the higher level assembly or subsystem. ... While the old strategy may have gotten us a good price on a vacuum tube, it is time to begin buying semi-conductor chips with dramatic reductions in life cycle costs and dramatic improvements in performance and reliability.*

Gilbert F. Decker
[former] Assistant Secretary of the Army (RDA)

GEN Leon E. Salomon
[former] Commanding General, AMC

Modernizing its equipment inventory continues to be a top priority for the Army. Given the current low level of Defense spending and the time lag to field a new capability, the Army must seek alternative ways to reduce costs and modernize its equipment fleets. The MTS concept evolved from this environment. The intended outcome of MTS is a reduction in operation and sustainment (O&S) costs made possible by the incorporation of technology available in the commercial marketplace.

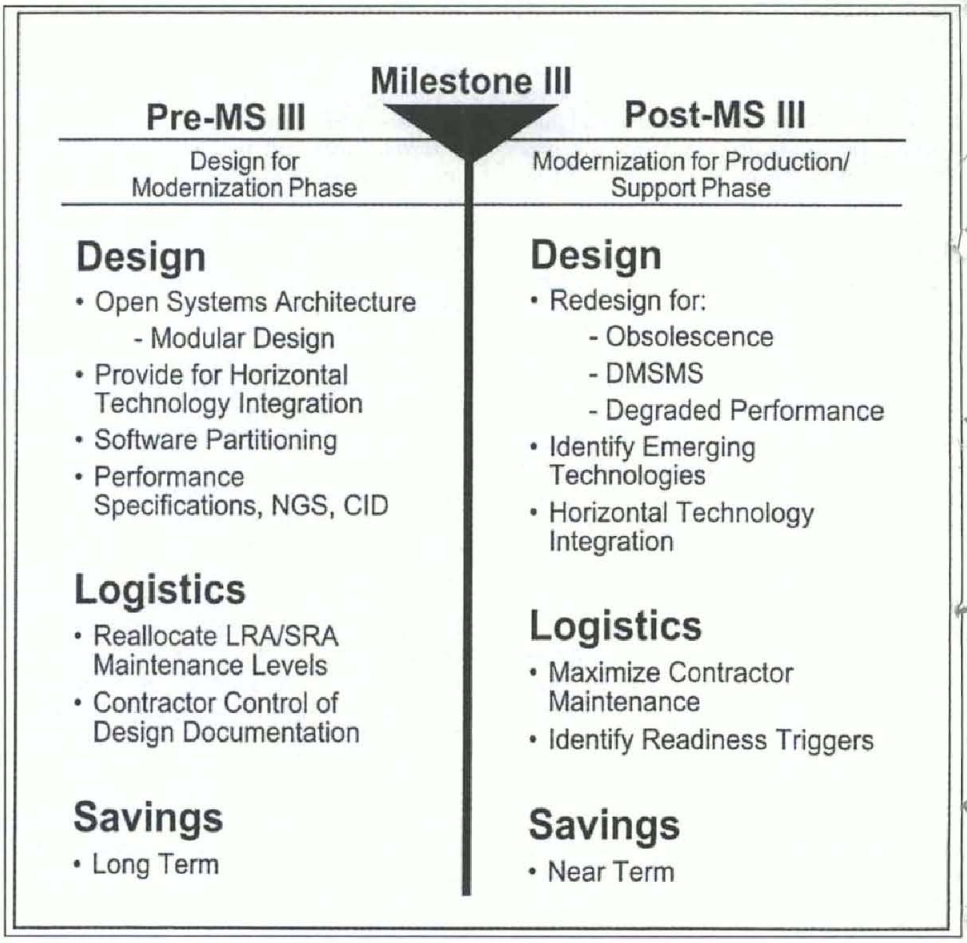


Figure 1.
Milestone III functions.

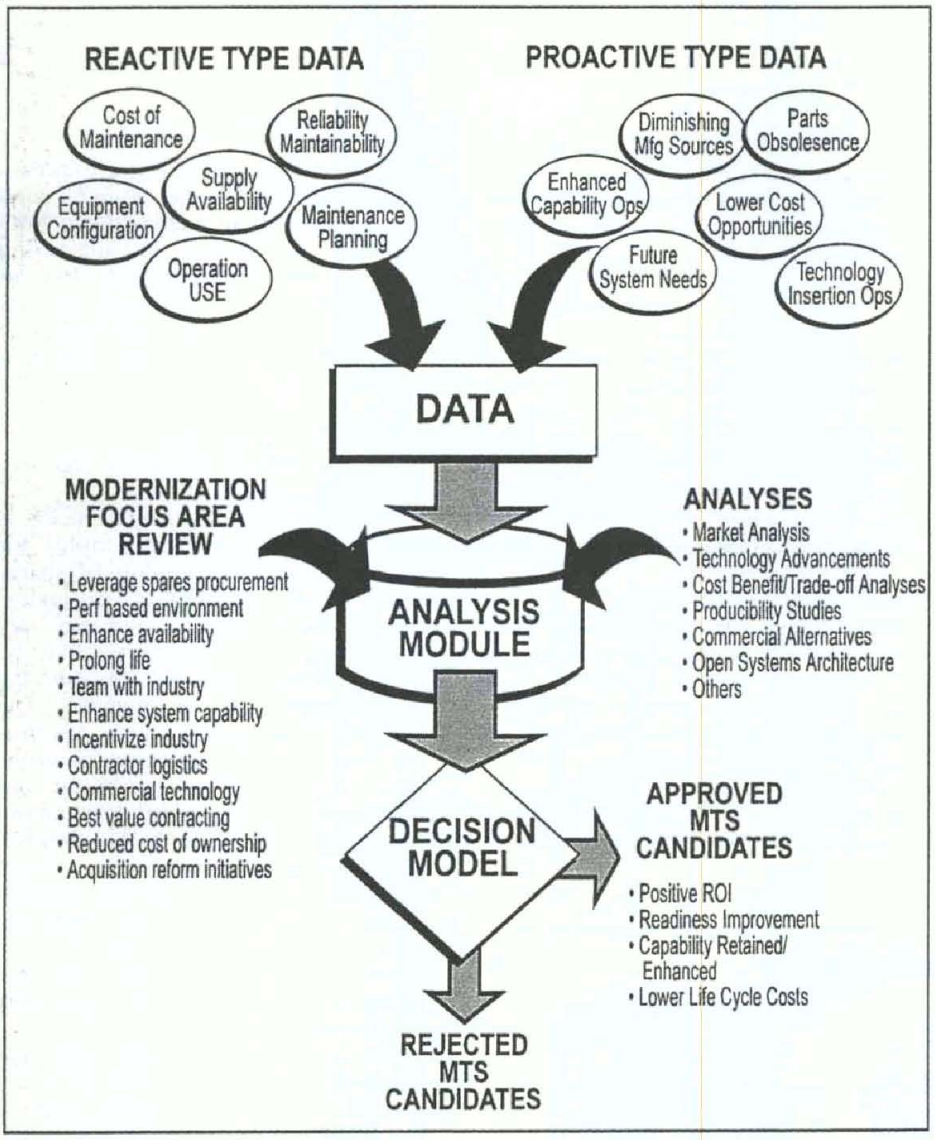


Figure 2.
Candidate selection process.

We must achieve a modern and superior warfighting capability by inserting new technologies into our weapon systems. With the declining budgets, we cannot achieve superiority solely by development and procurement of new weapon systems. We must identify approaches to leverage Operating and Support spares procurements to achieve Army Modernization objectives and we need your help and support.

GEN Johnnie E. Wilson
Commanding General, AMC
June 24, 1997

The MTS concept applies to both developmental systems and legacy systems. Legacy systems, defined as systems that have completed the Milestone III (MS III) decision and are in operational use, are of particular interest. These are the systems that offer the greatest potential for near-term cost savings. Legacy systems have not experienced the MTS approach and, therefore, must establish new program planning objectives. Basic changes in the weapon system may be required. Strong program management leadership with a long-term vision can meet these challenges. The associated risks define each program's potential to achieve the objectives of acquisition reform and MTS.

What Is Modernization Through Spares?

Modernization through spares is a spares acquisition strategy applied throughout the materiel acquisition life cycle to reduce O&S costs. It is based on technology insertion and use of commercial products, processes, and practices to extend a system's useful life.

Goals

Acquisition reform is a response to the changes in the Defense environment of the 1990s. MTS, a subset of acquisition reform, seeks to improve an end item's spares. It is centered on performance-based requirements, in contrast to MIL-SPEC detail design requirements. The emphasis is on form, fit, and function, allowing a supplier greater design and manufacturing flexibility to exploit technology used in the commercial marketplace. This approach intends that system readiness is maintained and life cycle costs are reduced:

We have made impressive gains in reducing acquisition costs through use of efficient business practices, modern technologies and process innovations. Now we must also focus our energies on reducing sustainment costs for our deployed systems. As we have seen in our acquisition programs, disciplined management is required to achieve the benefits of integration.

Gilbert F. Decker
[former] Assistant Secretary of the Army (RDA)
April 29, 1997

While O&S cost reduction is the primary goal of MTS (O&S accounts for at least 60 percent of a system's life cycle costs), additional benefits include upgraded component characteristics, new technology that significantly improves reliability, and merging the military and commercial industrial bases.

Implementing The MTS Concept

Implementing MTS brings into focus the importance of its role in life cycle management. Currently, the overall management of spares acquisition efforts is assigned to the national inventory control points (NCPs). NCPs are the AMC major subordinate command offices responsible for purchasing and controlling spare parts. Implementation of MTS requires that this approach to logistics be integrated with engineering, contracting, and cost analysis through an integrated product team (IPT) under leadership of the program manager (PM) or item manager and their commander.

The MTS contribution to modernization applies before and after MS III as shown in Figure 1, although the procedure varies. The development phases establish the basis on which the MTS strategy

will be implemented. The MTS objective during the pre-MS III phase of the materiel life cycle is to ensure developmental programs can continuously update the technology in spares throughout the system's useful life. Every developmental program needs a strategy for how spares modernization will be achieved when the spares are procured during the production and sustainment phase of the system's life cycle. Thus, in the pre-MS III phases, the major focus is on "designing for modernization." Design consideration such as open systems architecture, modular replacement, and software partitioning contribute to modernization by reducing costs to incorporate design changes.

Near-term cost savings can be achieved by focusing on the post-MS III modernization for the production and sustainment phase. The following steps ensure spares acquisition contracts enable the continuous updating of technology:

- Update spares currently being acquired with modern technology where the cost benefit is the greatest;
- Leverage spares procurement dollars to update technology within current funding levels; and
- Capture savings in spares acquisition and support costs for reinvestment in additional modernization.

Throughout the process, emphasis is placed on use of performance specifications to enhance the design baseline. Manufacturing and management changes, such as contractor configuration control, contractor logistics support, contracts consolidation, and the use of long-term contracts, may also be considered.

Candidate Selection

The candidate selection process (Figure 2) is intended to identify the weapon system spares that currently or in the future will limit operational capability. Conventional management of deployed systems is reactive in nature, that is, analysis tends to rely on failure reports, high-cost spares and usage-rate data. A proactive or predictive approach must be included in candidate selection and consists of an analysis of the changing commercial environment, such as the identification of the loss of manufacturing sources. The analysis should look at spares at the piece parts and component level and, when cost effective, aggregate to higher levels of assembly, as shown in Figure 3.

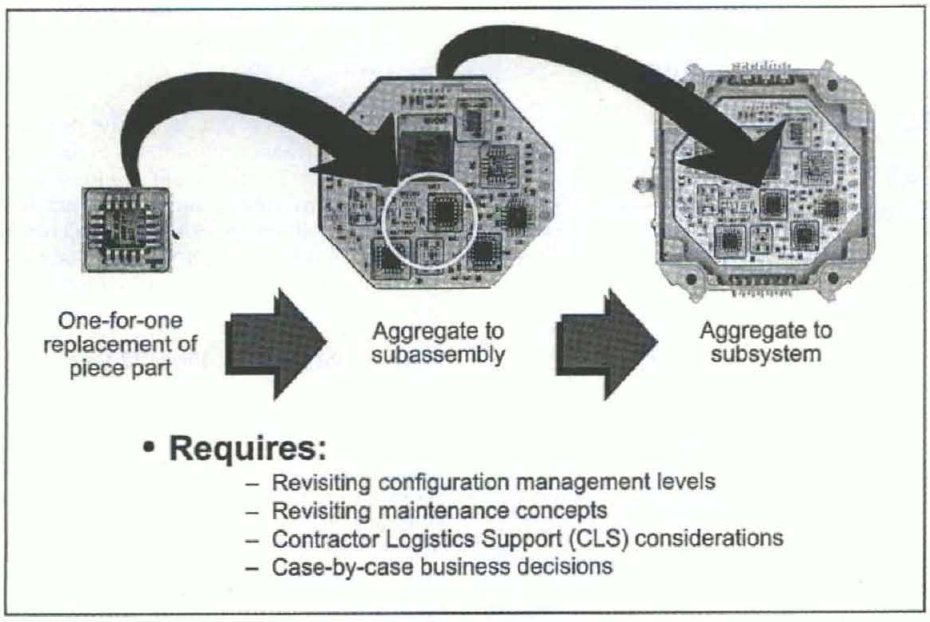


Figure 3.
MTS continuum.

The MTS Strategy

The MTS strategy consists of four key elements (see Figure 4):

- *Integrated Product Team.* The IPT is the key program team responsible for implementing modernization of spares within their respective programs. Although an IPT organization may vary among programs, it is expected that the existing program IPT will provide the required implementation capability. The team will acquire and evaluate information obtained from numerous sources. These "inputs" provide technical and management data for IPT evaluation. The product of the IPT's deliberation will vary by program phase ranging from acquisition planning to field deployment.
- *Inputs to the IPT.* After candidate items have been selected, the IPT must employ several analyses to determine feasibility, cost effectiveness, and practicality of modernization.
- *Key acquisition functions that support the IPT.* The key functions are representative of the essential acquisition guidance policies to be considered when implementing MTS. They operate as a set of guidelines tailored to each program's needs. When integrated, they provide the basis for effective program management.
- *Outputs that reflect results of MTS implementation.* For each acquisition phase, the products of the MTS strategy become an integral part of program execution.

Related Efforts

Other programs, such as Value Engineering and Cost As an Independent Variable, support and contribute to the intent of the MTS concept.

Funding MTS

There are funding sources that could be used to support engineering efforts to update spares procurement technical data packages. These include Engineering Change Proposals, Value Engineering, Supply Maintenance Account-Operating, and Support Cost Reduction.

Another MTS strategy is to include engineering and documentation as part of the contract requirements, and thus the cost to prepare the performance-based docu-

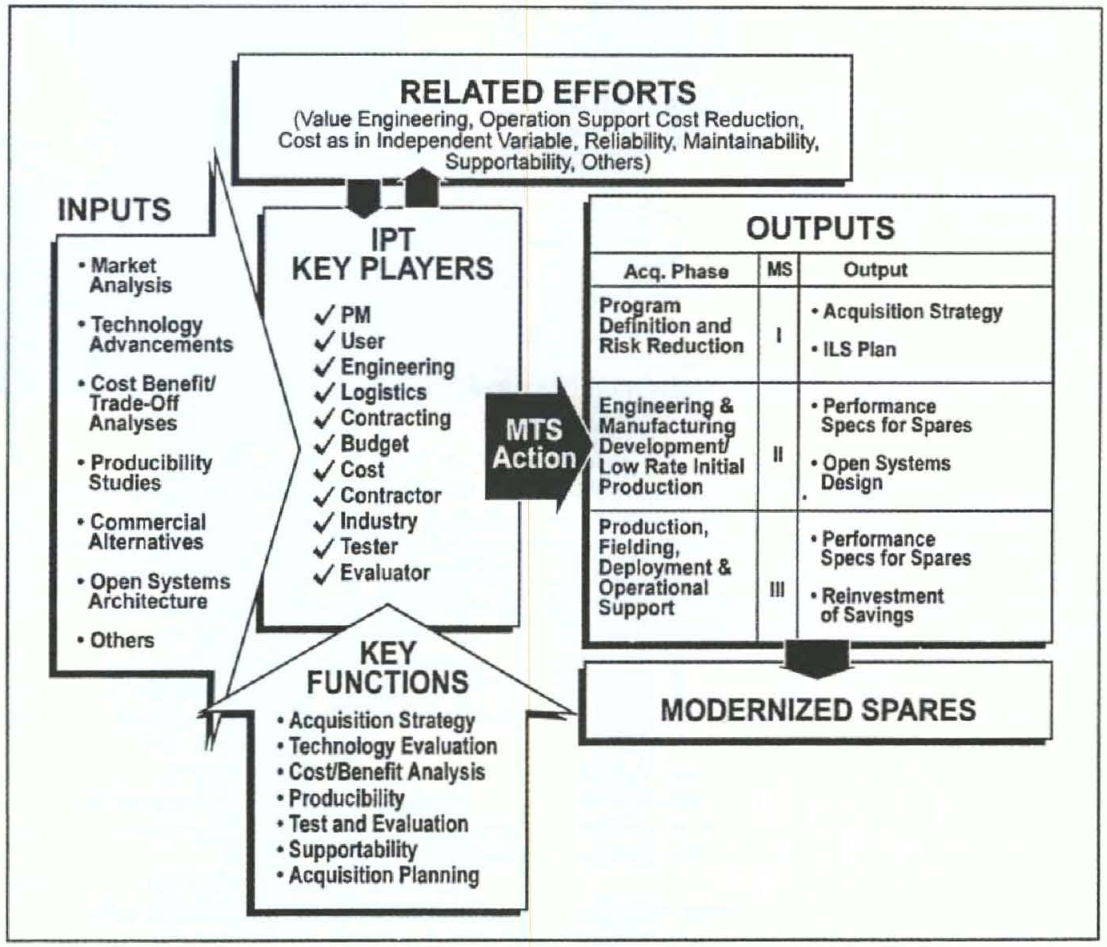


Figure 4.
MTS strategy: acquisition life cycle.

mentation would be included in the purchase price of the spares. This upfront investment would be paid off as a cost avoidance in the immediate procurement or, in subsequent procurements, with better technology, lower cost, and reduced delivery time. The customer would receive the benefit of lower cost spares after one-time costs were recovered. Alternatively, the spares supplier might absorb the cost of performance-based documentation in exchange for a longer term contract.

In addition, various forms of contractor logistic support, such as fleet management, will also be subject to the application of MTS. In this case, one-time costs could be initially borne and then recovered by the contractor.

As MTS implementation begins, many problematic funding issues will become apparent. Successful application of MTS will depend on the skill and knowledge of the IPT to solve the issues associated with the specific systems.

Conclusion

A key element of force modernization is a top-down emphasis on O&S cost reduction. The Army has evolved the MTS concept to assist in this effort. Project managers, system managers and item managers are challenged to implement MTS. Additional information about the MTS concept, strategy and implementation is available on the AMC Specifications and Standards home page at **http://amc.citi.net/amc/rda/milspec.** MTS information can be accessed by selecting the MTS site on the menu.

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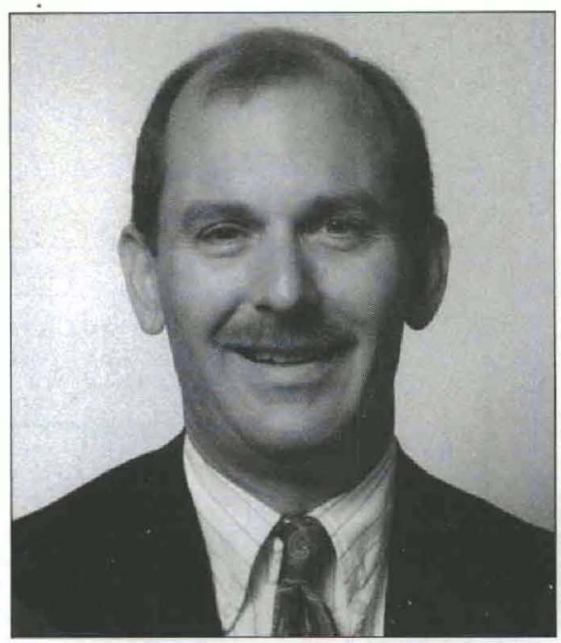
From Industry . . .

LEADERSHIP IN THE AGE OF ACQUISITION REFORM

By Steve Anderson
Northrop Grumman Corporation



Steve Anderson

There are a couple of thoughts driving this article. One is that streamlining the acquisition process is beginning to work. The evidence is starting to mount that designing systems and running programs with government/industry teams provides the best value for the soldier as well as the taxpayer. Our own experience here at Northrop Grumman includes a very successful effort to develop a multiyear procurement program for the Longbow Fire Control Radar with our Army and joint venture partners.

My second thought is how far we have yet to go to realize the full potential of acquisition streamlining initiatives. Our working level folks—our contracts representatives, controllers, engineers, and logisticians—have a working experience based predominantly on the traditional acquisition system. We are asking them to conduct themselves on integrated product teams (IPTs) in ways that often are counterintuitive to their experience and training.

To illustrate my concern, let's take a look at a few of the behaviors expected of IPTs according to AMC Pamphlet 70-27 (U.S. Army Materiel Command, *Guidance for Integrated Product and Process Management,* Vols. 1-3, March 15, 1996):

- Team membership: Members take a strategic view of the activity. The entire enterprise is represented. The team is cohesive and takes a holistic approach to the design activity.
- Team leadership: There is a natural emergence of leadership. Leadership is temporary and based on the most knowledgeable/capable leader for the task at hand.
- Team member contributions: People work together as a well-oiled machine; competent not just individually, but collectively.
- Business relationships: The relationship between internal and external business partners is understood and people are accepted as peers.
- Responsibility: The team is empowered to implement its decisions. Motivation and rewards come to the team as a group rather than as individuals.

These examples of IPT ideals paint a picture of decentralization, delegation, of a relinquishing of control by senior management. Within the team itself, powerful differences in perspective (if not out and out hostility and mistrust) must be overcome to produce a cohesive team in hot pursuit of a commonly held objective. These differences are especially hard to overcome when the process threatens to diminish or eliminate government and industry efforts to oversee and control a program.

Given this dramatic change, it seems that we have charged our people with achieving these ideals, but have done little to modify our own behaviors or to put in place the policies and incentives to facilitate the success of these ideals. Put another way, we desire a different outcome from our system, yet remain unwilling to change the way the system operates.

Our reticence, though, is understandable. IPTs strike at the heart of a value system that has sustained America since the Industrial Revolution. Specifically, the IPT concept challenges the following:

- That an individual should be rewarded or punished based on his or her individual contribution to the enterprise.
- That my job as a manager is fundamentally one of control. I believe that I can be personally responsible for the results achieved by my subordinates.
- That the level of one's skill at one's task discipline (finance, engineering, contracts, etc.) will determine the value of one's contribution to the enterprise.

These values work in opposition to the values embodied in the IPT concept. It is possible (in fact, common) to have individuals serving on IPTs who perceive their personal interests and those of the IPT to be in conflict; senior managers who are reluctant to empower the IPT within specific boundaries and to trust its decisions within those boundaries; for the IPT to be so concerned with the tasks it must accomplish that it fails to take the time to develop the interpersonal skills to facilitate effective task accomplishment.

It is perhaps evident by now that I believe that Integrated Product and Process Management/Integrated Product and Process Development (IPPM/IPPD) in its highest form demands a fundamental paradigm shift by the entire enterprise to be realized. As managers, we need to begin to see ourselves less as directors and controllers and more as facilitators and coaches. We need to embody the principles of IPPM in our own day-to-day management practices. Here are a few examples of what I mean:

- Our steering committees must charter our IPTs with clear tasks, tools, and authority. This means that government and industry executives must determine the extent, limitations, and checks on the IPT's activities prior to the formation of the IPT. We must also provide appropriate personnel and training.
- The team is king: Individual performance must become subordinate to that of the team when determining how to distribute incen-

tives. Ideally, individual performance appraisals would disappear completely.

• The team should have a big say in how it distributes rewards among its members. I should care a lot more about whether my teammates think I'm pulling my weight than whether senior management sees me as a rising star.

• We should be reluctant to arbitrate disagreements among members of the IPT. By interfering we tend to compromise the IPT's principle purpose—to find solutions that represent the best accommodation of all the concerns of the enterprise.

• We should, however, provide as much assistance in facilitating and managing the IPT process as the team needs to achieve its objectives. The need for outside facilitation will decrease as our people become used to working on IPTs and/or as our IPTs mature.

• We should review our management and leadership training within our organizations. Is the level of emphasis on interpersonal skills, team building, communications, and conflict resolution consistent with the importance of teamwork to the future of the enterprise?

The good news is, when the stakes are high, we seem to be able to get it mostly right and achieve some excellent results. In the case of the Longbow Fire Control Radar, government/industry IPTs representing the Longbow Project Management Office (PMO); the U.S. Army Aviation and Troop Command (ATCOM) (now combined with the Army Missile Command in Huntsville, AL); the Defense Contract Management Command (DCMC); the Defense Contract Audit Agency (DCAA); Northrop Grumman; and Lockheed Martin formulated, produced, and signed a 5-year contract in about 6 months. Our team produced a model contract instead of a request for proposal. The statement of work was seven pages. Configuration control of the system was placed with the contractor. In return, the contractor warranted operational performance—not just that the system would meet specifications. There's more. The delivery schedule was combined with that of the program for the UK Longbow to allow economical purchase of parts and efficient use of the assembly line. All spares and repairs were included in the contract. Data were reduced to the minimum necessary to run the program. There are no formal submittals. In the event that further unit cost savings are realized as the result of international sales or contractor initiatives, the government and the contractor share those savings. Also, the government agreed to make performance-based payments to the contractor, which allowed the contractor to reduce his investment, lower his price, and adjust his material and labor commitments to match the program to the funding profile.

What Went Well

• Program definition, pricing, and fact finding were conducted in parallel. The inevitable conflicts between these functional areas were dealt with on the spot by the team members themselves. The government had complete insight into cost and labor rationale, having helped develop it in the first place.

• An executive IPT (steering committee) was established to deal with cases where corporate or agency policy needed to be waived or modified. It was essential to the process that this committee had met and chartered the IPT prior to any need to convene to deal with problems or rough spots in the process.

• IPT members were trained in the IPT process and the principles of acquisition streamlining via the Total Army Roadshow V. (The Total Army Roadshow V was a 4-day training seminar delivered by HQ AMC, which involved all prospective members of the Longbow Multiyear IPT from government and industry.) The training step must never be skipped.

• Oversight of the team was reduced.

• Decisionmakers were represented. By and large the decisions of the IPT were unchallenged.

What Needs Improvement

• Government members of the IPT were constrained in ways that were not clear to the industry members. In particular, the government's ability to modify budgets and funding sources was different from that of the contractor. Government members remained constrained by limits of authority, which often required outside approvals for decisions within the IPT charter.

• Roles and authority levels were sometimes unclear among the members. It proved a difficult transition for IPT members whose traditional role was one of oversight and review. It is a different matter entirely to develop a solution than to check compliance.

• Management could have gone further in delegating authority to the IPT. Some members did not feel empowered to act decisively in their area.

• Some elements of the plan required corporate approvals above the level of the executive IPT. Thus, the empowerment of the IPPM/IPPD process was imperfect, necessitating time-consuming advise and consent activity at senior levels.

Conclusion

There are clear messages for managers in the Longbow experience. The first is to remember what an IPT is and why we form one. An IPT represents management philosophy that systematically employs a teaming of functional disciplines. This philosophy empowers the resulting team to integrate and apply concurrently all necessary processes to design and produce an effective and efficient product or service. Without the responsibility and authority to act, there is only a committee, not an IPT.

An IPT is more dependent for its success on the collective process skills of its members than on their individual functional skills. In the formative stages of an IPT, people issues dominate. It is much easier to establish effective group norms initially than to try to force a change later. High performance team characteristics are easiest to achieve if made a part of team norms from the outset.

Inadequate team training is a common trap cited in AMC Pamphlet 70-27. We must remember that we are asking people to use a special skill with which they are probably unfamiliar. Intensive training is a must upfront. Expert facilitation should be available to the team when needed, but particularly during the formative phase.

We must get the right people on the teams from the outset. IPTs are decision-making bodies. They should not have to keep "checking with the boss."

For senior leadership, IPPM/IPPD is a process of relinquishing our illusions of control. IPTs depend on empowerment to be effective. Our people must be able to make decisions that hold up. Our organizational "agendas," whatever they are, must be on the table for the IPT to develop solutions that best meet the needs of all parties involved. The extent to which we withhold information or authority proportionally weakens the quality of the IPT product.

IPPM/IPPD is a powerful management philosophy. Even partial success in implementing its principles can achieve substantial rewards. The Longbow multiyear process, though less than perfect, achieved outstanding results that are a model for acquisition streamlining. As we gain experience and confidence in the process throughout our organizations, we can look forward to better productivity, more efficient use of taxpayer dollars, and better equipment and services for our soldiers. The best is yet to come.

STEVE ANDERSON is the Deputy Director for Business Development on the Longbow Joint Venture at Northrop Grumman. He holds an M.S. degree in applied behavioral science from Johns Hopkins University.

ASSESSMENT OF THE ARMY MATERIEL COMMAND'S ACQUISITION REFORM EFFORTS

By Lamar W. Hickman, Janice L. McKenzie and Nannette M. Ramsey

Introduction

Acquisition reform (AR) initiatives have been pursued for years by various branches of the Department of Defense (DOD) to achieve improved performance, cost savings, and faster acquisition of supplies and services. The Army declared success in implementing AR for Acquisition Category (ACAT) I/II systems after completing intensive Request for Proposal (RFP) scrubs. ACAT I/II systems are the high-dollar, major systems acquisitions within the Services. Although the ACAT I/II AR efforts were declared a success, there was a question as to how well the Army was implementing AR on ACAT III/IV programs, those involving spares, rebuys, and services acquisitions. The Army Materiel Command (AMC) Principal Deputy for Acquisition, Dale Adams, chartered an Integrated Product Team (IPT) titled the Acquisition Reform Implementation Assessment Team (ARIAT) to check the progress of these programs. The ARIAT included representatives from the Department of the Army Headquarters (DA), AMC Headquarters, the Army Materiel Systems Analysis Activity (AMSAA), and AMC's major subordinate commands. The ARIAT also included a DOD staff member and a representative from the Defense Logistics Activity. The ARIAT members are shown in Figure 1.

Assessment Methodology

The ARIAT developed its own assessment methodology and scheduled on-site assessment visits to various AMC acquisition activities. Figure 2 shows the specific management practices and tools and techniques assessed by the ARIAT. Since the purpose of AR initiatives is to achieve cost efficiency, cost savings and avoidance, and schedule compression and improved performance (cheaper, quicker, and better), the ARIAT focused on those functional elements that would produce positive results in these areas.

Three approaches were used to conduct the analysis. First, the ARIAT scrubbed 10 RFPs that were prepared at the command where the assessment was conducted. Second, five of the IPTs that developed the RFPs were interviewed about all aspects of their efforts and the interaction

Acquisition Reform Implementation Assessment Team Members

Gary Tull	AMC HQ, Assistant DCS(RDA), ARIAT Leader
Gennaro (Jerry) Aveta	AMC HQ, Office of the DCS(RDA), Team Chief
Janice McKenzie	AMC HQ, Office of the DCS(RDA)
Lamar Hickman	AMC HQ, Office of the DCS(RDA)
Jack Millett	AMC HQ, Office of the DCS(RDA)
Lucille Davis	AMC HQ, Office of the DCS(RDA)
Lynn Mohler	AMC HQ, Office of the DCS(RDA)
Darryl Blackburn	U.S. Army Armament and Chemical Acquisition and Logistics Activity
Jim Brannon	U.S. Army Aviation and Missile Command
Jack Holman	Defense Logistics Activity
Tony Infanti	U.S. Army Communications-Electronics Command
Tom Mazza	U.S. Army Simulation, Training and Instrumentation Command
Dan O'Day	U.S. Army Tank-automotive and Armaments Command
Nan Ramsey	U.S. Army Industrial Engineering Activity
Bob Tiedeman	U.S. Army Communications-Electronics Command
Becky Ulman	U.S. Army Aviation and Missile Command
Max Westmoreland	Office of the Assistant Secretary of the Army (RDA)
Trudie Williams	Office of the Secretary of Defense
Alex Wong	U.S. Army Materiel Systems Analysis Activity

Figure 1.

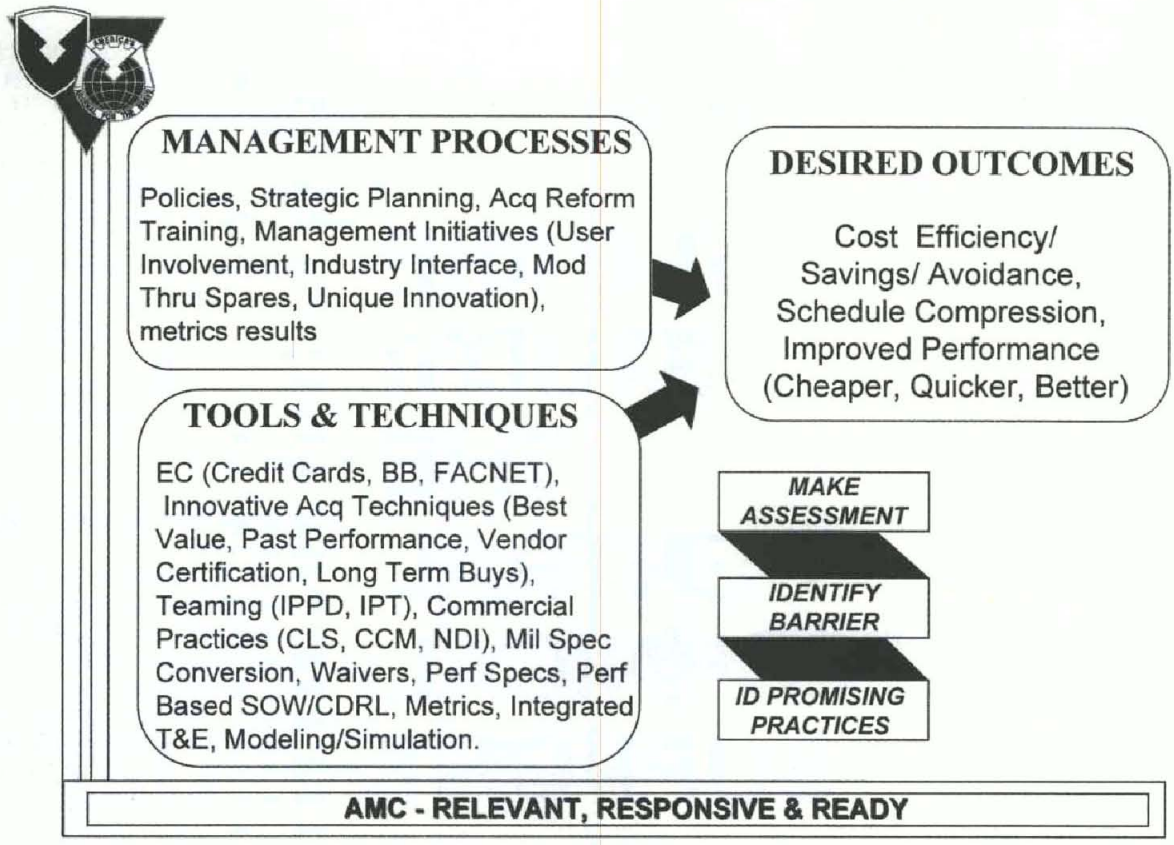


Figure 2.
Acquisition Reform Implementation Assessment Team site visit strategy.

of all elements at the command. Third, managers were interviewed and command policies clarified.

In addition to reviewing current practices, the ARIAT asked the IPTs about real or perceived barriers to AR, and ideas for possible solutions or "work-a-rounds" were shared with the command. Promising practices were also identified, and ARIAT members used the lessons learned from the site visits to further the AR initiatives at their own commands. The ARIAT also used the opportunity to encourage the buying activities to continue to "team" and pursue innovative acquisition practices.

Assessment Ratings

When an ARIAT assessment is concluded, the results are provided to the assessed activity's commander and/or director to act on if necessary. The ARIAT ratings are non-threatening and fall under three categories: "Needs Emphasis," "Good Start," and "Working Well."

Results

The initial baseline assessment of AMC was completed in June 1997. Based on the assessment of 12 sites and 14 functional elements at each site, AMC received an overall rating of "Good Start."

Conclusion

AMC has made real progress in implementing AR, but more progress is needed. The ARIAT encouraged AMC activities to challenge traditional thinking and aggressively pursue the dividends of AR. Key areas that each activity should focus on were identified. In addition, areas which AMC as a whole should focus on were identified so that specific training and additional emphasis can be rendered. The ARIAT final report is on the Internet at: **http://amc.citi.net/amc/rda/rda-ap/abcall.html.** The ARIAT began its reassessment in November 1997 to benchmark AMC's progress and ensure that AR objectives are accomplished. By teaming with other organizations, AMC will continue to make progress in its commitment to acquisition reform.

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Institutionalizing The Good Idea . . .

A CASE STUDY: THE CENTRAL TECHNICAL SUPPORT FACILITY

By BG Steven Boutelle and Alfred Grasso

Introduction

All too often a good idea is generated and not fully realized for a variety of not so good reasons. This article uses a case study to emphasize the need to break through barriers and bring good ideas to fruition in an executable fashion. In this case study, the Central Technical Support Facility (CTSF) established at Fort Hood, TX, in support of Task Force (TF) XXI will be used to highlight the potential value of visionary thinking and leadership, in practice. This article introduces the CTSF in context and breaks down the CTSF into those critical components that make it a model for systems development, collective training, and a really good idea. A roadmap to institutionalize this specific success is offered.

Task Force XXI Background

In February 1995, the Chief of Staff of the Army (CSA) established the Force XXI Campaign to focus the Army's direction on the 21st century. The overall objective of the Force XXI Campaign is to direct modernization efforts on the most promising technologies and resulting doctrine, tactics, techniques, and procedures that have the greatest potential for enhancing force capabilities. The Force XXI process involves three separate but complementary thrusts: the redesign of the Tactical Army or Joint Venture; the redesign of the Institutional Army; and the integration of information-age technology into the Force. These thrust areas fully support the pillars of Joint Vision 2010: dominant maneuver, precision engagement, full dimensional protection, and focused logistics. The Army is conducting a series of Advanced Warfighting Experiments (AWEs) to test warfighting concepts and the material that enables it to assess progress toward satisfying Joint Vision 2010 thrusts and Force XXI missions.

The TF XXI AWE was one in a series of AWEs designed to lead to a digitized division and corps. The TF XXI AWE consisted of a series of live field exercises and constructive simulations conducted by a digitized tailored brigade task force between June 1, 1996, and March 30, 1997. The TF XXI central hypothesis, developed by the Training and Doctrine Command (TRADOC), was that if information-age battle command capabilities and connectivity exist across all battlefield operating system functions in a brigade task force, then increases in lethality, survivability, and tempo will be achieved.

Central Technical Support Facility

The CTSF mission is to act as an enabler for rapid integration of dissimilar software and hardware systems through real time interaction with soldiers, contractors, testers, program managers, and the requirements community. The primary functions of the CTSF are to evaluate software releases for interoperability and perform software problem replication and resolution; to maintain configuration management for the exercise; provide on-site training; and perform digital tactics, techniques, and procedures and battle drill development with soldiers.

For TF XXI, the goal of the CTSF was to produce a validated software baseline for soldier training and field deployment. The software baseline was established by integrating and testing enhanced, fielded systems, prototypes, and new technologies. "It's where we come to integrate systems, to test, to make sure the solutions work together, and then we get feedback on how to fine tune it to make it better," said LTG Campbell.

The CTSF has been widely recognized as a success story. General Reimer, CSA, says, "This is a real success story because we cut off years, in terms of cycle-time, to identify requirements and field the right piece of equipment. This is executing acquisition reform, not just talking about it. The key was the team concept which we put together involving Combat Developers, Materiel Developers, Testers, and Users. That's a winner, and we will grow that to be all it can be in the Force XXI process." General Hartzog, Training and Doctrine Commander and Head of Force XXI said, "[I have] ... never been more proud to be associated with any group anywhere. You are the Gatekeepers for

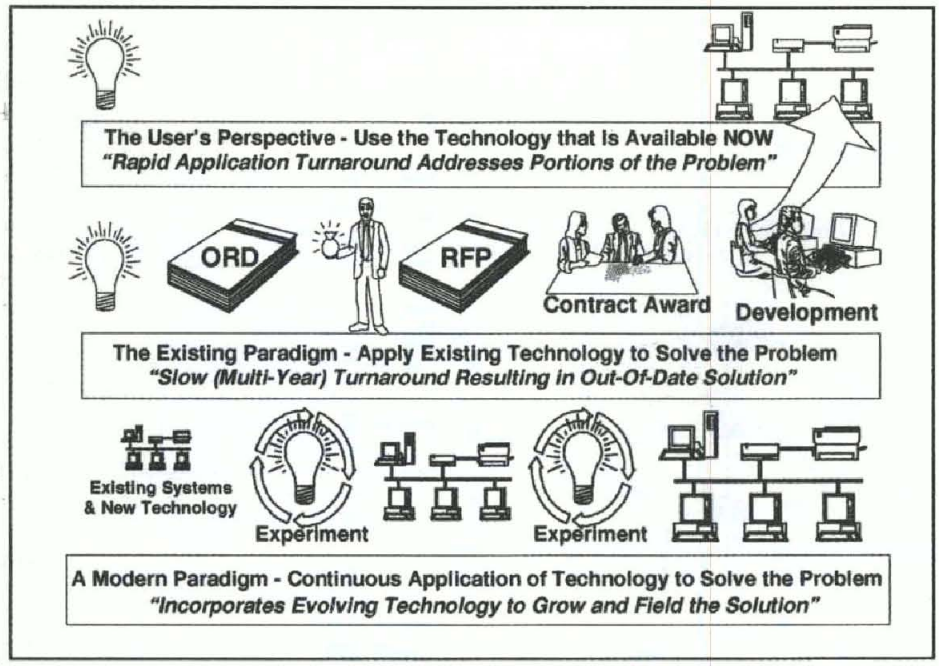

Figure 1.
Capabilities-driven vs. requirements-driven development.

our Army's future." Army officials said then Secretary of Defense William Perry was very impressed with the CTSF operation when he visited Fort Hood.

As with all good ideas, recognition and consensus are very important. Institutionalization, however, requires a thorough understanding of the basic principles and fundamentals employed in the idea.

CTSF—Ingredients For Success

Leadership, vision and resources. The good idea, as exemplified by the CTSF, is typically the result of experience, focus, vision, and commitment. In the case of the CTSF, a team of government and contractor representatives and federally funded research and development centers (FFRDCs) was organized and challenged with the formidable task of integrating and training what seemed to be an unmanageable number of new and enhanced systems and technologies. Through the leadership of LTG William H. Campbell, DISC4, the CTSF was first conceived. As described by BG Boutelle, the program executive officers' "Trail Boss" for TF XXI, the CTSF is " ... a facility where we would bring Soldiers in to say what worked and what didn't [work]." The CTSF team had to significantly reduce the time necessary to integrate the many TF XXI systems to meet the aggressive timelines of the AWE.

The first axiom to a good idea is that it must be executable; and to execute, **resources** are required. Once again, strong leadership is necessary to secure the requisite resources to pursue the vision. Although this step seems straightforward, it is not. Resourcing the good idea is where most good ideas change in their very nature due to limited, and often misdirected, resources.

The second axiom to a good idea is that the good idea is not always scaleable; i.e., you can't always do the same for less. The dedicated resourcing of horizontal integration activities performed at the CTSF was a key ingredient in leading to the success of the TF exercise. These integration activities are very often neglected and assumed to pre-exist.

Capabilities-driven vs. requirements-driven development. Systems development and integration is usually driven by a rigorous requirements process. This traditional process of acquisition and fielding is linear and follows a "waterfall schedule." Depending on system complexity, the development process may take less than 1 year to many years.

This conventional means of systems development has resulted in many successes, but is now challenged with technology advancing at an increasingly rapid pace. These technology advancements penetrate all aspects of system development from user requirements to system implementation. These advances may be the impetus for business reengineering and may fundamentally change user requirements. They may impact the system specification by offering new technological solutions for current business practices, or they may impact system implementation through system upgrades and product improvements.

Given the problems presented when dealing with the rapid pace of technology advancement, new system development paradigms must be considered. Figure 1 contrasts the conventional process with a modern paradigm emphasizing rapid application development and capabilities-driven development. Capabilities-driven development allows new hypotheses to be constantly offered with new technologies requiring verification, validation and insertion into the system development process. As suggested in the illustration, the conventional methods employed in a changing environment suggest slow turnaround and out-of-date solutions, whereas the modern paradigm incorporates evolving technology throughout the system's life cycle. Capabilities-driven development follows the spiral model for development, as illustrated in Figure 2. It offers incremental capabilities through rapid injection and evaluation of new technologies.

Boundaryless relations. Boundaries may be politically, programmatically, geographically, functionally, and/or interpersonally motivated. When these boundaries cause divergent or conflicting actions to emerge, the team becomes dysfunctional. As a result, the good idea is not properly executed. These unnecessary boundaries must be eliminated so that all team members

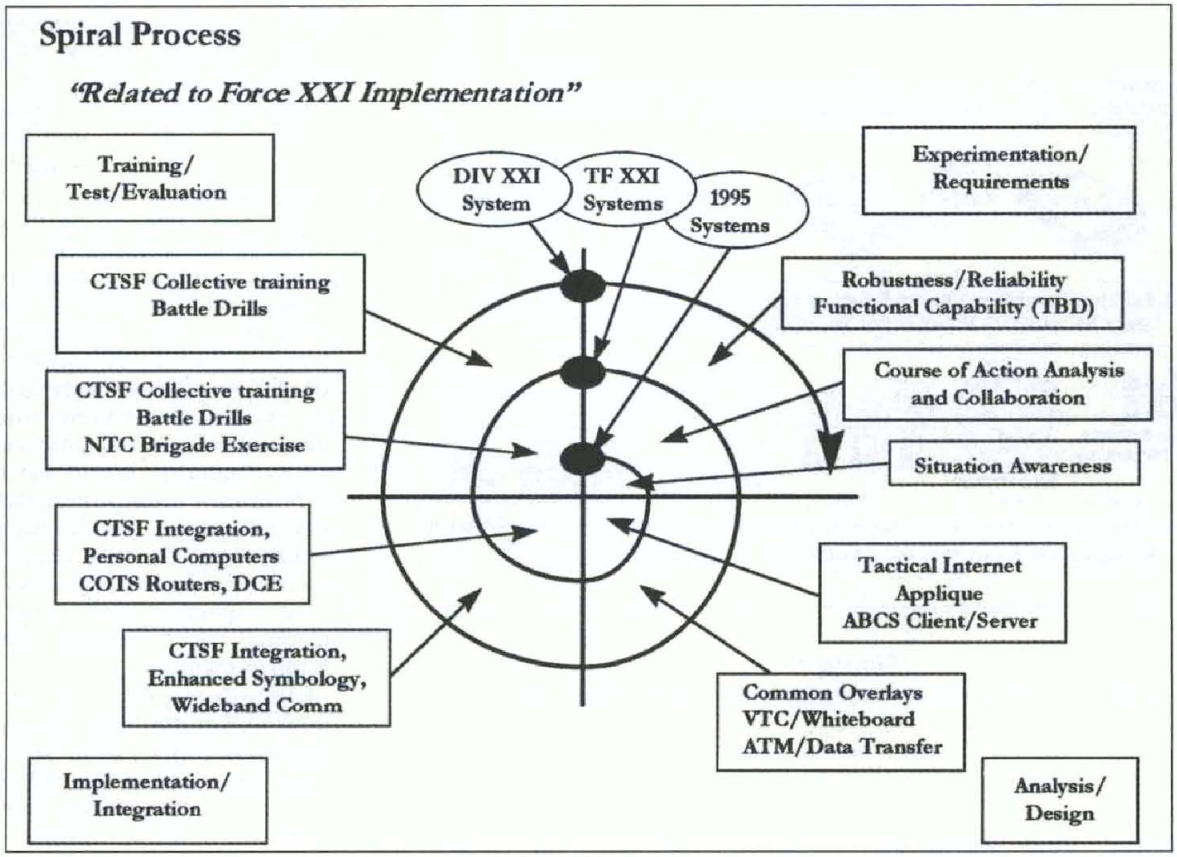

Figure 2.
Capabilities-driven development: spiral process model for development.

share common objectives, achieve a level of interdependency, and strive for each other's success.

The CTSF fostered such an environment. The CTSF team was comprised of materiel developers, contractors, FFRDCs, testers, warfighters, and user representatives, and provided connections to geographically dispersed locations. These communities, joining together in the CTSF, had a profound impact on the TF exercise and will serve as a model for future system integration activities. As one observer noted, "we all checked our hats and egos at the door to achieve our common goal."

The collaborative environment fostered within the CTSF has given the warfighter and user representative a better understanding of technological solution sets, while offering the materiel developers and contractors a more rapid means of implementing requirements and materiel solutions.

Synchronized milestones across all systems. Although interoperability and integration requirements may be identified very early in a system's life cycle, these requirements are typically not well synchronized across multiple systems. Synchronization is required in all stages of the system's life cycle, from requirements generation to field support; but typically synchronization has the most impact in the early stages when architectural decisions are being made. A well-synchronized system may consider technological and programmatic tradeoffs that would otherwise not be considered.

To facilitate a highly effective integration environment, the CTSF offered a single-process orientation, which was focused on the system-of-systems as opposed to any particular system. Specifically, the many systems entering the CTSF would now be considered a subsystem of the larger federation of systems, captured as the Army Battle Command Systems (ABCS) and managed under a single test, validation and configuration management process. Version releases of ABCS would provide the incremental capabilities sought by the warfighter. This single-process orientation created a level of interdependency and focus, which joined organizations together to accomplish much more than could have been done in a geographically dispersed, independently oriented environment. Finally, the ambitious "stake in the ground" was a forcing function, which motivated a very high level of ingenuity, creativity and commitment. This ambitious schedule would cut years off the time necessary to bring such a complex system to the warfighter.

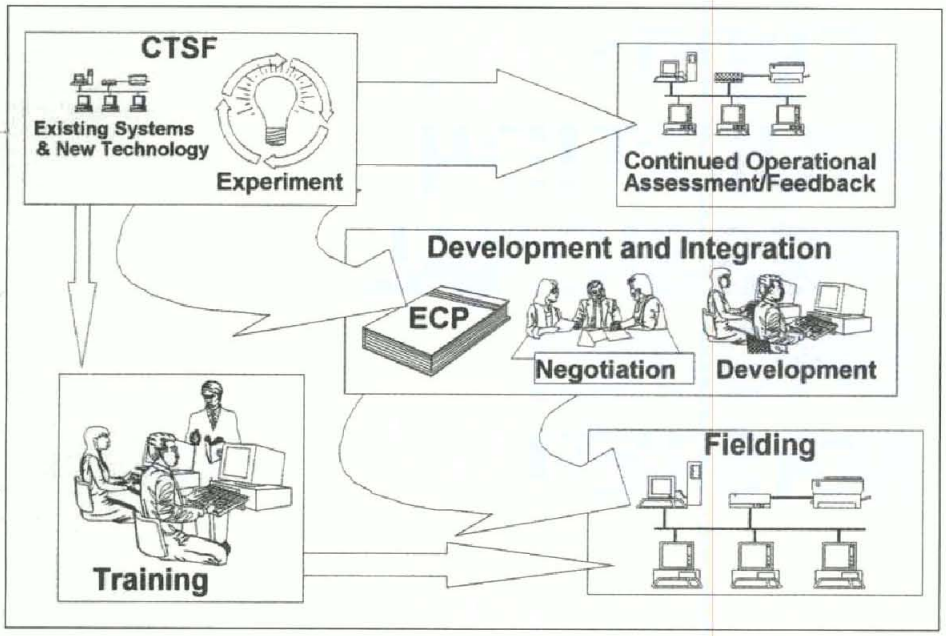

Figure 3.
Modified acquisition paradigm.

Collective training. The final ingredient in fielding a highly integrated set of capabilities is to ensure that the end user understands the power behind the system. The end user must make the system part of his or her business. Consequently, training must not be focused on how to punch the keys, but on how to better conduct business. Training must also include the collective set of capabilities available to the end user. The development and execution of battle drills was key to the success achieved in training the warfighter. These battle drills simulated specific threads of operation and allowed the warfighter to better understand the tools and capabilities available in the context of his or her mission.

The Road Ahead for the CTSF Concept

The CTSF has proven to be an excellent tool to examine the issues related to the incorporation of new technologies (both commercial-off-the-shelf and government-off-the-shelf), system-of-systems integration and operability, and the practical question of "does the new technology enhance tactical operations?" What follows is a set of actions necessary to institutionalize the CTSF given a thorough understanding of these aspects:

- Preserve the level of leadership exhibited during the TF exercise and maintain clear accountabilities.
- Foster a collaborative environment through direct funding of the CTSF. Expansion of the CTSF should be considered to include the broad array of contributors to Force XXI.
- Reassess individual project directions and synchronize milestones to common objectives.
- Continue and/or expand collective training exercises. The development and execution of battle drills and vignette-driven training is critical in allowing the user to understand the full implications of automation on his or her duties.
- Incorporate lessons learned from incremental system acquisition activities and assign an overall system architecture.

Figure 3 attempts to describe a modified acquisition paradigm to help address these issues. While it is recommended to continue to use the CTSF to evaluate new technologies and system modifications in the operational environment, additional planning is needed to define the modifications necessary to existing systems, field capabilities that are supportable, and provide enhanced user training.

Summary

Institutionalizing the good idea does not come easy. The first and sometimes most difficult step is recognition. Not all ideas are necessarily good ideas. Once an idea is recognized as good, we must step back and understand the anatomy of that idea. In the case of the CTSF, we have identified five critical components that make the CTSF a success. With the anatomy understood, the "institutionalize process" can commence. This process will be highly tailored to the idea.

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FIVE SKILLS EVERY ACQUISITION PROFESSIONAL SHOULD MASTER

By John Lesko

Introduction

Information managers and "help desk" personnel throughout the Defense community would probably agree that the majority of their time is spent teaching others—usually on a one-to-one basis—to understand new software features or master computer tools. The five skills suggested here were first offered by John Makulowich in the Aug. 29, 1996, issue of *Washington Technology*. I have adapted and expanded on these skills for the special needs of Army Acquisition Corps practitioners who are managing research, development, test, and evaluation projects; working with integrated product teams; or collaborating with commercial business partners. The five skills and a brief explanation of each follow.

- **Learn to use a web browser.** Microsoft Internet Explorer™ and Netscape Navigator™ are very versatile and very popular. You should know how to access the browser, as well as how to use the mail agent, news reader, and related features. If you need help getting started with the browser, have your local Internet administrator show you how they organize their personal computer (PC) or your organization's server. Dr. Charles Herzfeld (an early supporter of the Internet as former Advanced Research Projects Agency Director, IT&T Vice President, and Director of Defense Research and Engineering) claims, "The 21st Century has started." He adds, "The fall of the Soviet Union and the development of the web browser signal that the future is already here." The World Wide Web is not a fad, and as browsers become more and more integrated with bundled suites of software, proficiency in their use will pay dividends before the year 2000 arrives.
- **Master the use of at least two search engines.** A recent Internet search for the term "horizontal technology integration" resulted in the follow-

The Internet helps the acquisition professional save time, "shorten distances," and overcome the cross-cultural barriers found in most programs, cooperative research and development ventures, or weapons development projects.

BOOKMARK THESE INTERNET SITES!

Offering a "Best of the Web" list for acquisition professionals is a daunting task. Thousands of "hits" result from a simple search for the term "acquisition reform." Professionals from each laboratory, engineering center, military service, or program manager's office may seek out information for significantly different reasons. This list of sites is an optimistic starting point.

◆ **http://www.dtic.dla.mil/defenselink** is provided through the cooperative efforts of the Office of the Assistant Secretary of Defense (Public Affairs) and the Defense Technical Information Center (DTIC). This site is a first-rate Defense news source and a directory for the DOD and each of the Services. Military users can access *The Early Bird* at **http://www.dtic.dla.mil/ebird.**

◆ **http://www.dtic.dla.mil/techtransit** is the DTIC launch point for commercial links, business incubator sites, the Small Business Administration's programs (SBIR/STTR), universities doing Defense research and development, the various military lab and engineering centers' offices of research and technology application, and much more.

◆ **http://www.sarda.army.mil** is the web site for the Office of the Assistant Secretary of the Army for Research, Development and Acquisition (OASARDA). Internet users can search the OASARDA site by keyword. The Army Science and Technology Master Plan, DRAFT AR 70-1, *Army RD&A* magazine, notes from various technical working groups, and Army Acquisition Executive memoranda are found at this site. The Army Acquisition Corps web page can be reached from this site, or at **http://dacm.sarda.army.mil.** This site offers information essential to all members of the Army Acquisition Workforce. It includes news, publications, training information, workforce information policies, contacts, organization charts, and links to other worthwhile sites.

◆ **http://www.dtic.mil/stinet** allows users to search all of DTIC's catalogued scientific and technical (S&T) reports, STINET databases, S&T news, and "gray" literature, which is defined as foreign or domestic public release or "open source" material that is usually available through specialized rather than standard channels or systems of publication or bibliographic control.

◆ **http://www.dtic.mil/rdds** provides an online repository of the DOD research and development descriptive summaries (RDDSs). Another common name associated with RDDS data is Program Element Descriptive Summaries. RDDSs include narrative information on research, development, test, and evaluation programs and program elements within DOD. The RDDS repository contains data from the U.S. Air Force, the U.S. Army, and other Defense agencies.

◆ **http://www.ntis.gov/ntissrch.htm** is the National Technical Information Service (NTIS) search engine. NTIS is the agency responsible for electronically storing reports from non-Defense laboratories.

ing number of relevant "hits" when using the most popular search engines: AltaVista (90); eXcite (67); InfoSeek (65); Lycos (19,898); Yahoo (90); and WebCrawler (1). The application of Boolean logic coupled with a search of proximity sites is what separates the "master technician" from the apprentice or "weekend mechanic."

• **Complement your search engine skills by learning how to use an Internet directory service or "Switchboard."** DejaNews, Liszt, Yahoo, and Switchboard will help you identify discussion groups, news groups, special interest web pages, bulletin boards, and addresses. These networking tools can help you find and contact an author or organizational "gatekeeper" by finding their e-mail address, phone number, or Internet "business card." You might have to use commercial online information service providers for hard-to-find people. For example, Lexis-Nexis is the sole provider of access to *Who's Who in Science and Engineering*.

• **Learn to use Internet tools appropriate for your day-to-day professional work.** The exchange of briefing materials, works-in-progress, preprints of articles intended for publication, and the connectivity of one's PC to workstations and electronic libraries are influencing the way scientific and engineering information is disseminated in today's highly networked workplace. Add the following to your PC knowledge base: attaching files to e-mail messages; encoding and decoding files in MIME, BinHex, and pdf format; connecting to file transfer protocol (ftp) sites; and learning the fundamentals of HTML formats, tags, and scripts.

• **Combine tools and techniques into personalized "power tools."** For example, one can combine the use of a favorite word processor, POC list, or calendar with online databases accessed via the Internet. "Bookmark" your office or home computer with the Uniform Resource Locators listed in the accompanying sidebar. Use online references along with material available on CD-ROMs. Two excellent CDs produced specifically for acquisition professionals are the *Defense Acquisition Deskbook* produced by the Defense Acquisition Deskbook Joint Program Office at Wright-Patterson Air Force Base, OH, and the *Army Science and Technology Master Plan*, Volumes I and II. Produce better, more timely reports for supervisors, colleagues, peers, and project partners by sending them "links" to experts or decisionmakers who will influence or participate in the task at hand.

Conclusion

The Internet helps the acquisition professional save time, "shorten distances," and overcome the cross-cultural barriers found in most programs, cooperative research and development ventures, or weapons development projects. Furthermore, today's acquisition professional is a "knowledge worker" who must be committed to lifelong learning. The learning process cannot be reduced to a simple set of instructions. Learn these tools to "win the information war" and gain a competitive advantage in the research, development and acquisition marketplace.

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New Frontiers . . .

PITCHING PROCUREMENT IN THE NEWLY INDEPENDENT STATES

By Anthony C. DeLegge

Introduction

With the fall of the Berlin Wall, Europe entered an era of transformation and uncertainty. The Newly Independent States (NIS) (former Eastern Bloc countries) in particular are undergoing significant change as they begin the process of moving from centrally controlled political and economic systems toward those based on democratic processes and free enterprise initiatives. The military establishments in these countries are involved in this evolution as well, and have expressed interest in learning more about how the United States trains, equips, supports and deploys its military forces in a rapidly changing political environment.

Joint Contact Team Program

In the interest of regional stability and to address the increased level of interest by the NIS in U.S. military affairs, the U.S. European Command (USEUCOM) has implemented an integrated program of engagement activities. These activities include the conduct of joint exercises under Partnership for Peace Program initiatives and the State Partnership Program wherein U.S. National Guard units from various states establish long-term relationships and exchange information with participating countries. A key element of the USEUCOM effort is the Joint Contact Team Program (JCTP). This program involves sending U.S. military and civilian subject matter experts under traveling contact teams (TCTs) to 14 countries to exchange information on a wide range of military topics. The JCTP also includes familiarization visits in which NIS military personnel visit Department of Defense (DOD) installations and units to discuss and become familiar with U.S. military operations.

While U.S. contracting officers are subject to various levels of review and approval, the relative autonomy they enjoy in making procurement decisions is a source of considerable interest and discussion.

USEUCOM relies on U.S. Army Europe (USAREUR) through the USAREUR Office of the Deputy Chief of Staff for Operations (ODCSOPS) International Operations Division to identify and provide subject matter experts to participate in the JCTP. Since 1992, the USAREUR ODCSOPS has facilitated nearly 600 bilateral information exchange visits annually. The program has 14 participating countries including The Czech Republic, Hungary, and Poland, as well as Romania and Slovenia. These exchange visits cover a broad range of military topics, from chaplaincy to peacekeeping and peace enforcement operations. The information provided to the participating countries exposes them to U.S. military doctrine, training, and operations; builds mutual trust and confidence, and promotes genuine partnership among all the nations of Europe.

Traveling Contact Teams For Procurement

One frequently requested topic under the JCTP is the U.S. acquisition system, specifically, DOD procurement practices and procedures. The U.S. Army Contracting Command, Europe

(USACCE) has provided subject matter experts and procurement seminars under the JCTP since 1993. As executive agent responsible for contracting in USAREUR, and based upon the command proximity to the partnering countries, the USACCE can field TCTs in a timely and cost-effective manner in support of the JCTP mission.

USACCE procurement TCTs typically consist of two to three civilian or military procurement professionals drawn from the command, but may also include individuals from other agencies depending on the procurement expertise required. Previous USACCE procurement TCTs in Bulgaria, Macedonia and Slovenia included team members from the U.S. Marine Corps Reserve, the Defense Contract Management Command, and the Colorado Air National Guard. The team members work closely to plan, develop and present procurement seminars in a balanced, informative and professional manner. The average TCT seminar is conducted over a 3-day period, not including travel. This provides adequate time to conduct presentations, with translation, and allows time for in-depth questions and answers concerning the subject matter.

Target Audience And TCT Topics

The typical audience for a procurement TCT in the NIS countries consists of Ministry of Defense field grade officers and civilian professionals in the logistics or procurement fields. These individuals have proven to be highly trained and experienced in their profession, often demonstrating a familiarity with many aspects of the U.S. procurement process. All share with their U.S. counterparts a sincere interest in providing the best possible equipment and support for the service members under their command.

Representatives of NIS defense-related firms and private industry have also participated in procurement TCT events. These representatives have expressed interest in how the U.S. military purchases goods and services worldwide and the requirements for doing business with the U.S. government. Other areas of interest have included the relationship between the military and the Defense industry and the nature of competition in a free and open market environment.

The participation of private industry in these events allows for a more informed private sector and helps to create potential new sources for contingency operations in the Balkans or to meet European-specific requirements in support of U.S. forces in the theater.

While there have been continual acquisition challenges over the years, the U.S. procurement system has been outstanding in meeting its goal of supporting the development and maintenance of the best equipped and combat ready military force in the world.

The acquisition material covered during an event varies, ranging from systems acquisition to installation contracting. Much depends on the time available and the areas of interest indicated by the Ministry of Defense in the participating country. Given past and present U.S. military humanitarian and peacekeeping missions in Haiti, Bosnia and Africa, USACCE procurement TCTs have been modified to include the discussion of contingency contracting and the challenges of providing effective procurement support for deployed forces.

Another good example of a frequently discussed topic is the level of authority of the contracting officer and his or her roles and responsibilities under the U.S. acquisition system. While U.S. contracting officers are subject to various levels of review and approval, the relative autonomy they enjoy in making procurement decisions is a source of considerable interest and discussion. Many NIS countries use logistical systems and procurement procedures based on Soviet models emphasizing centralized control. These systems involve multiple levels of review and approval by various offices or established committees. In some cases, resulting contracts are signed by other than procurement personnel. In his farewell message to the Acquisition Workforce, Dr. Paul G. Kaminski, then Under Secretary of Defense (Acquisition and Technology), related how his Russian counterpart was astounded by the number of contracting officers in the U.S. system who can sign contracts (a couple thousand). Attendees during procurement TCTs have often exhibited the same level of surprise, and have demonstrated an understanding that, in Kaminski's words, "The strength of the U.S. acquisition system is its people."

Conclusion

The U.S. acquisition system is designed to ensure the government obtains a quality product or service at a fair and reasonable price. The system is built on checks and balances and reflects our democratic values and ethics by emphasizing fair and equal treatment for all participants. The federal acquisition system has had its share of successes and problem areas. However, change is well under way based upon the reinvention and process improvement initiatives passed under recent acquisition reform legislation. While there have been continual acquisition challenges over the years, the U.S. procurement system has been outstanding in meeting its goal of supporting the development and maintenance of the best equipped and combat ready military force in the world. As such, the U.S. system can serve as a comparative model for those countries considering changes in the way they train, equip and support their military forces.

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THE FOREIGN COMPARATIVE TESTING PROGRAM

By Tom Buonaugurio

The challenge facing the program manager and his team was to evaluate a number of designs and make a recommendation to the Secretary of the Army for fielding a new rifle. The amount of time allotted was tight, only 1 year as directed by Congress, effectively dictating a nondevelopmental item (NDI) acquisition strategy. The project was also complex since the solicitation would ultimately involve 97 domestic candidates and 9 foreign designs. In addition, there were several enhancements to be evaluated that could be incorporated with the new rifle. These included a bayonet that could be used as an entrenching tool, and ergonomically designed ammunition pouches.

The scenario I have just presented is not to be confused with a recent project related to Force XXI or Land Warrior, but occurred 125 years ago in the summer of 1872. This program management team, or as it was known then, the Ordnance Board, convened in the summer of 1872 to formulate a plan of action to equip the Army with a new, standardized caliber rifle.

I have revisited Army history to acquaint you with the Foreign Comparative Testing (FCT) Program.

The Ordnance Board of 1872 did not have the benefit of the FCT Program. Indeed, they would have to wait more than 100 years. It was in 1977 that influential members of Congress acted to establish a separate program in the budget. Congress believed that the Services needed an incentive to investigate allied equipment in meeting its materiel requirements. Congress has always been sensitive to Army development programs. Accusations of wasteful developments, fielding obsolete equipment, etc., have never been in short supply. Recognizing this, the Ordnance Board of 1872 specifically identified that "The trial to include a thorough comparison with the performance of the best foreign military small arms" be included in their charter. The President of the Board, General Benet, namesake of Benet Labs in Watervliet, NY, executed what was truly an aggressive schedule.

This action by General Benet mirrors the current FCT Program mission to provide cost-effective equipment that meets valid Army requirements. The acquisition hierarchy of today, *DODD 5000.1*, specifies that commercially available systems, to include allied systems, is the number one materiel acquisition alternative for fielding new equipment.

The foreign systems selected for evaluation in 1872 were from Austria, Bavaria, Netherlands, Prussia, Russia, Switzerland and the United Kingdom. Moreover, the foreign candidates excelled in key performance traits such as the UK Martini Henry's 11.3 inches of penetration into a wood block, 4 inches more than the current service cartridge, albeit with a fearsome recoil. The Prussian candidate initially had a combustible cartridge, thus doing away with the need for problem-plagued ejectors.

So we have a corollary in that off-the shelf and consideration of foreign systems was recognized in 1872. The next step is the second cornerstone of the FCT Program—an approved requirement, typically an Operational Requirements Document (ORD). This separates the FCT Program from the technology assessments and concept evaluation proposals. The approved ORD states that the Army recognizes that a materiel solution is required, and from this the materiel developer can proceed to decide whether a modification of a commercial system or a new development is required.

In the case of the Ordnance Board, no mention is made of a specific requirements document, but armies need reliable weapons, and Civil War experience proved that the breech loader was effective. Breech-loaded arms by Remington and Spencer seemed technologically superior and made single-shot muzzle loaders obsolete. These modern rifles featured magazines, level actions, etc., but there were concerns that they were too technically advanced for the soldiers who comprised the Army.

Despite these debates and the lack of an Army-generated requirement, it was a congressional mandate that the plethora of post-Civil War weapons was posing a logistical and maintenance nightmare in the small Army, and that was reason for the board to proceed with haste.

The third element of a successful FCT Program is a firm acquisition strategy to include identification of procurement funds. During the FY98 FCT review, a strong acquisition cycle included the Program Element (PE) number from the Procurement Objective Memorandum. But often, the items evaluated do not have a specific PE, so more often coordination with the end item manager and the Deputy Chief of Staff for Operations and Plans stating their support is included. The chart on page 39 shows what separates a strong proposal from a weak one. Here, the Ordnance Board had no problem in that Congress had specifically appropriated $150,000, provided the board picked a rifle and standardized on one caliber and that this was accomplished prior to June 1873!

The Ordnance Board did not pay for the test rifles in 1872. Candidates were loaned to the board and returned when broken or at the end of the test. In comparison, the FCT Program pays for everything associated with the evaluation of the candidate. This includes the cost to lease or buy the test items, technical and management support, test and evaluation costs,

Foreign Comparative Test Program

Characteristic	Good Project	Weak Project
Requirement	Approved ORD	Weakly supported draft requirement, MNS
Goal	MS III TC Standard Decision	"Evaluation" - Tech Assessment
Follow-on $	Procurement funding in place	No buys planned
Contracting	Production options in contracts ("Kaminski Acquisition Strategy")	No planned buys, decision to be made afterward
Competition	Multiple, equal-chance, candidates for competition	Sole Source, no Market Investigation
NIH	U.S. R&D item in trouble	Strong U.S.-based competitive items
Matching $	Army funds for T&E of U.S. candidates; or significant contribution to FCT	No funds for equivalent tests of U.S. Candidates
Legal	Issues resolved before funding approved	Any Issues
Project Size	Moderate cost ($500k - $2M)	Low pay-back ratio, e.g. procurement vs. T&E costs
R&D	NDI off-the-shelf or in production	Prototypes
Data	Available from multiple independent sources, usable for evaluation	Contractor Claims

AMC - RELEVANT, RESPONSIVE & READY

and travel. Cost sharing from the Service is strongly encouraged.

The Office of the Under Secretary of Defense (OUSD) FCT review committee continues to prefer the acquisition method used by the Ordnance Board of 1872—a loan, especially for large costly systems. Refurbishment costs can be included in the cost estimate when the FCT proposal is prepared.

Are modifications allowed? Can items be piggy-backed or tested alongside the FCT? Yes, the Ordnance Board was challenged with evaluating many items associated with the rifle. One item in particular generated dramatic controversy with the board, as evidenced in the Ordinance Board minutes. This was the trowel bayonet. The source of the disagreements was simple enough. Can an ungainly looking bayonet, akin in appearance to a mason's cement trowel, serve the dual function of an entrenching tool and a threatening, edged weapon of war? The "no" camp wanted to keep the short, sword-like bayonet but would compromise and support a separate entrenching tool implement. Nonetheless, a limited number of these unique trowel bayonets were procured, and the Aberdeen Ordnance Museum has one on display.

Interestingly, the cavalry representative member of the 1872 Ordnance Board, MAJ Reno, was specifically quoted in the report several times stating his unwavering support for the trowel bayonet. He knew from his Civil War experience that even a small breastwork thrown up in front of soldiers, who would otherwise fight unprotected, was more defensible and reduced casualties.

Cavalry soldiers at that time did not have any sort of entrenching tools. How prophetic then that 3 years later his troop of companies from the 7th Cavalry narrowly escaped annihilation by retreating to a steep bluff and finding what protection they could at a place near the Little Big Horn.

In 1872, the U.S. government fiscal year began on July 1. In the case of the Ordnance Board search for a standard rifle, the act was passed on June 6 and became law on July 1, 1872. The board's first meeting was on Sept. 3, and one of its first actions was to have published, in New York papers, an advertisement stating that the board was in session and that samples could be submitted or presented in person to the board. Remarkably, a retired General Officer, B.S. Roberts, appeared the very next day with a carbine of his own invention.

Other companies and inventors followed, and the board soon had its hands full examining as many as 10 rifles per day from September through April 1873. There were no costs quoted in the reports, but government personnel participating in the evaluation in New York were ultimately granted $2.50 per day expense money.

The typical FCT Program is funded for 2 years, and while the cost of each FCT project ranges from $50,000 to $13 million, the average cost is about $700,000. Every FCT project is required to have a market survey and OUSD policy is now emphasizing a two-step contract process where the test items are procured and production options are contained in the same contract. This avoids the test to test again syndrome and reduces the time necessary to field the items.

The actual test firings in 1872-73 were predominately accomplished at the Springfield Armory Arsenal, MA. As can be imagined, testing was predominantly done outdoors in the midst of a New England winter. Everyone is conscious of trying to prevent schedule slippages and, it is thus remarkable that the more things change the more they stay the same.

The Ordnance Board minutes reflect delays for missed travel connections, sickness, snow, holidays, and officers being detailed for other duties. Nevertheless, most of the testing was completed by late April. At one point, the board recommended that several of the most promising rifles be selected for trials in the field (operational test) to decide which were better. The Adjutant General, acting on behalf of the Secretary of War, stated that this was not possible since the deadline for the board's recommendation was fast approaching. In other words, the $150,000 set aside by Congress would be lost.

Ultimately, the board recommended selection of the .45-caliber breech-loading Springfield, which was the standard Service rifle with improvements. Curiously, the Acting Secretary of War and General Sherman did not concur in the board's request to have some of the rifles "field tested." They replied via telegram that, "New action by Congress and new appropriations will be necessary to permit trials in the field. If it is hard for the Board to agree, much harder would it be to get a decision from various reports of officers in the field." Obviously, this is a different philosophy than exists today.

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ACQUISITION OF CHEMICAL AND BIOLOGICAL EQUIPMENT

By Dr. Amnon Birenzvige

Long-term planning for materiel acquisition has always been difficult because of uncertainty about needs and the state of the art in science and technology.

Introduction

Communication between the materiel developer and the warfighter has always been difficult, at best. Usually the warfighters complain that the materiel developer provides them equipment they are unable to use. They say that the scientists and engineers do not understand the problems users encounter on the battlefield. The materiel developer complains that the user does not define his or her needs clearly, and frequently asks for the impossible.

The research and development technology base is planned for 7 years under the program objective memorandum (POM) or 10 years under the extended POM. Long-term planning for materiel acquisition has always been difficult because of uncertainty about needs and the state of the art in science and technology. The U.S. Army Edgewood Research, Development, and Engineering Center (ERDEC) developed a process that will provide the materiel developer the means to develop research, development and acquisition (RDA) plans for the long term in a logical manner. ("Long term" is defined as a period that starts where the extended POM ends and extends to 25 years.)

Determining User Needs

The first step in developing long-range RDA plans is to determine what warfighters will need in the future. This is particularly important in the post-Soviet-empire period because the nature of the future mission is changing. We no longer face the mighty military machine of the Russian Bear in central Europe. Future missions will likely be small- to medium-size engagements against adversaries using unconventional methods, including chemical and/or biological weapons (CBWs). To determine the need for chemical and biological defense (CBD) capabilities, we need to evaluate likely missions. These include both war missions and operations other than war missions, such as humanitarian and peacekeeping efforts.

To query the soldiers regarding future needs in CBD capabilities, a seminar war game took place at ERDEC. This method was selected because it allows simulation of real situations in a compressed timeframe. Players compete against an opposing team (red vs. blue) and actions and reactions develop in unpredictable ways. The potential for participants to do the unexpected provides insight that straight line projections and trend analysis can miss.

Civilians and military personnel representing the Army, Navy, Air Force, and Marine Corps were invited to participate in the seminar war game. Approximately half of the participants were active duty personnel. About half of the civilian participants were active reserve or retired military personnel, including two retired flag officers. Almost all the players had a CBD background either as members in the Chemical Corps or through their jobs in the CBD area.

The participants played three different scenarios (each lasting one-half day). The scenarios included a peacekeeping operation on the Indian subcontinent, a mid-intensity scenario in Korea, and a hostage rescue operation. Each team played both red and blue scenarios, and each scenario was played against a different team. This ensured the use of the broadest perspective possible. In these scenarios, the red forces were allowed to use limited CBWs. The blue forces were given CBD equipment that is available today or that is expected to be available within the next 5 to 10 years (extended POM period). The players were asked to evaluate the available equipment and develop a "wish list" of new CBD capabilities. Note that we asked about *needed capabilities and* ***not*** *technologies.*

As a result of the seminar war game, the users compiled a list of capabilities that they said will enable them to operate more efficiently in the chemical/biological battlefield. Some of these needs were not new, but new possibilities for their use were discovered. In addition, the discussions during the seminar war game surfaced several doctrinal and policy issues that need to be addressed by the Armed Forces leadership.

Projection Of Science And Technology

The outcome of the first seminar war game was presented to the scientists and technologists in the technology outlook workshop that followed, which also took place at ERDEC. The purpose was to decide which of the capabilities that the warfighters wanted are feasible in the future. Participants in the workshop were leading technical experts in a wide variety of technical areas. They were asked to project the state of the art in their particular areas for the next 10 to 25 years, and determine how it can be used, either by itself or in combination with other technologies. We used these results to evaluate our ability to provide the capabilities wanted by warfighters.

Participants were also asked to estimate the operational and physical characteristics (weight, size, etc.), the cost, and the projected time that the equipment would be available. The workshop was organized in such a way as to give the participants opportunities to interact with their peers as well as exchange information and ideas with experts from other technical areas. The outcome of the workshop was a list of CBD equipment that may be realized in the next 10 to 25 years, and its expected operational and physical attributes.

Usefulness Of New Equipment

A second seminar war game was used to determine the usefulness of new conceptual CBD equipment. Attempts were made, although only partially successful, to include joint combat arms personnel. Most of the participants were still associated with the Chemical Corps. However, discussions with some of the combat arms officers who were present indicated that the outcome of this exercise would not have changed even if the mix of the personnel had been different.

The scenarios played in the second seminar war game were similar to those played in the first one, except that the hostage rescue operation was replaced by a modified Desert Storm scenario. At this war game, the blue teams were given a selected list of futuristic CBD equipment. At the end of each scenario, the players were asked to rate the different conceptual equipment on a scale of 0 (not used in this scenario) to 5 (high added value). The results are summarized in Table 1 on page 42. Some of the players did not rate some of the equipment. No rating was evaluated as a 0 (i.e., "not used in this scenario"). As shown in Table 1, the opinion of the players was sometimes almost evenly split between no or very little value added and good/high value added. In other cases, the verdict of the players was more definitive. In general, there were no significant differences between the different scenarios. However, since all the participants in the seminar war game played all the scenarios, it seems that the differences in equipment rating are driven by the scenario.

Prioritizing CBD Technologies

There are a large number of CBD technologies that could be developed. In times of diminishing resources, there is a need to ensure that future development will have maximum return (added operational value) for investment. It is obvious that there is a need to both quantify the added value of new equipment and design a methodology that will allow trade-off analysis of different CBD equipment. The trade-off should be based on their operational and physical characteristics, anticipated cost, and probability of successful development according to the following formula:

$$\textit{Equipment Score } \mathbf{R} = \frac{\textit{(Add on value) X (Probability of success)}}{\textit{Anticipated cost}}$$

*(The goal is to maximize **R**.)*

The method chosen for quantifying the operational added value of the new CBD equipment is the analytical hierarchy process Expert Choice process. This process requires development of a criterion's hierarchy tree. It then assigns weights to each criteria by performing a pair wise comparison among all the criteria.

The criterion's hierarchy tree was developed by a group of combat arms individuals during a 2-day workshop at Fort Benning, GA. The 18 participants in that workshop were predominantly light infantry personnel. One individual represented the heavy infantry, two represented combat support and combat service support, and one represented the Air Force. There were no representatives from the Navy or the medical community. The top level of the hierarchy criteria tree, together with the definition of the different criteria, is presented in Figure 1 on page 43.

Scoring the criteria, i.e., assigning the different criteria relative weight, was accomplished by a series of scoring conferences. Participants in these conferences were senior officers and non-commissioned officers (NCOs) representing the different segments of the battlefield. This will ensure that the research and development program will consider the needs of all segments of the battlefield. These conferences were conducted at the different warfighters' facilities (i.e., Fort Bragg for the light infantry, Fort Hood for the heavy infantry, Norfolk for the Navy).

Participants in the scoring conferences were asked to compare the different criteria one pair at a time. They were asked to determine which criterion is more important and by how much (on a scale from 1 to 9). Answers were recorded on paper, then transcribed to the computer for analysis. This method of collecting the data was chosen to enable application of rigorous statistical analysis. This will provide information that will enable us to determine if needs of different groups can be satisfied by a single RDA program, or if separate programs are needed to satisfy the special needs of some groups.

At the bottom of each branch of the hierarchy tree are factors that relate to equipment characteristics (operational and physical characteristics). The scale for each criterion was set by the warfighters. The score of the different conceptual equipment, and its anticipated characteristics (such as detector sensitivity, weight, and size) were filled by the appropriate technical experts.

Conclusions And Recommendations

Preparing Defense RDA plans is, at best, a very difficult and complex process, particularly in times of changing missions and shrinking resources. The battlefield is a very complex environment with many interacting players, all with their own needs.

The combination of seminar war games and a technology workshop provided a mechanism for interaction between the warfighters and the scientists. It provided the scientists and engineers insights into the problems facing the warfighters. It also brings the perspective of the technical people to the attention of the soldiers.

The seminar war game provides a useful instrument to determine warfighter needs. It was also shown to be a good tool for surfacing major doctrinal and national policy issues that need the attention of the senior leadership.

The technology workshop provided ERDEC scientists and engineers an opportunity to interact with leading scientists in academia and industry, particularly those who are not normally involved in Defense-related research. It also provided an opportunity for interaction among scientists from seemingly unrelated fields and provided them with insight into future developments in these areas.

At the beginning of the project, we decided to limit the activities to CBD issues. This decision proved to be the right one and allowed the participants from different activities to focus their attention. On the other hand, successful employment and use of CBD equipment may depend on the availability of other military capabilities. For example, participants in the first seminar war game expressed the need to confirm the biological activity of a suspected aerosol plume as early as possible. The scientists in the technology workshop indicated it is possible to develop a small, lightweight system that can collect an aerosol sample from the plume; analyze the sample as to

Table 1.
Summary of evaluation of conceptual chemical and biological defense equipment.

	0	1	2	3	4	5
CB Passive Detector	0.36	0.02	0.08	0.14	0.25	0.15
Stand off Detector	0.15	0.01	0.08	0.10	0.27	0.39
CB Imaging Sensor	0.17	0.01	0.04	0.13	0.31	0.33
Universal CB Point Detector	0.32	0.04	0.08	0.15	0.21	0.20
CB all clear Detector	0.35	0.01	0.11	0.13	0.22	0.18
Drop-off multi sensor array	0.25	0.03	0.06	0.14	0.25	0.27
miniature multi sensor array	0.51	0.04	0.09	0.14	0.13	0.09
Air / terrain mapping	0.20	0.00	0.07	0.13	0.34	0.26
Personal terrain mapping	0.42	0.01	0.11	0.19	0.16	0.12
personnel / equipment mapping	0.32	0.01	0.13	0.17	0.21	0.17
Protective battle dress	0.24	0.02	0.02	0.14	0.23	0.35
Univ. individual filter canister	0.38	0.03	0.04	0.15	0.19	0.21
skin protection W/O gloves	0.34	0.04	0.04	0.11	0.21	0.27
specific threat individual filter canister	0.52	0.13	0.16	0.10	0.08	0.02
Helmet / apron Hybrid	0.46	0.10	0.12	0.15	0.07	0.10
Individual blower positive pressure	0.51	0.04	0.10	0.13	0.17	0.05
light weight bio mask	0.47	0.13	0.11	0.08	0.18	0.04
Collective protec non carbon filter	0.40	0.04	0.05	0.21	0.19	0.10
protective coating	0.36	0.03	0.08	0.14	0.28	0.12
protective cover	0.32	0.04	0.10	0.15	0.29	0.11
disposable protective garments	0.41	0.06	0.12	0.11	0.20	0.10
Aqueous decon	0.41	0.08	0.05	0.15	0.21	0.09
Hot air decon	0.40	0.09	0.04	0.16	0.24	0.06
Sorbent decon	0.43	0.03	0.09	0.21	0.16	0.08
Powder / gas decon	0.45	0.06	0.08	0.15	0.15	0.11
Shippable film self decon	0.27	0.04	0.01	0.14	0.22	0.32

RATING: 0 - not used, 1 - no added value, 2 - little added value, 3 - some added value, 4 - good added value, 5 - High added value

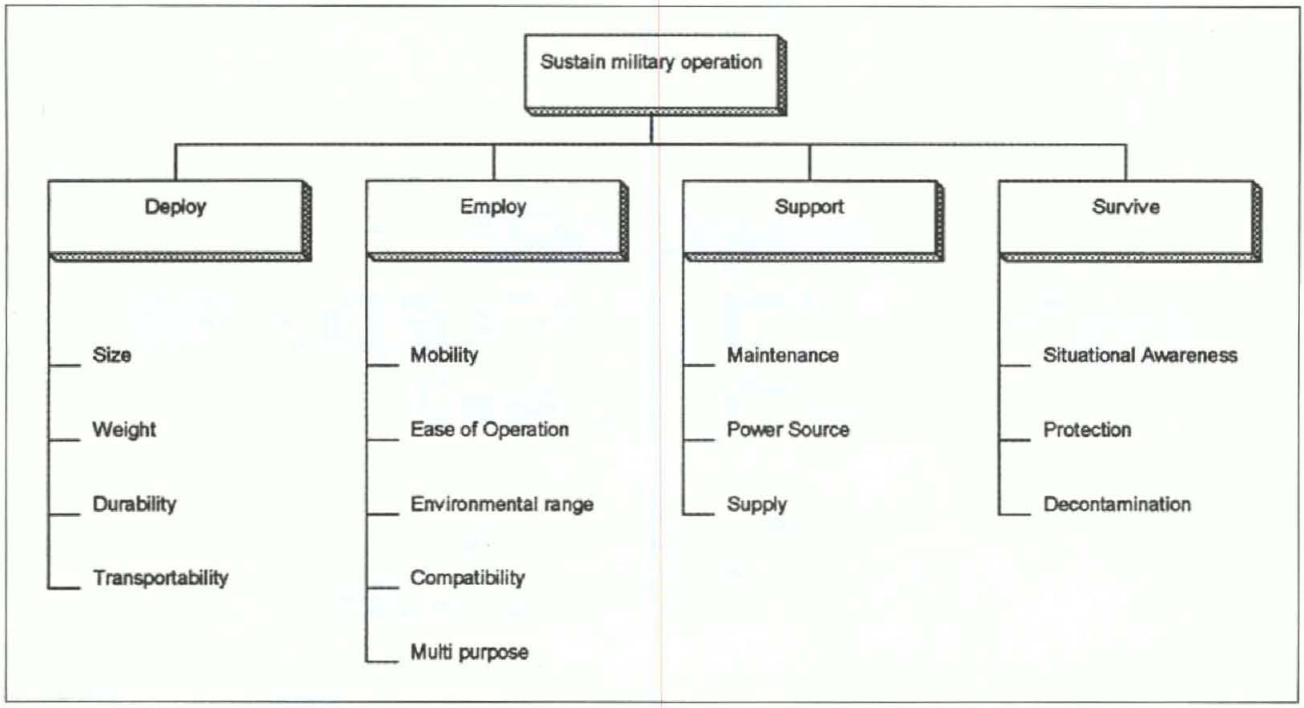


Figure 1.
Chemical and biological defense equipment criteria hierarchy tree.

DEFINITIONS: ***Deploy****—Move equipment to site of operation;* ***Employ****—Carry out mission in battle space;* ***Support****—Supply equipment, spare parts, and supplies to the battle space;* ***Survive****—Protect personnel and equipment from chemical and biological threats while minimizing vulnerability from battle space threats.*

its biological activity, and possibly identify the agent, almost in real time; communicate the results back and, if necessary, issue an early warning; and bring back a sample to confirm enemy use of biological agents. Successful employment of such a device depends on the availability of an Unmanned Aerial Vehicle that can maneuver at low altitudes (100 meters or less). Thus, we recommend close collaboration between the different research, development and engineering centers (RDECs) and, if possible, participation of RDECs and command representatives in similar future activities.

To both evaluate the needs of the warfighters and perform successful trade-off analyses, it is crucial to develop the correct hierarchy criteria tree. The criteria tree should include the concerns of the whole military hierarchy, from the top leadership, through the field commanders and the NCOs, to the individual soldier. This is important because each of these groups has different perspectives and concerns. For example, in this effort, the people building the hierarchy tree were at battalion commander level (grades O-5 and O-6). The main concern was the employment of the CBD equipment and the effects it will have on the employment of their forces. They assumed that the equipment "will get there somehow." On the other hand, theater commanders and commanders-in-chief might be more concerned about the effects of CBWs on deployment. The main concern of both NCOs and individual soldiers is individual survival and well-being. Similarly, those who developed the hierarchy criteria had assigned very little importance to the possibility of other military uses of the CBD equipment or to dual use. This might have changed if higher level leadership had input to the criteria hierarchy.

The top level of the hierarchy tree should be determined by the top leadership of the military. The vision of the Chief of Staff of the Army—project the force, sustain the force, protect the force, win the information war, precision strike, and dominate the maneuver—is a good example, but the elements must be weighed against each other. It is also important that the vision of the other Services be included in the hierarchy tree. Lower levels of the hierarchy tree should be built upon the higher level by the appropriate level of the battlefield.

The second seminar war game indicates that usefulness of equipment is sometimes scenario dependent. Thus, we recommend that the second seminar war game be combined with the scoring conferences, and that scoring of the hierarchy take place following each scenario. The scenarios played should be pertinent to the overall mission of the unit, but should not be too restrictive. The participants in the scoring should have the opportunity to score specific equipment. This equipment should be described in sufficient detail (as to their operational and physical characteristics).

Any effort to develop a long-term Defense RDA plan could not succeed without a great deal of input from the warfighters. The Edgewood Research, Development, and Engineering Center recommends that top leadership emphasize cooperation between soldiers and scientists.

DR. AMNON BIRENZVIGE is a senior research scientist at the U.S. Army Edgewood Research, Development and Engineering Center, where he has worked since 1981. Birenzvige earned his B.S. and M.S. degrees in physical chemistry from the Technion, Israel Institute of Technology in Haifa Israel, and his Ph.D. in physics from the State University of New York at Albany.

WHAT ARE THOSE LITTLE MOLECULES UP TO NOW?

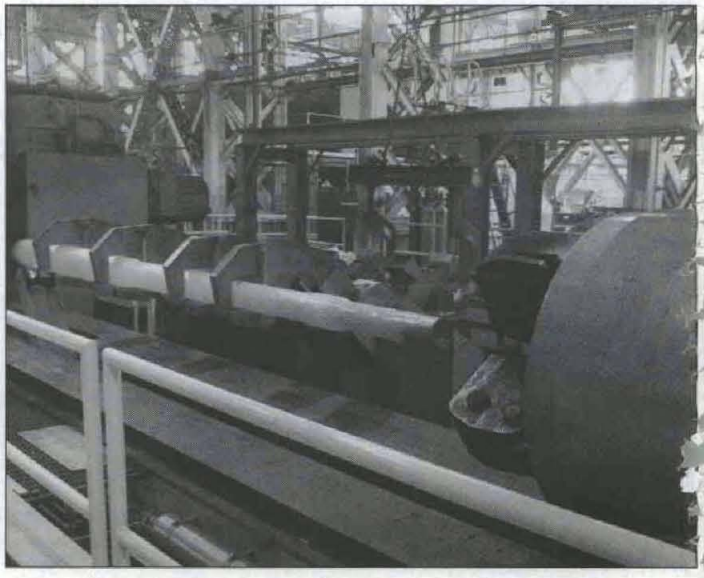
How Molecules Let The Big Guns Work

By Joe Sites

Imagine for a moment that you are in charge of providing weapons systems for the Army. (I'm sure that some of you are involved in the process.) Next, imagine that you have as your mission the development of a new howitzer. For clothing, rifles, and vehicles, you would have a variety of sources. However, for a howitzer, there is only one source—Watervliet Arsenal. One facility, Benet Laboratories, is responsible for ensuring that Watervliet Arsenal is taking advantage of modern technology. Outside of Watervliet Arsenal and Benet Laboratories, both in Watervliet, NY, there are only a select few individuals who have expertise in making big guns. I was recently privileged to be in the company of a number of these professionals. Although I served 30 years as an artillery officer and have had other associations that bring my total years of interest in artillery to about 50 years, my recent 3 days with this group made it clear that I had taken much for granted for a long time, and I suspect that others have too.

The organizers of the Eighth International Symposium on Gun Dynamics asked me if I would make some opening remarks at their gathering. As soon as I was through with my "war stories" on the use of artillery in the past 50 years, I was able to relax and listen to the presentations, which included *The Effects of Vehicle and Barrel Motion on the Accuracy of Repeat Fire Small Cannon, Nonlinear Control and Its Application to Flexible Pointing, Techniques for Modeling Bullet Exit State Conditions Predicted by Transient Finite Element Models, and Experimental Investigation of the Influence of Muzzle and Projectile Tail Assymetrics on the Flight and*

The U.S. Army's main battlefield tank wields the powerful 120 mm gun manufactured by Watervliet Arsenal and improved and developed through the research of Benet Laboratories, located in Watervliet, NY.



The rotary forge at Watervliet Arsenal is a unique national resource that has sped up the forging of gun tubes from what used to be 10 or more hours to just a few minutes.

Hit Performance of Spin Stabilized Projectiles. If you think these subjects were deep, you should see the titles of the other 35 presentations!

The presentations at the symposium thoroughly demonstrated to me that building guns, improving their capabilities, and ensuring their safety requires more effort than meets the eye. In fact, the critical actions that go on during the firing of artillery are actually taking place at the molecular level. In his presentation, *Comparison of Computed and Measured Flight Characteristics of Fin Stabilized Projectiles,* Dr. Robert E. Dillon, Department of Mechanical Engineering, Rose-Hulman Institute of Technology, Terre Haute, IN, used the expression "What are those little molecules up to now?" That question was enough to trigger my imagination to relate some of the problems encountered by these scientists and engineers to what really goes on in a gun tube while it is being fired.

There are several physical changes that take place in the metal of a gun when it is fired. Obviously, there are huge changes in pressures and temperatures. Also, there is friction resulting from the movement of the projectile. As I listened to the different presenters, I realized that these people are really dealing with the behavior of molecules in extreme circumstances.

Let us use our imagination a bit and envision that we can see the molecules lined up in the interior of a gun barrel. All of a sudden, there is a huge explosion accompanied by equally huge pressure. Now, those little molecules directly behind the projectile link hands as tight as they can and try to hold back the pressure. They do the best they can, but their line will bend backward. Then, as the projectile passes and the pressures drop, they lean forward. This movement is followed down the tube until the pressure reaches a steady state. I imagined that I was looking at a line of school children "cracking the whip." If the pressure is too high, no matter how hard the molecules link hands and how hard the molecules to the rear push, the line of molecules will bend until it breaks.

Now, let us take a look at friction. At the same time that our friendly little molecules are holding hands to withstand pressures, a projectile is going down the tube at 2,000 feet per second (1,364 miles per hour). The projectile may well weigh 100 pounds. If there is not a close fit between the projectile and the tube, then a lot of the force of the propellant will be lost. All of this means that as the projectile goes down the tube, friction provides another source of heat and actually rubs away some of the molecules that have been doing their best to stay together.

A similar story can be invented for chemical reactions where it is easier for some molecules to combine with others than it is to stay with their own kind. With heat, a parody can be made on "if it's too hot in the kitchen." At a given point, it can get too hot in the gun tube and the molecules will leave.

All of this discussion about molecules does have a real connection with developing guns. The limits of materials to withstand the forces of an extreme environment are not tested in any other environment to the extent that they are in the firing of guns. The participants at the Eighth International Symposium on Gun Dynamics were presenting new means of predicting effects and possibilities of new designs, techniques for measuring minuscule changes in minuscule periods of time. They really are concerned with what those little molecules are doing. Their dedication was exemplified by one participant who has been working for 17 years on improving breech rings. Their knowledge and experience is demonstrated by the guns they build. Their uniqueness is unquestioned. There is nowhere else for the guns to go.

All of us should be grateful to the gun people at Watervliet and their associates who are carrying on a proud tradition. They are a small, unique group of dedicated professionals we have depended on since the beginning of our nation. We all know that failures in their work can be catastrophic. We also know that we have won wars because of them.

TOMORROW'S FIREPOWER— *Tests are conducted on an experimental, large caliber weapon system developed and manufactured through the unique collocation of Watervliet Arsenal and Benet Laboratories in Watervliet, NY.*

JOE SITES is vice president and director for Defense Systems at BRTRC Inc., Fairfax, VA, and a 1951 West Point graduate. During his 30 years of active duty, he served in both the Korean and Vietnam conflicts. He also served 9 years in Europe, including assignment as a student at the Italian War College and as an operations officer on a NATO staff at Verona.

From The Acting Director, Acquisition Career Management Office (ACMO)

We bid a fond farewell to COL Tom Rosner, former Director, Acquisition Career Management Office, who retired Feb. 13, 1998. COL Rosner's contributions to improving acquisition career management and the Army Acquisition Corps (AAC) will be long lasting. His dedication and service are greatly appreciated by all of us in the ACMO. His work will personally benefit many of you in the Army Acquisition Workforce. We wish him the best of luck in his new career in the private sector!

As reported in the article below, the ACMO has moved to a new location during the Pentagon renovation! Our new address is as follows:

Acquisition Career Management Office (ACMO)
2511 Jefferson Davis Highway
Arlington, VA 22201-3911

All of the new phone numbers for the ACMO are listed at the AAC website: **http://www.dacm.sarda.army.mil/contacts/acmo.html.** While visiting this site, browse through the other valuable information and subscribe to news section updates! From the opening page, click on "News" and subscribe! Being accessible to the workforce and having information readily available remain top priorities for the ACMO.

In late March, a new roadshow, sponsored by the Deputy Director for Acquisition Career Management begins in Huntsville, AL, in conjunction with the Regional Army Acquisition Workshop. Keith Charles, Deputy Director for Acquisition Career Management, will address the Army Acquisition Workforce Wednesday, March 25. These roadshows will take place every month in different locations throughout the United States. In conjunction with these roadshows, the ACMO will send a Mobile Acquisition Career Management Office (MACMO) team to each location. The MACMO team will consist of a Proponency Officer, a Functional Acquisition Specialist, an Acquisition Workforce Support Specialist, and Acquisition Education and Training, and Information Technology personnel. This MACMO team will provide one-on-one counseling, answer questions related to Acquisition Career Record Brief updates, and assist with any other acquisition career management problem. The roadshow schedule is on the AAC home page, so be sure to check when the MACMO team will be near you!

In conjunction with the roadshows, the ACMO is offering a series of training seminars to the Corps Eligible population. Prior to the roadshow, Corps Eligibles will be invited to participate in training seminars on such topics as *Career Architect, Mentoring for Achievement, Working With and Managing Others, and Developing Leaders of Character.* One or more seminars will be available, depending on the population at each location. We strongly urge you to take advantage of this unique opportunity.

Finally, be on the lookout for the July-August edition of *Army RD&A*, which will be devoted to acquisition career development!

Mary Thomas
Acting Director
Acquisition Career
Management Office

OASARDA Moves To Crystal City

As part of the Department of Defense Pentagon Renovation Project, the majority of personnel in the Office of the Assistant Secretary of the Army for Research, Development and Acquisition (OASARDA) in Wedge One (Corridors 2½ to 4½, Floors 1 to 5) of the Pentagon moved during February 1998 to Presidential Tower (9th, 10th and 11th floors) in Crystal City, Arlington, VA.

The Assistant Secretary of the Army (Research, Development and Acquisition), his Military Deputy, and their support personnel remain in Room 2E672 of the Pentagon. In addition, the OASARDA Deputies and a small contingent of personnel from other OASARDA organizations moved to Rooms 2E661 to 2E675 in the Pentagon. Special Programs, which is a Sensitive Compartmented Information Facility, also relocated within the Pentagon.

Updated information on new telephone numbers for OASARDA personnel and other move-related details are on the website: **http://www.sarda.army.mil/renovation/**.

PERSCOM Notes . . . Army Acquisition Corps Senior Service College Attendance

Twenty-eight Army Acquisition Corps (AAC) officers will attend Senior Service Colleges (SSCs) during academic year 1998-99. Two officers from an initial list of 30 AAC selectees have since retired and will not attend. Of the 28 officers who will attend, 21 will attend the SSC they selected as their first choice.

Careful consideration was given to each officer's preferred school, the published criteria for each school, and the possible follow-on assignment for each officer.

The following list identifies each officer, their functional area (FA), and the SSC they will attend:

HARVARD UNIVERSITY
JFK SCHOOL OF GOVERNMENT
LTC Robert Birmingham, FA51

UNIVERSITY OF TEXAS (AUSTIN)
ACQUISITION FELLOWSHIP
LTC Robert M. Brown, FA97
LTC Mary Fuller, FA51

LTC Jody A. Maxwell, FA51

INDUSTRIAL COLLEGE OF THE ARMED FORCES

LTC Thomas M. Cole, FA51
LTC Donald P. Kotchman, FA51
LTC Gabriel Leyva, FA53
LTC Steven R. Perry, FA97
LTC Valerie Rasmussen, FA53
LTC Luis Sans, FA97
LTC Robert Reyenga, FA53
LTC Theodore Johnson, FA51

ARMY WAR COLLEGE, CARLISLE BARRACKS, PA

LTC Charles R. Ball, FA53
LTC William D. Beatty, FA51
LTC Joseph M. Brito, FA53
LTC Lauren S. Davis, FA51
LTC Michael A. Hamilton, FA51
LTC Ronald R. Heuler, FA51
LTC William R. Johnson, FA51
LTC Kim C. Leach, FA97
LTC Thomas W. Light, FA51
LTC Tim R. McKaig, FA51
LTC Gregory S. Miller, FA97
LTC James C. Naudain, FA51
LTC Frank S. Petty, FA97
LTC Charles R. Stevens, FA51
LTC John P. Weinzettle, FA51
LTC Karl A. Wickizer, FA51

FY97 Colonel Level Promotion Board Results

The release of a promotion list is always followed by an exhaustive data analysis to "map" the characteristics of the considered vs. selected populations. This article summarizes the initial analysis of the Army Acquisition Corps (AAC) FY97 Colonel Level Promotion Board population.

Acquisition Corps Results

Board members reviewed the files of 79 AAC officers in the primary zone. From this population, 29 were selected by the board. The resulting selection rate of 36.9 percent is slightly below the Army competitive category figure of 39 percent. Additionally, 4 officers were selected above the zone to give the AAC a total of 33 selections and a Defense Officer Personnel Management Act selection rate of 41.8 percent. AAC results by functional area (FA) are as follows:

FA	Considered	Selected	Percent
51	46	17	36.9
53	11	5	45.4
97	22	7	31.8

Who Was Promoted?

Of the 29 officers selected, all were either current or previous centrally selected product managers (PMs) or acquisition commanders. When the board convened, 11 officers were serving as product managers, 8 selectees were serving as contracting commanders, and 1 officer was serving in an acquisition (test) command. Only 5 of the 29 selecteees had not been selected for Senior Service College (SSC) resident or corresponding studies prior to the FY97 Colonel Level Promotion Board.

Trends

Based on the analysis applied to the information above, it is apparent that officers who complete a successful PM/command tour (under the old Officer Evaluation Report (OER) system, number one block OER with supporting narrative from the senior rater) are GENERALLY selected for continued service as colonels. The inflation in the previous OER system required "top block ABOVE CENTER OF MASS" performance as a PM/commander.

Who Was Not Promoted?

Of the 50 officers not selected for promotion to colonel, 15 were either current or former PMs or acquisition commanders. The majority of those officers not selected for promotion to colonel had not served as an O-5 level PM or acquisition commander.

Trends

Clearly, success as a lieutenant colonel PM and/or commander is key to competing for promotion to colonel. Late selection for lieutenant colonel command (especially when the board sees no "command" reports) can lead to non-selection. In the past, these officers have sometimes been selected "above-the-zone" by subsequent boards. This year, four officers were selected by the board in this category, resulting in a 9.7 percent selection rate, significantly higher than the Army competitive category figure of 4.7 percent.

General Observations

The quality of officers selected for promotion continues to be strong. Although early selection for lieutenant colonel PM or command improves one's chances for promotion to colonel, the competition remains tough. Strong potential narrative block comments provided by senior raters still get emphasis from board members. Officers with OERs that contain good, qualitative comments are more competitive than those with OERs that lack such comments.

Summary

The practices of previous boards continue. It is imperative that officers in all consideration zones take time to personally "scrub" their officer record brief to ensure accurate information is conveyed to the board members. Include a recent photo. It is recommended that photos more than 2 years old be replaced. Check your awards, branch and U.S. insignia, etc. Attention to detail makes a difference.

Finally, as a captain or major, seek career-broadening experiences to become competitive for early selection as a lieutenant colonel PM/commander. With limited positions in the program executive offices, the U.S. Total Army Personnel Command will need to rotate captains and

majors approximately every 24 months to ensure a sufficient pool of experienced branch-qualified officers for future PM positions.

FY97 AAC Colonel Selectees

Congratulations to the following acquisition officers selected for colonel in FY97:

Arnone, Robert Francis
Asada, Michael Kazumi
Ball, Charles Randolph
Barlow, Wellsford Vernie Jr.
Bramblett, Howard Travis
Buckstad, Robert Douglas
Cannon, Samuel Michael
Cox, Michael Charles
Coxe, Robert Lloyd Jr.
Daniels, Ricky
Dronka, Paul Joseph
Garrett, Johnny Lee
Griswold, Robert Kelley
Hamilton, Michael Arnett
Horner, Stephen Clark
Jerauld, Gary Duane
Jette, Bruce Donald
Johnson, Joseph Edwin
Kelly, Thomas Patrick
Laymon, William Arthur Jr.
Lesniak, Christopher Francis
Lindsay, Timothy Clark
Ludwig, David William
Major, Edward Bernard
Meriwether, David Payton
Payne, Gary Eugene
Phillips, William Norris
Sheehan, Jed Allan
Siomacco, Edward Michael
Thomas, Dwight Erric
Vondra, Charles Francis
Webster, Cecil Ray
Young, Bryon John

Army Acquisition Corps FY97 Resident Command And Staff College Selection Results

The FY97 Command and Staff College Selection Board results for Academic Year (AY) 98/99 were released Dec. 2, 1997. Sixty-two Army Acquisition Corps (AAC) officers were selected for resident attendance and 48 AAC officers were revalidated for resident attendance. The following are statistics for the 62 officers selected for the first time during this board. These statistics are corrections for those contained in the original selection board memorandum.

Statistics For Selected Officers

Year Group	Functional Area
84 - 7	51 - 32
85 - 13	53 - 12
86 - 17	97 - 18
87 - 21	
88 - 4	

Command And Staff College Slating

The Military Acquisition Management Branch, U.S. Total Army Personnel Command (PERSCOM) was allocated 65 resident Command and Staff College seats for AY 98/99. These included 58 seats at the Army Command and General Staff College, 4 seats at the Air Command and Staff College, and 3 seats at the Navy Command and Staff College. Seats to the Marine Corps Command and Staff College were centrally controlled by the Director, Officer Personnel Management Directorate, PERSCOM. Officers slated to fill the above seats were selected based on the following priorities:

Priority 1: All year group (YG) 83 officers (must be slated).

Priority 2: YG 84 officers with 12 months time on station (TOS) (CONUS) or 24 months TOS (OCONUS).

Priority 3: YG 85 officers with 18 months TOS (CONUS) or 24 months TOS (OCONUS).

Priority 4: YG 88 below zone officers with 24 months TOS (CONUS) or 30 months TOS (OCONUS).

Priority 5: YG 86/87 officers with 24 months TOS (CONUS) or 30 months TOS (OCONUS).

Priority 6: All other selected officers by order of merit required to meet remaining seat allocations.

The figure at the top of page 49 summarizes the Command and Staff College selection status.

Year Group Command and Staff College Selection Status

Year Group	Pop	Tot to Sel	% to Sel	Prev Sel	FY97 Sel	Cur Tot	To Sel	Cur % Sel	Projected* FY98 Sel	FY99 Sel	FY00 Sel
					FA 51						
1984	86	44	51.2%	43	1	44	0	100%			
1985	83	42	50.6%	34	6	40	2	95.2%	2		
1986	64	32	50.0%	14	12	26	6	81.3%	5	1	
1987	66	33	50.0%	4	12	16	17	48.5%	12	4	1
1988**					1						
					FA 53						
1984	28	15	53.6%	13	2	15	0	100%			
1985	31	16	51.6%	10	3	13	3	81.3%	3		
1986	20	10	50.0%	4	2	6	4	60.0%	3	1	
1987	21	11	52.4%	1	4	5	6	45.5%	3	2	1
1988**					1						
					FA 97						
1984	43	22	51.2%	16	4	22	0	100%			
1985	32	16	50.0%	11	4	15	1	93.8%	1		
1986	20	10	50.0%	4	3	7	3	70.0%	2	1	
1987	29	15	51.7%	2	5	7	8	46.7%	5	2	1
1988**					2						

* The projected number of selections for FY 98, FY99, and FY00 are subject to change within the Total to Select ceilings.

** Below Zone selects.

From The Acquisition Reform Office...

What We Buy and How We Pay For It

According to Dr. Jacques S. Gansler, Under Secretary of Defense for Acquisition and Technology, the two big acquisition issues are developing and buying the right weapons for 21st century military superiority and paying for weapons modernization with a constrained budget. In speeches to government and industry forums, Gansler related his opinions about how the Department of Defense (DOD) should move forward. He announced that his personal goal during his tenure is to focus all of his energies on the detailed implementation required to address two critical questions: What we buy and how we pay for it.

What We Buy

As we enter the 21st century, our major challenge will be to specify, develop, equip, train, and support America's splendid fighting forces with the weapons and other essential military systems required to meet projected threats. These projected threats range from actions by terrorists, transnational actors and rogue nations, through major urban and theater warfare, up to nuclear war. As the Joint Chiefs of Staff stressed in "Joint Vision 2010," the key to handling likely scenarios of 21st century warfare will be our ability to achieve truly integrated, multi-Service operations at all levels, and increasingly, on a multinational basis. This new strategic and tactical environment will make it critically important to recognize that many future military needs cannot be met through simple extensions or subsets of current operations and equipment. Numerous military system developments and procurements are under way to address the likely sources and targets of threats to the United States—ballistic missile defense, some next-generation platforms, weapons, and system upgrades. In light of our present position of military superiority, however, we can allocate more of our resources toward remedying areas of perceived deficiencies and creating new technological opportunities for meeting the requirements of future military conflict. There are five specific goals that Gansler believes require immediate attention:

• We must create an integrated, secure, and "smart" command, control, communications, computing, intelligence, surveillance, and reconnaissance (C4ISR) infrastructure on a multi-Service basis. This infrastructure must take into account both our strategic and tactical needs. This is the critical element of an effective 21st century warfighting capability and the backbone of the Revolution in Military Affairs. It is the key to our strategy of "information dominance."

• We must develop and deploy long-range, all-weather, low-cost, precise, and "smart" weapons. This will allow us to achieve maximum fire power on targets (either fixed or mobile) from air, land, or sea with minimum loss of life. It will allow us to take full advantage of the advanced C4ISR systems, such as providing in-flight retargeting updates to weapons launched from remote platforms.

• We must improve the rapid force projection and global reach of our military capability. With uncertainty over where our forces will be required and the need for extremely rapid response to a crisis anywhere in the world, this capability—when combined with the first two elements—will provide the United States with overwhelming military superiority.

• We must develop and deploy credible deterrents and, if necessary, military defense against projected, less "traditional," early 21st century threats—biological, chemical and nuclear weapons, urban combat, information warfare, and large numbers of low-cost ballistic and cruise missiles. These are areas of growing concern and likelihood, and we can no longer put them into the "too hard" category. They must be addressed as priority issues, even if that means taking resources from programs aimed at more traditional threats.

• We must achieve interoperability with our allies, an essential requirement for coalition warfare. As events over the last few years have shown, coalition warfare is likely to be the normal case. Therefore, we must work closely with our allies to ensure that their technologies represent a strong complement to our forces. They too must be participants in the Revolution in Military Affairs, and the C4ISR systems and advanced weapons that we are using must be fully interoperable.

How We Pay for It

The second major challenge the United States faces is how to pay for this required modernization within a constrained budget. This will require a significant realignment of overall DOD resources to reflect 21st century military needs. To meet this challenge, we must fully implement a "Revolution in Business Affairs," both within DOD and with its industrial base. Joint success in this venture will achieve performance gains at far lower cost. To do this, the government must take advantage of technologies and management lessons that U.S. commercial industry has put in place over the last decade as it returned to its leadership position in worldwide commerce. How will we accomplish all this?

• We must aggressively pursue and fully implement the acquisition reform initiatives of the past several years and add to these where appropriate. Many reforms are already in motion—"cost as an independent variable"; short acquisition cycles; advanced concept technology demonstrations (ACTDs); "single process initiative"; etc. All of these must be pursued aggressively, with detailed action plans and, especially, metrics. They must be fully implemented if DOD is to achieve its desired objective of "faster, cheaper, and better" development, production, and support of both current and future systems.

• We must broaden the defense industrial base to meet our goal of putting in place the required 21st century defense systems at a much lower cost and with greater speed. All this must be accomplished within required state-of-the-art performance objectives. Here, three factors are critical: we must maintain competition, achieve civil/military integration, and take full advantage of the global marketplace.

• There must be a significant shift of DOD resources from support to modernization and combat—a conversion from "tail" to "teeth." Industry found it had to attack this problem to improve performance and, at the same time, reduce overall costs. Lower DOD support costs can result from widespread application of commercial technology and products, advanced information systems, and competitive sourcing of all non-inherently governmental functions. The last of these could provide tens of billions of dollars in potential additional business opportunities each year to competitive U.S. industries. All the empirical evidence indicates that such competition will result in dramatic improvements in performance, along with more than a 30-percent reduction in costs.

• We must dramatically transform the current DOD logistics ele-

ments of the acquisition system to achieve much faster response at a much lower cost. "Focused logistics" is one of the four major objectives of "Joint Vision 2010." Our first priority is clear: more reliable equipment at a much lower cost. "Modernization through Spares," particularly with commercial parts and subsystems, is a key to this effort. This, however, must be supported by an overall reengineering of the logistics process. The broad objective of this reengineering is to transform DOD logistics from one based on Cold War scenarios to one incorporating best commercial practices, advanced information systems, and rapid transportation to provide highly responsive logistics support at significantly reduced costs to our forces in the 21st century. Achieving this will require major reductions in cycle times to include procurement and production lead time, repair cycle time, and order-to-receipt time. These cycle time reductions will also enable us to reduce infrastructure and current inventory levels by tens of billions of dollars. U.S. world class commercial firms across a wide range of industries have already done this. We must pursue similar aggressive actions throughout DOD.

• We must focus our energies on enhancement of the overall Acquisition Workforce to achieve efficient and effective modernization of the DOD acquisition system. The key to the success of all of the required changes is the people within the government responsible for their successful implementation. As we move to more sophisticated processes that require decision-making empowerment down to lower levels in the workforce, we must have the right people for the government's role—specifically, more systems thinkers and good managers, fewer detailed designers. It is essential, therefore, that the training and education of these people be the best possible. This is an area that must receive increased and continuing emphasis. We can no longer assume that someone who once took an acquisition or logistics course is currently up-to-date.

In summary, Gansler noted that Defense modernization is the key to our nation's ability to meet the challenges posed by what we consider to be the most likely threats to our national security as we enter the 21st century.

MTS Strategy Key To Army Reserve Rebuild Program

The application of the Modernization Through Spares (MTS) strategy to the U.S. Army Reserve's (USAR) M915 Truck, Tractor Upgrade (Glider Kit) Program will be fundamental in transforming a Defense Reutilization Market Office candidate into a technologically proven, mission-ready asset. The current M915 fleet is approaching the end of its service life with little relief in near-term procurement dollars programmed for the existing Extended Service Program for the USAR. The MTS approach provides a 10- to 15-year life extension for this valuable but aging line haul fleet. The Glider Kit Program is a performance-based requirement. Restoring form, fit, and function saves over one-half the cost of replacing the fleet ($60,000 savings per conversion). The program uses USAR soldiers and facilities in applying a commercial off-the-shelf kit. The MTS approach ensures system readiness, returns performance to the original design, improves safety, and reduces life cycle costs for this line haul fleet.

Implementing A Paperless Contracting Process

The Deputy Secretary of Defense, Dr. John J. Hamre, has directed that each Service implement a paperless contracting process by Jan. 1, 2000. The goal of the paperless contracting initiative is to eliminate all DOD internally required non-digital transactions (e.g., paper documents, forms, reports) from the DOD contracting process. The paperless effort will focus on that portion of the contracting continuum that encompasses requirement's definition through contract closeout, to include interfaces with the logistics, finance and administrative communities.

The Army's visionary concept of paperless acquisition is to acquire supplies, equipment and services necessary to support Army XXI. The goal is to harness current technology to create an electronic infrastructure requiring no paper documentation. The Army's implementation plan lays a basic foundation for a paperless contracting system. A Working Integrated Product Team (WIPT) will define the exact processes, initiatives and measurements of success that will lead the Army to a paperless contracting environment. The WIPT will establish the Army's master plan for implementing paperless contracting no later than (NLT) March 27, 1998. It will monitor initial implementation Armywide and report metrics on progress. An Army Project Office will be established in April 1998 to manage implementation throughout the Army with responsibility for eliminating all paper transactions NLT Sep. 30, 1999.

For additional information on Acquisition Reform, contact LTC L. Hooks on (703) 681-9479, or e-mail: **hooksl@sarda.army.mil.**

PERSONNEL

Gansler Named Under Secretary of Defense (Acquisition and Technology)

Dr. Jacques S. Gansler has assumed new duties as the Under Secretary of Defense (Acquisition and Technology), succeeding Paul G. Kaminski. Prior to this appointment, Gansler served as the Executive Vice President and Director for TASC Inc., an applied information technology company in Arlington, VA.

He has also held assignments as Deputy Assistant Secretary of Defense (Materiel Acquisition); Assistant Director of Defense Research and Engineering (Electronics); and Vice President, ITT.

Gansler has served on numerous special committees and advisory boards including Vice Chairman, Defense Science Board; Chairman, Board of Visitors, Defense Acquisition University; Director, Procurement Round Table; Chairman, Industry Advisory Board of Visitors, University of Virginia; Chairman, Board of Visitors, University of Maryland, School of Public Affairs; member of the FAA Blue Ribbon Panel on Acquisition Reform; and senior consultant to the Packard Commission on Defense Acquisition Reform.

He is also the author of *Defense Conversion: Transforming the Arsenal of Democracy; Affording Defense;* and *The Defense Industry.*

Gansler holds a bachelor of engineering degree from Yale University, a master of science in electrical engineering from Northeastern University, an M.A. in political economy from the New School for Social Research, and a Ph.D. in economics from American University.

Winners And Losers

Do you want to win or lose in your career, in school, in a business, or just in the game of life in general? The choice is yours!

A winner says, "If it is to be, it is up to me."
A loser says, "I can't help it."

A winner translates dreams into reality.
A loser translates reality into dreams.

A winner empowers.
A loser controls.

A winner says, "Let's find out."
A loser says, "Nobody knows."

A winner is part of the solution.
A loser is part of the problem.

A winner is not afraid of losing.
A loser is afraid of winning.

A winner works harder than a loser.
A loser is always "too busy."

A winner says, "I was wrong."
A loser says, "It wasn't my fault."

A winner "wants to."
A loser "has to."

A winner makes time.
A loser wastes time.

A winner makes commitments.
A loser makes promises.

A winner says "I'm good, but not as good as I can be."
A loser says, "I'm not as bad as a lot of other people."

A winner listens.
A loser just waits until it's his/her turn to talk.

A winner catches people doing things right.
A loser catches people doing things wrong.

A winner learns from others.
A loser resents others.

A winner sees opportunities.
A loser sees problems.

A winner does it.
A loser talks about it.

A winner feels responsibility for more than his job.
A loser says, "I only work here."

A winner says, "There ought to be a better way."
A loser says, "That's the way it's always been done."

A winner celebrates others.
A loser complains about others.

A winner is willing to "pay the price."
A loser expects it on a "silver platter."

A winner expects success.
A loser expects failure.

Remember: There is no time to lose, but so much time to WIN! So be sure to MAKE it a WINNING life!

BOOKS

Department Of Defense Report *Proliferation: Threat And Response 1997*

Reviewed by Joe Sites, Vice President, Director for Defense Systems, BRTRC Inc., Fairfax, VA

During a DOD news briefing on Nov. 25, 1997, Secretary of Defense William Cohen released the report, *Proliferation: Threat and Response 1997*. This report provides an exceptional discussion of the challenge (not just for the United States) resulting from the proliferation of nuclear, biological and chemical (NBC) weapons, and includes DOD's response to the proliferation problem.

Clearly, the threat of wartime use of NBC weapons has been factored into military planning since the inception of these weapons. Today, however, as a result of proliferation, we are faced with different problems. Nations that are otherwise militarily weak may well resort to the use of weapons of mass destruction. In addition to the military use of these weapons, we must now be concerned with their use by terrorists. This concern is illustrated by a quotation from the report: "The March 1995 attack on the Tokyo subway by the religious group Aum Shinrikyo using the nerve gas sarin was the most glaring example of terrorist use of these kinds of weapons. This attack crossed the psychological boundary and showed that the use of NBC weapons was no longer restricted to the traditional battlefield."

This report identifies specific threats both by region (e.g., Northeast Asia) and by nations within the region (e.g., China and North Korea) and discusses why the nations have NBC weapons, their intentions, and delivery capabilities.

The threat from terrorists is classified as a transnational threat. This report focuses on potential sources of weapons

found in a number of different countries or individuals from a number of different countries who may pose a threat.

This report presents a sobering picture of a condition that has grown in importance from being a military problem to being a problem for civilians. The DOD response to the proliferation threat, however, is encouraging and should be understood, in particular, by the RD&A community. The multifaceted response includes counterproliferation programs, chemical and biological defense programs, technical support programs and international programs. All of these programs, however, are aimed at doing one or more of the following: prevent international proliferation, protect U.S. military forces and civilians, and provide a counterforce capability to eliminate NBC targets.

Also included in the report is an excellent glossary that is valuable in our world of acronyms. The document can be electronically accessed at **http://www.defenselink.mil/pubs/prolif97/**.

The Abilene Paradox and Other Meditations On Management

By Jerry B. Harvey,
Josey-Bass Publishers (paper), 1996

Reviewed by LTC Kenneth H. Rose (USA, Ret.), a project manager with the Waste Policy Institute in San Antonio, TX, and a former member of the Army Acquisition Corps

Long before Dilbert became the darling of office bulletin boards, Jerry Harvey was poking insightful holes in the armor of organizational beliefs. A 1996 paperback edition of *The Abilene Paradox and Other Meditations on Management* makes his unique humor and wit available for discovery to a new generation and for review and reflection to the old.

First published in 1988, the book is a collection of vignettes that address traditional foundations of organization and management, and turn them on their ear. The flagship chapter, "The Abilene Paradox: The Management of Agreement," is probably the most well known—it was made into a movie that is still shown on the seminar circuit—but may not be the most understood. The essence of the Abilene paradox is agreement: all members of the story's group agree individually that getting in the family car and driving a hot, dusty 50 miles to Abilene to have lunch at a so-so diner is not a very good idea ... so collectively, they all get in the car and go to Abilene. The group faced no conflict, no coercion, no groupthink or group tyranny. They agreed not to go, but still, they went. That's the paradox.

Harvey suggests that this behavior results from a failure to manage agreement, and that this is just as much a challenge to organization leaders as managing and resolving conflict. To develop a preventive prescription, he reaches into psychology and calls forth concepts that explain the paradox and lay a path around it.

In a related chapter, "Group Tyranny and the Gunsmoke Phenomenon," a courageous Marshal Dillon faces down an angry mob on a darkened street. Harvey suggests that the situation is not one of courage, but rather a matter of wisely assessing risk and providing the members of the group an opportunity not to do something that they don't really want to do anyway.

Both of these vignettes are relevant to program managers. The first explicitly so because Harvey cites as an example an R&D project that is pursued even though all agree that it should be canceled. The second requires only a little imagination. Consider the possibility that so-called "pork barrel" programs are not inevitable. Consider that the sponsors of such programs are only waiting (hoping?) for a wise or courageous chief executive to strike them aside with a well-aimed line item veto. Could it be? If it could, Harvey suggests that no one would admit it. That is the essence of the gunsmoke phenomenon.

Another relevant vignette, but one less pleasant in metaphor, is "Eichmann in the Organization." In this story, a university professor is approached by a colleague during times of budget cuts and downsizing. The colleague asks for collaboration in protecting their two departments from reduction by considering making cuts to another department that clearly is not pulling its weight. The professor declines, making a historical comparison to the Holocaust that the colleague finds first offensive, then enlightening.

This vignette is the longest in the book, and the most complex. In characterizing reductions in force as "little murders," Harvey is venturing onto thin ice with traditionalists. But that is where he intends to go, and his invitation to the reader to accompany him is compelling. A similar scenario could play out in government organizations, where downsizing has become a continuing fact of life. It is possible that science and engineering divisions might collaborate to protect their functions and funnel any personnel cuts toward riper targets, such as safety, environmental, or quality functions. The rationale for such action, as in Harvey's vignette, may be seductive: Those offices don't contribute as much as we do, and besides, we can do their work as well as they can.

Alas, Harvey's solution is not a magic bullet in current contexts. Since 1988, the world has changed in ways that obviate some of what he suggests. His thoughts on participative management and structures of altruism, though, may provide beacons for guiding an organization through troubled times.

Two other vignettes in the book are amusing and illuminating. "Captain Asoh and the Concept of Grace" addresses organization learning, error, and blame from a view of individual responsibility. "Organizations as Phrog Farms" is an absolute delight in its pithy comparisons to organizational life, such as: "Most phrogs spend more time flicking flies in the fog than draining the swamp." Two additional vignettes complete the set of seven.

The Abilene Paradox and Other Meditations on Management does not provide answers to every organizational question. Only people can do that—people who know the questions, face them every day, and respond as best they can. Jerry Harvey provides a new way of looking at the world that may reframe some of those questions in such a way that answers are more effective now and in the future. This is a book to be read and considered, and perhaps read again. It aids not the solution, but the method to find the solution. It may, therefore, be more valuable than a book of answers.

Regional Army Acquisition Workshop

The U.S. Army Materiel Command (AMC) Project Manager (PM) Conference has received a facelift. The first Regional Army Acquisition Workshop was held Oct. 30-31, 1997, in Dearborn, MI, in place of the regularly scheduled AMC PM Conference. This regional workshop was the first of future quarterly workshops cosponsored by the Assistant Secretary of the Army (Research, Development and Acquisition) (ASA(RDA)) and AMC. The theme of this regional workshop was "Program Management in a Changing Environment."

The October 1997 workshop began with a welcoming address from the host, MG Roy E. Beauchamp, Commanding General, U.S. Army Tank-automotive and Armaments Command (TACOM), and opening comments from LTG Dennis Benchoff, workshop cosponsor. MG John S. Caldwell, AMC Deputy Chief of Staff, Research, Development and Acquisition (DCSRDA), provided attendees with a review of ongoing efforts within the Office of the AMC DCSRDA to enhance the level of support for AMC PMs.

Each newly established deputy for systems acquisition (DSA), BG Joseph L. Yakovac, TACOM; BG Robert E. Armbruster, Aviation and Missile Command; and BG Dean R. Ertwine, Communications-Electronics Command, provided a brief overview of their operations. They were followed by briefings on various topics including pollution and environmental issues, Test and Evaluation Command testing capabilities, depot workloading, the Acquisition Reform Implementation Assessment Team, program management metrics, and the new Officer Evaluation Report. During the remainder of the first day, LTG Benchoff received a program briefing from each TACOM PM that he senior rates.

The second day of the workshop began with a welcome from workshop cosponsor, LTG Paul J. Kern, Military Deputy to the ASA(RDA), and opening remarks from Dr. Kenneth J. Oscar, Acting ASA(RDA). Topics included partnering, modernization through spares, life cycle cost management, fleet management, and operation and M1 Abrams tank support cost drivers.

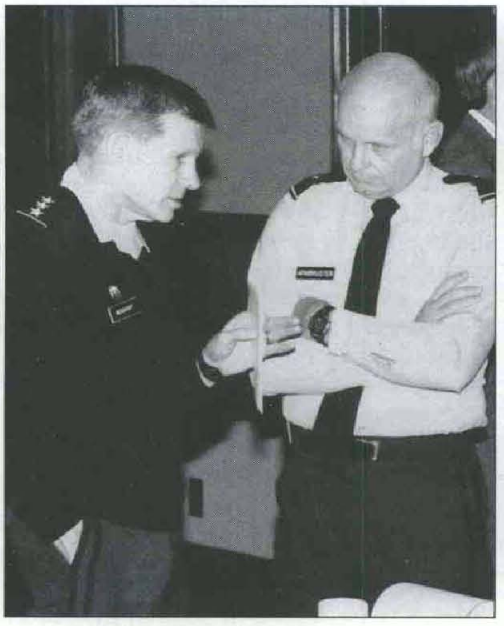
The afternoon Executive Session was devoted to an examination of the progress made toward Army digitization. BG William L. Bond, Director of the Army Digitization Office, provided an overview of the digitization effort. Each program executive officer (PEO) and DSA then discussed the digitization issues and barriers related to their programs.

The workshop also provided an opportunity for Dr. Oscar to present the 1997 Project Manager of the Year Award to COL James B. Cross for his efforts as PM, Mobile Electric Power. Cross, who now serves as Director of the Army Acquisition Executive Support Agency, was recognized for his exemplary management of financial and personnel resources, his innovation in acquisition reform, and his ability to effectively modernize the Army inventory of generators.

These new regional workshops will be conducted three times annually. The purpose is to provide discussion forums on "regional" issues and topics and to provide PMs and acquisition commanders a forum to interact with senior members of the Army acquisition leadership. Attendees at regional workshops will include PEOs, AMC DSAs, all PMs and acquisition commanders located within the region, senior members of the Army acquisition leadership, senior U.S. Army Training and Doctrine Command (TRADOC) representatives, and invited guests. An Executive Session will be held immediately following the regional workshop. The Executive Session will be limited to PEOs, DSAs, PMs who report directly to the Army Acquisition Executive, and senior members of the Army acquisition leadership. The purpose of the Executive Session is to provide the senior acquisition leaders a forum to discuss issues impacting the Army and the acquisition community.

The annual Army Acquisition Workshop will continue to be sponsored by the ASA(RDA). All PMs, acquisition commanders, PEOs, DSAs, senior Army acquisition leaders, senior TRADOC representatives, and invited guests will attend the annual workshop. The purpose is to provide the senior Army acquisition leaders an opportunity to express their vision and philosophies. It will also provide a forum to exchange ideas, discuss issues of mutual interest, share lessons learned, and recognize PM achievements through presentation of Project and Product Manager of the Year Awards.

The first Regional Army Acquisition Workshop was considered to be a great success. Attendees were provided with significant insights into many of the issues and concerns facing the acquisition community, and in many cases, were provided with the tools to effectively deal with these issues. The PEO, Air and Missile Defense will host the next regional workshop, tentatively scheduled for March 26-27, 1998, in Huntsville, AL.



LTG Dennis Benchoff (left), AMC DCG, and BG Robert E. Armbruster, AMCOM DSA, converse during one of the conference breaks.

LTG Paul J. Kern, Military Deputy to the ASA(RDA).

CONFERENCES

Research Laboratory Hosts Military Symposium

More than 55 officers and senior noncommissioned officers (NCOs) from the Army Research Laboratory (ARL) attended a Military Symposium late last year. The symposium was held at the ARL's newly constructed, $76 million Rodman Materials Research Laboratory at Aberdeen Proving Ground (APG), MD. ARL, which is the corporate laboratory for the Army, has locations across the country, and soldiers came from each of ARL's five geographically dispersed directorates to attend this meeting.

The purpose of the symposium was threefold: to enhance the professional interaction among the soldiers in ARL and its Army Acquisition Corps (AAC) ranks; to broaden career field knowledge in areas such as the Army After Next; and to inform soldiers of recent research, development and acquisition (RDA) changes and enlighten the military on RD&A plans.

On the first day, invited speakers briefed officers and enlisted soldiers on the latest Army information. BG Harry D. Gatanas, Assistant Deputy, Systems Management and Horizontal Technology Integration, Office of the Assistant Secretary of the Army (Research Development and Acquisition) (OASARDA), commented on the status of the Army modernization effort, acquisition reform, horizontal technology integration, and the research, development, test and evaluation focus within the Army.

COL Charles R. Rash, Deputy Assistant Deputy Chief of Staff for Operations and Plans, Force Development, Office of the Assistant Deputy Chief of Staff for Operations and Plans, Force Development, explained the links among Army efforts related to Force XXI, Army XXI, and the Army After Next.

COL Michael Starry, Assistant Deputy Chief of Staff for Doctrine, U.S. Army Training and Doctrine Command, then gave a more detailed discussion on the Army After Next and technologies needed for the future.

Dr. C. David Brown, Chief, Simulation and Technology Division, U.S. Army Test and Evaluation Command (TECOM), explained TECOM's future vision, the concept of the virtual proving ground and how these relate to each other, and ARL's mission and projects.

While the NCOs met with ARL's Sergeant Major James F. Tobiasz, the officers received a briefing on the new Officer Evaluation Report System from CPT Ruthann Murff, Career Manager for functional areas 53 and 97, Military Acquisition Management Branch, U.S. Total Army Personnel Command.

COL William Fast, AAC Proponency Officer, Acquisition Career Management Office, OASARDA, provided information and fielded questions on the current and future state of the AAC.

On the second day of the symposium, attendees toured the new Rodman Laboratory, which officially opened in July 1997. This state-of-the-art laboratory is the lead Army center for materials research and development. Scientists and engineers in the laboratory conduct research on advanced materials for individual soldier protection and armored vehicles, such as polymers, adhesives, fibers, protective coatings, lightweight metals, opaque and transparent ceramics, and composites. It was built following the closure of the Watertown Arsenal in Massachusetts under the 1988 Base Realignment and Closure Act. The building is 297,000 square feet and it sits on 6.5 acres. It is the largest facility at APG.

The group then heard Michael Fisette, Principal Deputy for Technology, Headquarters, Army Materiel Command (AMC), provide an overview of the Quadrennial Defense Review process, recommendations, current status, and potential impacts on AMC.

The remainder of the second day included briefings by soldiers from each of ARL's five directorates and two centers on their current projects. The directorates focus on such technology areas as information and computer science; sensors and electron devices; weapons and materials research for survivability and lethality; human research and engineering; and analyses for survivability and lethality; while the two centers specialize in vehicle technology and corporate information. These briefings gave attendees new insight regarding current technology research and development within the ARL. Several potential cooperative research projects were identified, as well as opportunities for cross-directorate collaboration.

Traditionally, military personnel spend an average of 2½ years at the ARL. All officers assigned to the ARL are in designated AAC engineer and scientist positions. Most enlisted positions are also coded as research and development. Currently, there are 35 officers and 40 enlisted soldiers assigned to ARL, occupying important positions and providing invaluable assistance to their civilian counterparts.

ARL scientists are committed to providing the Army with key research that will have profound technological advances on the Army well into the next century.

Army Engineer Center Hosts Conferences

The U.S. Army Engineer Center, Fort Leonard Wood, MO, will host four concurrent conferences from April 21, 1998, through April 24, 1998: the Engineer Force XXI Conference, the U.S. Army Corps of Engineers District Commanders' Conference, a Major Command Engineers' Conference, and a Director of Public Works Conference. For more information, contact CPT Mark Maciel at **macielm@wood.army.mil**, DSN 676-7015, or (573) 596-0131 (ext. 37015). Details are available on the U.S. Army Engineer Center's homepage at **http://www.wood.army.mil**.

NEWS BRIEFS

Technology Navigator Improves Access to Technical Information

The Defense Technical Information Center (DTIC) has announced the availability of Technology Navigator, a DTIC-sponsored website to improve access and exchange of scientific and technical information.

Technology Navigator uses the Internet and the government's "intranets" to enable government, industry, and academia to share research efforts on today's technology issues with others. This information sharing is designed to match the interests and requirements of government technologists and program managers with various products and service providers and researchers.

The service is focused on information technology and measurements and signatures technology. Sample topics include automated warning, anomaly detection and discovery tools; advanced radio frequency sensors; collaborative analysis tools and groupware; and human-computer interface for information systems.

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NEWS BRIEFS

Army Researchers Work On Realistic Holograms

In the future, a battlefield commander may be able to plan battles on miniature battlefields using miniature, but totally realistic, troops, tanks, and other weapons in the form of three-dimensional (3-D) holograms that move on command.

Sound like science fiction? It is, for now. However, a small group of researchers at the Army Research Laboratory are working to make 3-D holograms a useful reality for advanced displays for the military and other applications.

A group of researchers led by Dr. Gary Wood, a physicist in the Sensors and Electron Devices Directorate (SEDD) at Fort Belvoir, VA, has created a monochromatic 3-D hologram using a laser to illuminate an object and "write" its image into a photorefractive crystal. Another laser then projects that image into a liquid scattering material. The result is a realistic 3-D holographic image that is written and read in real time.

Other researchers in the group include Brian Ketchel, SEDD; Dr. Richard Anderson, a visiting researcher from the National Science Foundation; Professor Greg Salamo, a visiting researcher from the University of Arkansas; and Dr. Christy Heid, who is serving a post-doctorate appointment with SEDD.

Wood says that his team's main research is in the area of developing eye and sensor protection from lasers on the battlefield. However, their investigations of photorefractive materials for laser protection led to some interesting offshoots of which 3-D holography is one. "Our research has been fruitful in terms of science and potential applications, but we haven't seen any of them mature enough to be put in an Army system," he says. Wood, who leads the Non-Linear Optics Team at SEDD, sees a number of potential uses for 3-D holograms, including data storage, advanced displays, medical applications and entertainment. "One possible application is storing information in the crystals. There is the potential to store orders of magnitude more information than on magnetic tape," Wood says. The crystals also require no special climate control to prevent degradation while stored.

A problem that must be solved before this and other potential applications can be accomplished is fixing the diffraction gratings (which contain the image and information) permanently within the crystal.

Wood explains that now when a crystal is read out, the information disappears. "You can only read it once or, at best, a limited number of times," he says.

Although his group is not working directly on that problem, he says they are keeping a close eye on the developments of an effort by the Advanced Research Projects Agency to solve the problem. "We would like to take advantage of that ability to fix gratings which then could be read out with a laser. With that, you can store and present a three-dimensional view of the world," he notes.

Wood points out that the holograms would have practical applications not only in advanced displays for the military, but others like the medical community could use the technology for example to project a realistic 3-D display of organs within the body cavity for training young surgeons or working through a difficult operation before actually performing it. Wood also believes the holograms would be of great interest to the entertainment industry for uses ranging from illustrating books to 3-D presentations in theaters or in the home.

LETTERS

Dear Sir:

A comment on the article, "Modernization Through Spares" by Lynn Mohler (November-December 1997, *Army RD&A*).

For me, articles or talks on acquisition reform, performance specifications, and modernization through spares are "preaching to the choir." However, the dissertations on these subjects that I have seen lessen their effectiveness with the Acquisition Workforce because of the kinds of examples used to present the value of our new way of doing business. Army equipment is based on mechanics, chemistry and electronics and the soldier's materials are largely managed by mechanical/civil/aeronautical, chemical and electrical engineers. However, the examples presented to illustrate the new techniques and the benefits they bring are virtually all from the area of electronics. These examples do not influence or mean much to the engineers responsible for items containing no electronics. Moreover, electronics examples such as the performance growth of the Intel computer chip are simple and obvious. Modernization of mechanical spares would be much more meaningful and instructive.

The article is typical in that it contains examples of four specific items and examples of six general approaches to support the wisdom of modernizing through spares. Of these ten illustrations only one is not in the area of electronics. Yes, modernizing through spares is worthwhile, but articles on this subject as well as on acquisition reform in general would be far more effective if they were supported by a broader range of examples.

John Paul Fiala
Chemical and Biological
Defense Command

Author's Response:

You are right on target with your comment that the examples in the article tended to be electronic in nature. These were the examples offered by the Army community at the AMCOM MTS seminar in May 1997. Subsequently, an Overarching Integrated Process Team (OIPT) was chartered by the Acting Assistant Secretary of the Army (RDA) and chaired by the Army Standards Improvement Executive with the direction to develop an MTS implementing strategy for application across all Army product lines and assist in the implementation. The OIPT has completed the first edition of the Army Strategy for Modernization Through Spares.

This guidance document is expected to be available on the AMC Military Specification and Standards homepage at **http://amc.citi.net/amc/rda/milspec** by 31 January 1998.

The MTS initiative was implemented by a joint SARDA/AMC memo dated 12 January 1998. As a result, all offices that manage systems in development, production or support phases should incorporate the MTS strategy into their total life cycle management program activities.

To answer your specific question about a broader range of examples, we are continually searching for good examples from program and item managers and since May 1997 have identified some good non-electronic examples. I'm sure more examples will be forthcoming as Army managers gain experience with the MTS concept. We will capture that experience and share more examples across the many Army commodity lines as implementing organizations post their plans and results on their home pages. The OIPT, with representatives located in Army acquisition and logistics organizations, will continue to assist Army program and item managers during the implementation period.

Thanks,
Lynn

ARMY RD&A WRITER'S GUIDELINES

About Army RD&A

Army RD&A is a bimonthly professional development magazine published by the Office of the Assistant Secretary of the Army (Research, Development and Acquisition). The address for the Editorial Office is: DEPARTMENT OF THE ARMY, ARMY RDA, 9900 BELVOIR RD SUITE 101, FT BELVOIR VA 22060-5567. Phone numbers and e-mail addresses for the editorial staff are as follows:

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Purpose

To instruct members of the RD&A community relative to RD&A processes, procedures, techniques and management philosophy and to disseminate other information pertinent to the professional development of the RD&A community.

Subject Matter

Subjects of articles may include, but are not restricted to, policy guidance, program accomplishments, state-of-the-art technology/systems developments, career development information, and management philosophy/techniques. Acronyms should be kept to a minimum and, when used, be defined on first reference. Articles with footnotes are not accepted.

Length of Articles

Articles should be approximately 1,500 t o 1,600 words in length. This equates to approximately 8 double-spaced typed pages, using a 20-line page.

Photos and Illustrations

Include any photographs or illustrations which complement the article. Black and white is preferred, but color is acceptable. Graphics may be submitted in paper format, or on a 3 1/2-inch disk in powerpoint, but ***must be black and white only, with no shading, screens or tints***. We cannot promise to use all photos or illustrations, and they are normally not returned unless requested.

Biographical Sketch

Include a short biographical sketch of the author/s. This should include the author's educational background and current position.

Clearance

All articles must be cleared by the author's security/OPSEC office and public affairs office prior to submission. The cover letter accompanying the article must state that these clearances have been obtained and that the article has command approval for open publication.

Offices and individuals submitting articles that report Army cost savings must be prepared to quickly provide detailed documentation upon request that (1) verifies the cost savings; and (2) shows where the savings were reinvested. Organizations should be prepared to defend these monies in the event higher headquarters have a higher priority use for these savings. All Army RD&A *articles are cleared through SARD-ZAC. SARD-ZAC will clear all articles reporting cost savings through SARD-RI. Questions regarding this guideline can be directed to SARD-ZAC, Acquisition Career Management Office, (703)695-6533, DSN 255-6533.*

Submission Dates

Issue	*Author's Deadline*
January-February	15 October
March-April	15 December
May-June	15 February
July-August	15 April
September-October	15 June
November-December	15 August

Authors should include their address and office phone number (DSN and commercial) with all submissions, **as well as a typed, self-adhesive label containing their correct mailing address**. In addition to providing a printed copy, authors should submit articles on a 3 1/2-inch disk in MS Word, or ASCII format. Articles may also be sent via e-mail to: bleicheh@aaesa.belvoir.army.mil

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