development paths for the most challenging requirements — power, voice control, collaborative planning, weight reduction and combat identification. The program office is exploiting technology base expertise at the Army Research and Development Center at Fort Monmouth, NJ, for these parallel paths. This allows the prime contractor, who has total systems integration responsibility, to focus on the primary development path and monitor parallel path progress. The prime contractor, using the systems engineering and integrated product and process development processes will determine if, when and what efforts from the parallel paths will migrate to the primary path.

The parallel path efforts begin after system preliminary design review and last approximately 9 months. Each of the paths results in a prototype demonstration prior to system critical design review in the third quarter of FY04.

Risk Reduction Relationships

The internal LW-SI program risk reduction efforts support a lower risk development of the Land Warrior-Advanced Capability (LW-AC) program. LW-AC is the revolutionary capability plan of the Objective Force unit of action (UA). Both the LW-AC and LW-SI programs take advantage of technologies matured under the Objective Force Warrior Advanced Technology Demonstration (OFW ATD). The OFW ATD will feed LW-SI evolutionary improvements as early as FY06 and provide a foundation for revolutionary improvements for LW-AC.

The Army restructured the Land Warrior program in FY03 to facilitate a lower risk approach that follows a build a little, test a little approach. The program will exploit the CDA as model for Land Warrior to get real world, analogous data on C3 and supportability immediately. Early, short-duration parallel development paths yielding working prototypes mitigate some of the riskier technologies. Close coordination between the OFW ATD and Land Warrior programs will reduce the risk of fielding LW-AC to the UA and reduce the risk that LW-SI capabilities will become obsolete.

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Defining the Objective Force Soldier: TRADOC and the Objective Force Warrior Advanced Technology Demonstration

MAJ Marco J. Barrera and CPT Vincent Grizio

"Soldiers are the centerpiece of our formations."

The Army Vision

Defining the soldier concepts and requirements within the Objective Force (OF) is a daunting task. However, the U.S. Army Training and Doctrine Command (TRADOC) and the science and technology (S&T) community are in close partnership to help provide the answers. In fact, TRADOC and the Army Natick Soldier Center have been working together since the early planning of the Objective Force Warrior (OFW) Advanced Technology Demonstration (ATD) 2 years ago when both communities participated in developing the ATD's exit criteria. Through the OFW ATD, TRADOC, the S&T community and industry are set to refine the soldier operational concepts and user requirements and, ultimately, conduct a technology demonstration that provides the answers to the operational requirements for the OF soldier.

Where the unit of action (UA) operational and organizational (O&O) concept stops, the soldier operational concept begins. Currently, the Future Combat Systems (FCS) UA O&O describes the operational context for the FCS-enabled OF brigade and battalion but does not provide the detail required for small units at company level and below. The soldier and small-unit operational concept developed by TRADOC in conjunction with the OFW ATD will set the conditions for operational requirements that will add the right fidelity to the soldier described in the UA O&O.

> The OFW ATD seeks to exhibit connectivity within the command, control, communications, computers, intelligence, surveillance and reconnaissance network of the UA and Future Force.

The Soldier Concept and the UA O&O

Even in the OF, the dismounted soldier in close combat will continue to possess the greatest operational need. The TRADOC Systems Manager-Soldier (TSM-S) and the Infantry Directorate of Combat Developments (DCD) are developing the third increment of the Land Warrior program and are addressing the operational concept and potential requirement deficiencies OF soldiers may have. The OFW ATD leads the S&T effort to feed mature, advanced technologies into the Land Warrior program. Through direct OFW ATD involvement, the TSM-S will synchronize TRADOC development efforts with this ATD's spiral development process to continuously refine and validate operational concepts and requirements for soldiers and small unit operations.

Army transformation has initiated many programs to make the OF a reality. The UA O&O and the FCS Operational Requirements Document (ORD) provide the requirements for many of the UA platforms and enabling systems. TSM-S and DCD are spearheading the operational concepts and requirements effort for the OF soldier and small unit. The current OF soldier concept documents feed updates into the UA O&O Modes of Maneuver, Chapter 6.3.3.3, and further define soldier capabilities within the FCS UA structure at company level and below. Annex E of the UA O&O addresses the proposed soldier-borne ensemble capabilities, which is an integrated combat uniform that provides individual connectivity to the network, reduced weight through the integration of requirements for soldier systems, greater integrated body armor and better power sources. The user envisions soldier and small-unit operational concepts that describe dismounted, mounted, dismounted supported by mounted, mounted supported by dismounted, aerial envelopment operations and three more additions that include deployment preparations, forced entry operations and sustainment operations. The user envisions further concept refinements to provide a stand-alone soldier operational concept for the OF developed under the Soldier-as-a-System (SaaS) concept documents.

The OF soldier concepts, nested with the FCS UA O&O, will provide the detail missing in many OF documents because it shows how the individual soldier and leader will function within the FCS-enabled OF. This concept shows the integration of the soldier with his soldier-borne equipment and interoperability with FCS family of vehicles and FCS complementary systems. This integration and interoperability enables the soldier's continued role as an integral player in combined arms operations.

Soldier Requirements and the FCS ORD

Not until the OFW ATD and TRADOC's approval of the SaaS Integrated Concept Team (ICT) requirements management process did soldier requirements evolve in a holistic sense. Prior to integration through the SaaS ICT management process, fielding new equipment to a soldier was analogous to hanging additional ornaments on a Christmas tree. The paradigm shift focuses on centrally managing all soldier requirements. The SaaS ICT performs this task with participation from all TRADOC centers and schools. The Joint Capabilities Integration and Development System and TRADOC Pamphlet 71-9, *Force Development Requirements Determination*, provide the current guidance for requirements development. The SaaS ICT provides a custom-tailored approach to this requirements development guidance to address the unique complexities involved with managing SaaS.

The current draft version of the *Land Warrior Block III ORD* consolidates many of the baseline soldier requirements for the OF soldier. *The Land Warrior Block III* requirements document provides the next spiral development of the Land

Warrior program. The Land Warrior Block I and II design addressed close combatants and their vehicle interoperability. Land Warrior Block III evolves to provide OF capabilities to all soldiers — from infantrymen to combat service support soldiers.

The user continues the operational concept effort of streamlining soldier processes through integration of required operational capabilities. A system-of-systems approach ensures continuous integration of required capabilities to increase functionality while reducing weight, space, power requirements and logistic footprint. This effort includes integration of different requirements within this document including the approved Blocks I and II and integration of soldier-related requirements from multiple proponents.

As soldiers begin to perform multiple tasks in support of their missions, the requirements for all soldiers become more common. Requirements normally reserved for infantry soldiers are finding a place with combat service supporters and vice versa. In essence, the requirements address everyone, but to ensure that the "Christmas tree" approach does not continue, TRADOC, in conjunction with the OFW ATD, is working to provide an integrated soldier-borne system with common capabilities that will address the requirements for all OF soldiers. Integrated soldier system development continues by addressing additional requirements for specific military occupational specialty functions layered on top of the common soldier-borne ensemble. Primarily designed for all soldiers in the UA, the Land Warrior Block III vision includes airborne, air assault and special operations units. To further develop Land Warrior Block III requirements, the SaaS ICT is working with all proponents to fully address requirements for all soldiers.

The Way Ahead

Through early collaboration between TRADOC and the OFW ATD communities, the conditions for defining the operational requirements and concepts for the OF soldier are becoming a reality. The soldier and small-unit operational concepts and requirements developed early on by TRADOC assist the S&T community in focusing their development efforts. Conversely, the S&T community will provide answers and reality checks on the future force capabilities provided by the concept and requirement writers. This exchange will drive spiral developments for multiple revisions of the operational requirements and the technology. Phase II of the ATD will conclude with system design lock and Phase III will deliver prototypes for a limited systems demonstration that will provide the first glimpse at the OF soldier. This demonstration will showcase an integrated soldier-borne combat ensemble and its interoperability with FCS enablers that will project the soldier into the OF. The end result marries operational requirements with technological solutions so that soldiers and their supporting systems are better integrated to provide greater lethality, survivability, mobility, sustainability and command and control.

Defining the OF soldier requires answering many hard questions and understanding the daunting requirements for operating in a network-centric, FCS-enabled OF. However, careful thought, concept development, analysis and technology maturation will help refine the soldier's requirements as an interoperable member of the FCS-equipped OF. The developing soldier and small-unit concepts and requirements documents, nested within TRADOC's OF operating capabilities provides the azimuth to guide the S&T community and ensures an integrated soldier concept within the current OF concept documents. The consolidated efforts of TRADOC organizations, the S&T community and industry will help reveal the answers to the hard questions. The resulting systems will enable the soldier and small unit to dominate all opponents with overmatching capability in warfighting environments anticipated during the next 20 years.

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