Stryker Unit Deploys with Land Warrior

Getting Dismounted Soldiers in the Future Network

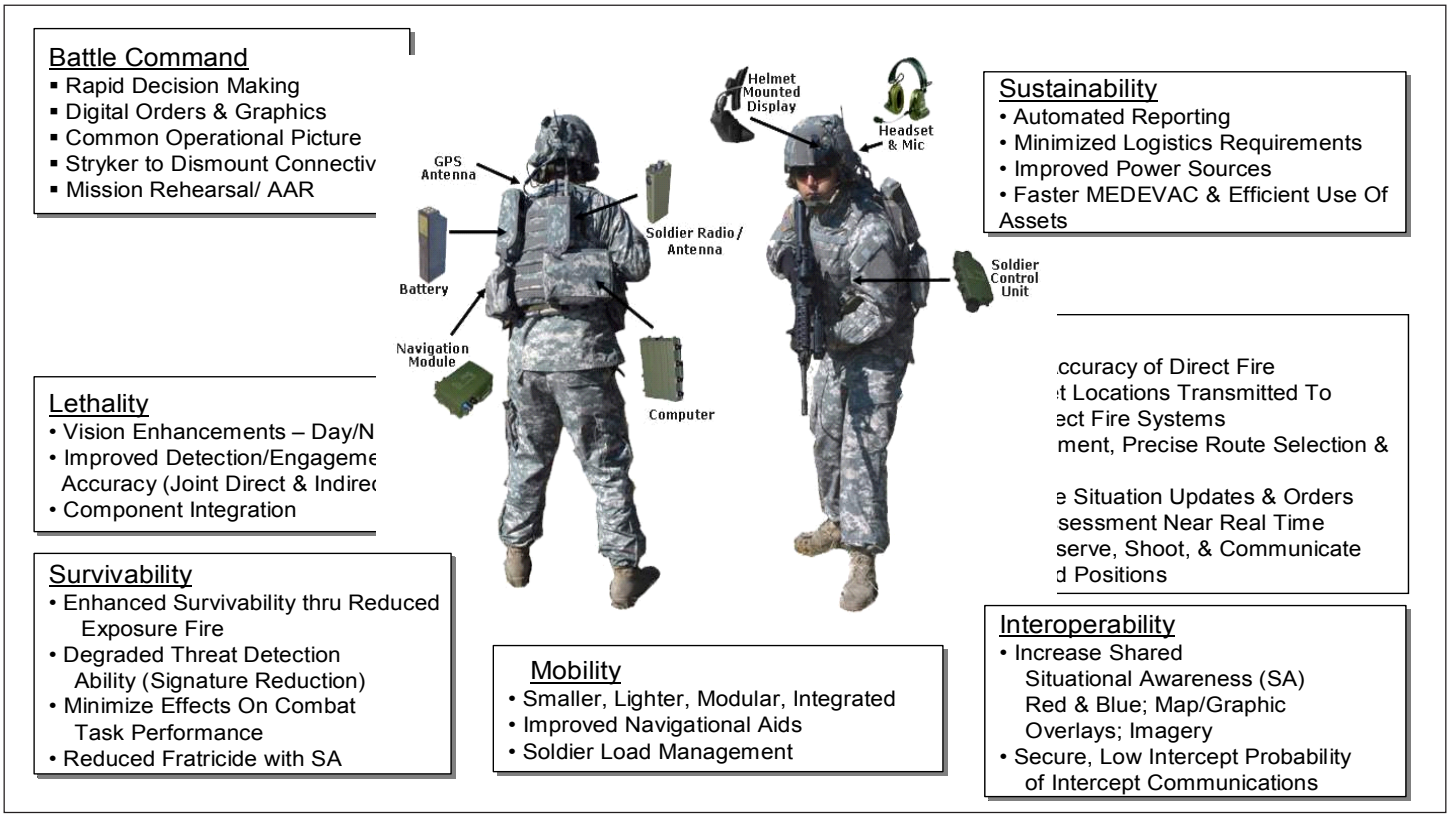
MAJOR DOUGLAS COPELAND

"Wars may be fought with weapons, but they are won by men."
— General George Patton, Jr.

General Patton's quote rings true today and probably will as long as we have to fight our nation's wars. Warfighting is tough business and gets tougher as our enemy adapts. As technology evolves, the U.S. Army Soldier is expected to do more, absorb more information, and control more than ever before. I submit that this expectation will not decrease, but only increase as we infuse better technology and faster paced operations into our future force structure. The necessity for increased communications, situational awareness and situational understanding capabilities is intuitive to those who have had to operate dismounted in the current enemy environment; it is complicated and mistakes are unforgiving. As our current force leverages its technological edge to overmatch its enemies, the current enemy is negating the standoff of our weapons and technology by "hugging" our forces in tight urban terrain. This fact has once again brought the close fight to our small combat units. They have to know more about their immediate battlespace, both friendly and enemy, and apply that knowledge quickly. This kind of tactical decision making has always been at the tip of the spear. However, our sergeants and lieutenants are now making strategic impacts when they make decisions during the conduct of this dynamic, fluid and always changing "three block war." We must arm these leaders with the capabilities to allow them to fight and win in the current environment and on the battlefields of the future.

The capability to communicate by voice and data and the ability to receive and display maneuver graphics is essential for Army leaders. Dismounted leaders must be able to do these tasks in order to receive and issue orders, receive and manipulate digital information, direct fire and maneuver, report information, call for fire and conduct troop leading procedures. Army leaders have been doing these things on battlefields of the past and continue to do so today in Iraq, Afghanistan, and elsewhere. For years,

Figure 1 — Land Warrior Capabilities



dismounted leaders have relied on radios to communicate. If they were lucky, they had a map, a picture or other form of imagery, alcohol pen, protractor and pencil, coupled with acetate, to wage both deep and close battles. Plans were made under poncho liners with a red lens flashlight or on a HMMWV top and disseminated to subordinates by runner, radio, or in person. As technology evolved, friendly locations were tracked leveraging global positioning systems (GPS). Digital networks proliferated throughout mounted formations. Leveraging Force XXI Battle Command Brigade and Below (FBCB2) and Blue Force Tracker systems, leaders at all levels developed tactics, techniques and procedures (TTPs) that built upon these abilities. Leaders not only saw themselves and their buddies, but also enemy positions and other battlefield entities in real time. Static and mobile command posts were empowered by collaborative planning and battle-tracking tools. Commanders concentrated on combat system effects rather than combat forces, enabling units to be both more survivable and more lethal. Our Army evolved into a digitally connected, platform-centric force, but our leaders, once dismounted, have continued to fight in nearly the same manner as we did before a digital, GPS-empowered network. Not any more. The Land Warrior Soldier system is the first step to get the leader into the digital battlefield. Currently, Land Warrior systems are deployed to the Central Command area of responsibility (AOR) with the 4th Battalion, 9th Infantry Regiment, 4th Stryker Brigade Combat Team, 2nd Infantry Division.

Figure 2 — Views from the Land Warrior common operational picture as seen by the Soldier through the helmet-mounted display. Graphical control measures highlighting a scheme of maneuver (left) and zoom in view of the objective area (right).

Land Warrior is a fully integrated and modular close combat fighting system that connects the dismounted leader to the digital battlefield. Land Warrior enhances the lethality, battle command and control (C2), mobility, survivability, and sustainability of dismounted combat leaders, enabling them to accomplish their mission. Land Warrior facilitates command, control, and information sharing. It integrates dismounted Soldiers down to the team leader level into the digitized battlefield. The Land Warrior system includes a multifunction laser rangefinder, helmet-mounted visual displays, integrated load-carrying equipment with ballistic protection (Improved Outer Tactical Vest), Advanced Combat Helmet, Peltor headset with speaker and microphone, computer subsystem, navigation module, combat net radio system (CNRS), Soldier control unit, weapon user interface and a power source. Land Warrior interfaces with the M4 carbine, the M203, and the M249 weapon systems. Integrated components reduce the net weight gain to the Soldier to approximately 9 pounds. Land Warrior modularity permits tailoring for mission requirements, and has the flexibility for expanded capabilities. The 4th Battalion, 9th Infantry equipped its leaders down to the team leader level. The unit also equipped its medics, joint tactical air controllers (JTACs) and slice elements with Land Warrior systems. We have seen additional equipping of Cavalry Soldiers in response to the nontraditional roles in which many Soldiers find themselves operating in Iraq.

Land Warrior supports the tenets of current infantry doctrine. It enhances a unit's ability to perform its Army warfighting functions. Land Warrior allows the unit to shape the battlefield and set the conditions that permit the equipped force to close with and destroy the enemy. The Land Warrior Mission Needs Statement, dated September 8, 1993, identified the need for improvements in five capabilities for dismounted Soldiers and leaders. These capabilities are: lethality, command and control, survivability, mobility, and sustainment. The Land Warrior system was developed to overcome these deficiencies based on the requirements in the Land Warrior Capability Production Document approved by the Department of the Army on December 19, 2005. Equipping a small unit with Land Warrior enhances its ability to perform combat mission tasks by providing improvements in these areas. Impacts to current techniques and procedures are primarily in the areas of movement, reconnaissance and surveillance, attack, consolidate and reorganize, defense, military operations in urban terrain, command and control, as well as supporting individual and collective tasks. Land Warrior provides the means to enhance combat power across the full spectrum of tactical actions, missions, and operations. Infantry unit design enables the force to achieve dominance across the full scale of contingencies from stability and reconstruction operations, small scale contingency to a major theater of war. Tasks associated with these mission areas require a system that enables success in the planning, shaping, and execution of close combat.

Land Warrior provides units critically needed capabilities to accomplish assigned combat tasks and overcome existing capability gaps. Land Warrior, beginning at the small unit level, provides:

- A common operational picture of the close fight (operational levels); enhanced leader control in the close fight between maneuver and support elements, and between dismounted and mounted elements; accurate and timely sharing of voice, data, and graphical information, and mutual tracking of individual locations, enabling tactical understanding at all levels, which in turn, enables full synchronization of maneuver and fires, intra-small unit cooperative

engagements, fire distribution, and fire control.

- Increased survivability of units through enhanced situational understanding, individual (body armor) and collective force protection (unit dispersion in the close fight, protected or reduced exposure engagement, individual locations and tracking), and reduced incidences of fratricide.
- The ability to generate and maintain reliable combat power through engineering design of a robust electronics system. Built-in diagnostics and fault isolation reduces the need to evacuate total systems but focuses on fault identification at the small unit level enhanced by rapid reporting of repair needs; providing the means to detect and repair problems at the lowest level, increasing the availability to the end user.
- Increased small unit lethality through controlled, efficient maneuver combined with a greater ability to mass combat power (direct and indirect) at the proper point and time.
- Increased movement efficiency through accurate visualization of the battlespace at all levels, integrated navigation, load reduction, and thermal and image intensification sensors, which enables units to move farther, faster, and fight longer.
- Increased leadership and command enhancements at the small tactical level, by providing leaders the means to fully understand the situation and to better control the maneuver of his unit and deliver all forms of effects.
- Integrated Soldier systems that use one and/or two batteries to run all components for 8-16 hours.

Land Warrior employment enables two critical conditions that influence success in close combat. The first is the dismounted force's ability to set the conditions of the fight to friendly advantage. The second is the ability to strike the enemy with decisive maneuver while limiting the enemy's ability to effectively engage friendly forces.

Setting the Conditions of the Fight. Friendly forces must be able to develop the situation out of contact prior to making physical or visual contact with the enemy. To do so, Soldiers must have access to real-time tactical information on terrain, obstacles, and the composition, disposition, and intentions of relevant enemy and friendly units. The Land Warrior system enables squads, platoons, and companies to synchronize effects through an enhanced ability to acquire and distribute knowledge. Enemy disposition is derived via Soldier reporting (every Soldier is a sensor) and leader synchronization. Land Warrior-equipped leaders are provided the means to establish and maintain a common operating picture that assists in rapid adjustments to the tactical plan, more robust combat power synchronization, and an overall higher unit operational tempo.

Maintaining Situational Awareness (SA). While out of contact, Land Warrior-equipped forces continue to have access to timely information. This is enabled through efficiently receiving and disseminating critical information at the appropriate level of command. Land Warrior-equipped units maintain freedom of action and rapid tempo by receiving and displaying information

Soldiers from C Company, 4th Battalion, 9th Infantry, take part in urban training during assessments of Land Warrior equipment at Fort Lewis, Washington.

U.S. Army photo

in such a manner that allows leaders to rapidly make adjustments to the maneuver plan. Sensor equipment (day, thermal sights, lasers, etc.) integrated onto a Soldier's primary weapon provides the ability to generate and distribute SA within small units. The Land Warrior system, supported by selected battalion command and staff personnel equipped with Land Warrior, enables more accurate assessments of enemy dispositions and is better enabled to support the commander's intent in the close fight by maneuvering to a position of advantage out of contact.

Courtesy photo

The 4th Battalion, 9th Infantry Regiment spent nine months testing and training with the Land Warrior system before deploying to Iraq.

Strike the Enemy with Decisive Maneuver. The infantry battalion applies its combat power to produce overmatching effects at the decisive time and place to defeat the enemy and accomplish its mission. Subordinate units are employed as the primary elements of the battalion's combat power against specific decisive points, key forces, and capabilities within the battalion. Within the scope of battalion operations, companies, platoons, and squads must maximize their ability to choose decisive engagement locations from positions of advantage, synchronizing fire and maneuver culminating in tactical assault followed by a rapid transition to exploitation and pursuit. Land Warrior-equipped units still execute the traditional forms of maneuver. However, a Land Warrior-equipped small unit will be better enabled to rely on forms of maneuver requiring greater precision while avoiding engagements such as the frontal attack that are characterized by minimal maneuver precision and marginal situational understanding of enemy disposition and intent. As a component of a higher command achieving superior knowledge, the Land Warrior unit chooses the time and location of decisive engagement. These attacks are originated by continuing maneuver from established positions of advantage. Once forces are decisively engaged, the primary purpose of any infantry-based force is to close with and destroy the enemy. Land Warrior enables units to leverage information to more rapidly seize and retain the initiative. Leaders make better informed decisions, increasing agility and threat overmatch.

Offensive Operations. Offensive operations seek to seize, retain, and exploit the initiative to defeat the enemy decisively. Battles may be linear or nonlinear and conducted in contiguous or noncontiguous areas of operations. Infantry forces (companies, platoons, and squads) utilize Land Warrior to reduce reactive battle drills to more deliberate tactical operations. For example, units will gain greater situational awareness on enemy positions vice conducting operations to find the enemy. Units develop the situation largely out of contact instead of reacting to contact. Units maneuver to positions of advantage out of contact while retaining freedom of maneuver, and conducting decisive combat at the time and place of friendly force choosing. Units also have the ability to re-task organize "on the fly," attach and detach platoons and cross-attach companies, when required to support the commander's intent.

Develop Situation Out Of Contact. Land Warrior-equipped units are more capable of developing the situation out of contact through access to timely information and thus greater situational awareness. A common operational picture provides the information required in a tactical unit to ensure Soldiers in the force know where they are, know where their unit members are, and as information is acquired or disseminated from a higher command, where the enemy is located. The primary requirements that will drive enhanced capabilities are a networked small unit information infrastructure that generates and routes critical information to Soldiers, combined with a near real-time visual friendly and enemy common operating picture that provides key leaders the means to determine required adjustments to the tactical plan. Land Warrior key leaders located at the battalion command and staff level review and update the enemy common operating picture. Land Warrior leaders will also update a friendly common picture scaled to their area of operations. Initially, Soldiers not equipped with Land Warrior will continue to observe their sectors and provide verbal reports. Subsequent increments will evolve system capability towards greater battle command interoperability across the force structure and eventually evolve into the Ground Soldier System.

Maneuver To Positions Of Advantage. Land Warrior-equipped forces are better enabled to maneuver to positions of advantage out of contact while retaining freedom of maneuver through the enhanced capability of Soldiers having near real-time access to a tailored friendly and enemy common operating picture. An enemy location either becomes known prior to contact or once contact is made. Leaders can choose alternative schemes of maneuver (e.g. direct and/or indirect fires) that do not rely on significant forces to fix an enemy prior to unit movement to destroy the enemy. Given a broader tactical perspective that generates situational understanding, leaders have the option of retaining freedom of maneuver and protecting the force to attack more dangerous targets first rather than simply react to contact enroute to an ultimate objective. Maneuver units are able to more effectively identify assailable flanks and positions of advantage through knowledge of the enemy's dispositions and posture. Commanders have greater insight into (and control over) the most

effective time to conduct maneuver. Better knowledge further permits commanders to choose the best routes to the objective area with respect to stealth, speed, and momentum. Through the confidence built by knowing the locations of friendly forces, day or night, and/or limited visibility, small unit agility is enhanced. More complex movements are accomplished to gain positions of advantage with distinct force protection improvements of being able to rapidly synchronize shifts in the maneuver plan with adjustments to supporting fires.

Decisive Operations. Decisive operations are ultimately based on tactical success in close combat. Land Warrior-equipped units must be effective in closing with and destroying the enemy and seizing and controlling key terrain. The key aspect of close combat tactical actions is the ability of units to integrate firepower, maneuver, and assault to win the close combat fight wherever the enemy is found. During contact, Land Warrior-equipped small units maneuver to positions of advantage, initiate decisive contact at the chosen time and place while integrating fire and maneuver. Through the integrated capabilities provided to Land Warrior-equipped Soldiers in the close fight, small units are able to employ speed, stealth, and deception to avoid detection, protect movement, retain freedom of action, engage enemy forces while en route, and build momentum. The Land Warrior-equipped unit adapts on the move, adjusting routes and objectives based on changes to the situation, fighting the enemy, not the plan. The Land Warrior tactical assault is characterized by highly precise and synchronized fires and maneuver. Support-by-fire elements have exact personnel locations and can place effective suppressive fire on distinct locations. Indirect fire assets are more precisely synchronized due to a clear visualization of all equipped Soldiers in the assault and knowledge of the enemy disposition and intent. The Land Warrior-equipped unit seeks to engage the enemy one time, denying him the opportunity to retreat and reconstitute. This goal requires both close assault and finishing actions that continue contact with retreating forces to destroy them in detail.

Defensive Operations. The purpose of defensive operations is to defeat enemy attacks with the desired end state to buy time, economize forces, and develop conditions favorable for resuming offensive operations. Defending forces await the attacker's blow and defeat the attack by successfully deflecting it. All phases of defensive operations are enhanced through tactical awareness, providing a common tactical picture throughout the entire defense. Land Warrior enables focused concentration of fires, fire control and distribution, proper commitment of reserves for execution of the counterattack, and execution of alternate and primary battle plans. Capability is enhanced in defensive preparation through collaborative planning and coordination of available fires, intelligence, surveillance, and reconnaissance. Land Warrior capabilities provide a combat multiplier in the defense, enabling early detection of the enemy force and rapid reporting and dissemination of information. The threat is attacked with precision from protected positions, through maneuver and indirect fire support, in support of the close fight. The result is the disruption of the attacker's tempo and synchronization with actions designed to prevent them from massing combat power. Tactical awareness and understanding enhances the Land Warrior-equipped force's ability to mass effects of overwhelming combat power across a wide variety of battlefield conditions. A characteristic of defensive operations is that commanders accept risk in some areas to mass effects elsewhere. The common operating picture containing both friendly and enemy situational awareness information enables commanders to mitigate risk given the ability to better discern enemy disposition and intent. Ultimately, Land Warrior enables concentration of forces with enhanced C2 for fire control and distribution, commitment of reserves, timely occupation of battle positions and counterattacks.

Stability and Support Operations (SASO). In accordance with U.S. national military strategy and as evidenced by current and recent military operations, the Army will continue to be involved in SASO. Stability operations promote and protect U.S. national interests by influencing the threat, political, and information dimensions of the operational environment. Support operations are usually nonlinear and noncontiguous. Commanders designate the decisive, shaping, and sustaining operations necessary for mission success. In stability and support operations, the enemy is often disease, hunger, or the consequences of disaster. Although the Land Warrior system was designed primarily as a combat system to provide infantry maneuver battalions, companies,

A Soldier with C Company, 4th Battalion, 9th Infantry Regiment takes part in urban training during assessments of Land Warrior equipment at Fort Lewis, Washington, in June 2006.

Courtesy photo

small units, and individual combatants an overmatch capability against enemy forces, it also provides flexibility for employment across the full spectrum of military operations.

Soldier as a System:

Land Warrior is one of the first steps that align Soldier capabilities in accordance with the Soldier as a System (SaaS) concept. The Soldier as a System concept provides an integrated system's approach to modernizing and increasing Soldier and small unit capabilities to support current and future joint operations. In addition, the SaaS concept views the Soldier as the centerpiece and ensures Soldier-related DOTMLPF issues are addressed. Land Warrior is the initial effort in the development of an integrated, modular Soldier system. It initially focused on Stryker brigade combat teams, small units within Stryker infantry battalions, and selected Soldiers in direct support of infantry battalions. Land Warrior is the evolutionary base for the Ground Soldier Systems' (GSS) capabilities. Land Warrior-equipped Soldiers perform missions that require connectivity to their supporting platforms, but must have survivability and communications that are independent of Soldier platforms. The GSS will improve upon Land Warrior capabilities, and when combined with the core Soldier system will meet the needs of all Soldiers who conduct ground close combat in the future force. The GSS enables Soldiers to efficiently interoperate with, and better exploit, all capabilities by providing continuous connectivity to sensors and effectively linking warfighters to both mounted and dismounted crews and local security elements. The GSS supports UJTL (Universal Joint Task List) tasks at all levels, specifically the tasks at the tactical level of war. The GSS will enhance mission performance of the following tactical level tasks: Tactical 1 — Deploy/Conduct Maneuver; Tactical 2 — Develop Intelligence; Tactical 3 and 4 — Employ Firepower; and Tactical 5 — Perform Logistics and Combat Service Support. Capabilities include lighter weight, enhanced power sources and sensors. GSS will also add FCS interoperability. The user-defined operational picture (UDOP) will add greater fidelity to friendly location tracking and adds enemy tracking. Collaborative SA improves information exchange to enhance Soldier-to-Soldier interactions, especially for networked lethality, and mission rehearsal. The user interface requires greater hands free efficiency. Embedded training (ET) will enable more learning and retention in less time and provides just-in-time refresher training or emergency initial training. Networking of Soldiers, weapons, sensors and external assets enables geographically dispersed small units to collaboratively influence larger areas with greater precision, speed and a broader variety of lethal and less-than-lethal effects. The UDOP will provide Soldiers the actionable information they need to sustain collaborative initiative.

Ultimately, Land Warrior enables concentration of forces with enhanced C2 for fire control and distribution, commitment of reserves, timely occupation of battle positions and counterattacks.

While Land Warrior is truly the baseline for the GSS, the Future Force Warrior (FFW) Advanced Technology Demonstration (ATD) has worked diligently for the last five years on testing, evaluating and integrating best in class technologies to further inform the GSS. Focus areas have been in reducing size, weight, power consumption while increasing integrated, modular capabilities available to the Soldier. The FFW ATD will meet its exit criteria this fall at Air Assault Expeditionary Force (AAEF), Spiral D, at Fort Benning, Georgia.

Major Douglas Copeland is currently attending the Naval Postgraduate School in Monterey, California. He previously served as the Assistant TRADOC Capability Manager - Soldier at Fort Benning, Georgia, and was the Ground Soldier System/Future Force Warrior lead. He has also served as the deputy brigade S3 for the 3rd Brigade, 1st Cavalry Division and as a company commander for B Company, 2nd Battalion, 7th Cavalry (Mechanized).

Land Warrior System Components

- **Integrated Body Subsystem (IBS)** — Consists of the Computer/Master Hub Subsystem, Soldier Control Unit Subsystem, Communications Net Radio Subsystem, Navigation Subsystem, Power Subsystem, and Personal Area Network.
- **Computer/Master Hub Subsystem** — Primary device for integrating data from the other sensors, components, and subsystems and displaying this information in the Soldier's helmet-mounted display (HMD). The computer and software allows the Soldier to access and process situational awareness information received in mission operation orders and messages. It also prepares mission reports to higher echelons, and processes and sends stillframe video or thermal images from sensors and compresses them for transmission via the radio subsystem.
- **Soldier Control Unit (SCU) Subsystem** — Allows the Soldier to interface with the system, through a thumb stick for cursor mouse controls, mouse buttons, radio talk control buttons to control volume and video selection. The SCU is designed for right or left-handed Soldiers; and has a zeroize button that allows the Soldier to delete sensitive data. The SCU contains a Soldier Access Module (SAM) card reader that allows Soldier log-on. The SAM card contains the unit reference number (URN) and Soldier's personal identification number (PIN); it is unique for each Soldier and made for the Soldier on the Mission Data Support Equipment (MDSE).
- **Communications Network Radio Subsystem (CNRS)** — Provides the voice and data transmission/communication capabilities of Land Warrior.
- **Navigation Subsystem (NSS)** — Provides position and navigation information. NSS consists of the GPS and antenna and the Dead Reckoning Device (DRD). GPS provides a position solution that is accurate to within 3-5 meters. The DRD augments GPS and maintains a position solution when the Soldier is operating in restrictive terrain (e.g., urban or thick tree canopy) and GPS may be degraded or unavailable. The DRD also provides a heading reference indication to assist in navigation. Algorithms process information from the GPS and DRD to provide a position solution that is more accurate than either sensor alone.

■ **Personal Area Network and Power Subsystem** — A distributed Universal Serial Bus (USB) network that directs information between the subsystems and the Computer/Master Hub. Dependent upon duration desired, the system is powered by 1 – 2 Lithium Ion rechargeable batteries. One of these lasts approximately eight hours during continuous use.

■ **Software Subsystem** — Integrates subsystems which provide lethality, survivability, mobility, command, control, communications, and situational awareness.

■ **Helmet Subsystem (HSS)** — Integrated on the Advanced Combat Helmet (ACH), HMD, and image intensifier (I^2). The HSS has a Helmet Interface Assembly (HIA) which interfaces with the HMD, headset with speakers/microphone, and the IBS. The HSS is compatible with the manual aiming and firing of the modular weapon, with chemical/biological (CB) and environmental protective clothing, and with the M45 CB mask that are provided as government-furnished equipment (GFE).

*** Advanced Combat Helmet —** Provided as GFE. In addition to the HMD and PVS-14 described below, a Peltor headset with microphone and speaker is worn with the helmet to receive and transmit voice communications and receive audio from the computer and radio

*** Helmet-Mounted Display —** Is a color display that, when viewed, replicates a 17 inch color monitor. The HMD is hands-free and can be positioned over either eye. It has an integrated on/off switch so that it can be turned off when not in use. The HMD is not constantly over the user's eye. It swings up and out of the way of the eye when not needed.

*** Image Intensifier** — The PVS-14 is provided as GFE and connects to the ACH.

*** Headset** — The Peltor headset provides high-quality hearing protection while allowing small-sound recognition and includes speakers and a microphone. The Peltor headset is a commercial off-the-shelf (COTS) item.

■ **Weapon Subsystem** — Consists of the Modular Weapon System (MWS), Close Combat Optic (CCO), Thermal Weapons Sight (TWS), Daylight Video Sight (DVS), and Multifunction Laser (MFL). The TWS, DVS, and MFL are integrated to the system through a single cable wiring harness. Land Warrior interfaces with the M4, M249 Squad Automatic Weapon (SAW) and M203 grenade launcher.

*** Modular Weapons System** — Consists of mounting rails and adapters that can be attached to the presently-fielded M4 5.56mm weapon, M249 SAW, and M16A4/M203. The MWS rails provide additional mounting surfaces that allow components such as the CCO, DVS, and MFL to be attached.

*** Thermal Weapons Sight (AN-PAS 13)** — Provides the capability to detect man-sized targets in daylight, darkness, and through obscurants. The TWS image can be viewed directly on the sight, displayed in the HMD for indirect viewing, or captured (single frame only) for transmission via radio.

*** Daylight Video Sight** — For daylight use and provides the Soldier with video images that can be displayed on the HMD. The DVS has the capability to magnify images at 1.5 X, 6 X and 12 X. Soldiers can also capture and store digital images.

*** STORM Multifunction Laser** — Incorporates laser range-finding, digital compass, visible and infrared (IR) pointing, and IR illumination capabilities. The MFL replaces functionality of the existing stand-alone PEQ-2 and PAQ-4 devices into a combined device that is controlled through Land Warrior software.

*** Close Combat Optic** – A reflex or telescopic sight. Has a red aiming reference (collimated dot) and is designed for "two eyes open" method of sighting. The dot follows the horizontal and vertical movement of the eye while remaining fixed on the target. No centering or focusing is required.

■ **Protective Clothing and Individual Equipment Subsystem (PCIES)** — Includes existing GFE and new clothing and individual equipment items. Components include: Modular Load-Carrying Equipment, IOTV, Joint Services Lightweight Integrated Suit Technology (JSLIST), M45 CB Mask, Military Eye Protection System (MEPS), and other existing organizational clothing and individual equipment (CIE).

Land Warrior Support Equipment:

Mission Data Support Equipment (MDSE) – Primary source of digital mission information used by system. The MDSE is resident on a dedicated laptop computer (toughbook). It allows the user to generate, maintain, and transfer the Mission Data Packages (MDPs) that contain critical information required to enable conduct of missions. MDPs include digital maps, overlays, operations orders, Unit Task Organization (UTO) data, and images. The MDSE also prepares and edit SAM cards. (GFE)

Network Manager — A rugged laptop based software program used to provide automated network management and control of the communications network. Assigns and maintains configuration parameters of the communications devices. The network manager is provided as GFE and is resident at the battalion level S6. Allows the battalion signal shop to configure radios, remote zeroize and monitor network.

Multi-Battery Charger — Recharges system rechargeable batteries both in the vehicle and out of the vehicle. The chargers are configured for a three-battery charger (vehicle) and a 12-battery charger (unit resupply area).

Keying Device — A hand-held device capable of securely receiving, storing, and transferring data between compatible cryptographic and communications equipment. The keying device will be used to load communications security (COMSEC) keys and is provided as GFE to the Land Warrior-equipped unit.

Vehicle Interface Kits (VIK) — Provided for the following Stryker vehicle variants: Infantry Combat Vehicle, Reconnaissance Vehicle, Commander's Vehicle, Engineer Squad Vehicle, Mortar Carrier, Fire Support Vehicle, Medical Evacuation Vehicle, and the NBC Reconnaissance Vehicle. The VIK expands system capability to interoperate with the Army Battle Command System by interfacing through FBCB2, AN/VIC-3, and the Land Warrior radio network system, to provide the Army-wide capability to conduct operations with battlefield information distributed in digital voice and data format.

LAND WARRIOR DOTMLPF AND LUT RESULTS

MAJOR DOUGLAS COPELAND

TRADOC Capability Manager (TCM) Soldier conducted a DOTMLPF (doctrine, organization, training, materiel, leadership, education, personnel, and facilities) assessment of the Land Warrior system with 4-9 Infantry at Fort Lewis, Washington, over the past 18 months. In conjunction with the TCM-Soldier assessments, the Army Test and Evaluation Command conducted an independent limited user test (LUT) in September and October of 2006. Land Warrior proved to mitigate 13 of the 19 identified U.S. Army Small Unit Capability Gaps. Land Warrior proved to provide increased capabilities to small units and their leaders. The most significant impacts were in the areas of lethality, battle command, voice communications, and situational awareness.

1.	Perform voice communications	G*
2.	Leaders gain and maintain situational understanding	G
3.	Receive and issue orders and instructions with overlays to include Rules Of Engagement (ROE) and Rules Of Interaction (ROI)	G
4.	Receive, process, and report tactical information	G
5.	Coordinate movements and fires of subordinate elements	G
6.	Coordinate with adjacent units	G
7.	Navigate as a small unit	G
8.	Kill or suppress enemy personnel and vehicles using direct fire weapon	G*
9.	Kill or suppress enemy personnel and vehicles using indirect fire assets	G
10.	Move under direct fire	R
11.	Direct dismount from an armored vehicle	G
12.	Fight dismounted in conjunction with armored vehicles	G
13.	Enter a building during an urban operation	G
14.	Conduct vehicle / personnel checkpoints	R
15.	Request and adjust fires from a Joint source (Naval Gunfire; USMC Cannon and Mortar Fire; USMC Rotary Wing Fire; USMC, USN, and USAF Fixed Wing Fires)	G
16.	Direct employment of smoke	R
17.	Conduct engagement with precision munitions	O
18.	Locate mine and booby trap indicators by visual means	R
19.	React to man-to-man contact (Combatives)	

R	Does not fill gap	O	Potentially fills gap w/TTPs	G	Fills gap		Gap not filled by material solution	* Gap filled if ROI goes to every Soldier	

Figure 1 — Land Warrior/Mounted Warrior DOTMLPF Assessment Study Director Small Unit Capability Gap Assessment

Lethality. Day and night vision enhancements are integrated through thermal imagery, image intensification, and daylight video. Land Warrior provides the capability to engage targets by viewing through the helmet-mounted display while exposing hands and arms only (reduced exposure firing technique). This integrated capability is not found on the battlefield today. This technique has proven to reduce Soldier exposure to hostile fire by up to 82 percent.

The Land Warrior-integrated Multi-Function Laser (MFL) also allows Soldiers to quickly determine the accurate location of targets as well as their own location and send accurate, digital calls for fire or target descriptions (e.g. sniper or improvised explosive device locations). Land Warrior was not used as a sole source for clearance of fires, but was another tool for the fires clearance authority to use to verify the situation and help alleviate fratricide.

Land Warrior provided increased small unit lethality through controlled, efficient maneuver combined with a greater ability to mass combat power (direct and indirect) at the proper point and time. Similar to the effect FBCB2 has on mounted warfare, Land Warrior provided added situational awareness to dismounted and mounted personnel. Mounted personnel have enhanced situational understanding of where dismounted Soldiers are located and how they are arrayed on the battlefield. Dismounted personnel have increased situational understanding of where other dismounted and mounted elements are located and how they are supporting their maneuver. Digital, real-time reporting creates a common, easily accessible medium for all to monitor enemy and friendly situational updates. This combination of information enhances situational awareness and fosters greater understanding for mounted and dismounted leaders, which enables efficient, coordinated maneuver to the decisive point. The MFL provides the user with the ability to call for fire by using its integrated functionality of laze, auto fill, call for fire, or terrain association and verification on the helmet-mounted display using a host of maps and imagery. This capability provides a bridge to controlling precision fires, another current capability gap for the small combat unit. Call-for-fire missions using the MFL have proven to provide more responsive and accurate fire missions. Clearance of fires procedures are reduced due to two factors: increased situational awareness and enhanced communications between initiator and clearance-level authority with the additional capability to interface with digital call-for-fire procedures. These additional procedures support the "see first, understand first, and act first" philosophy. The combination of these capabilities in a unit equipped with Land Warrior results in a more agile and responsive unit that leverages all enablers available to the force.

Battle Command. Command and control is greatly enhanced by the ability to communicate orders to all elements simultaneously. Precise unit locations on the digital map that show the relationship of friendly and known hostile elements on the battlefield help reduce the fog of war created by voice-only situation reports. Situational awareness allows leaders to

track the progress of subordinate elements as they maneuver, allowing them to make corrections or changes as necessary. Warning orders, fragmentary orders, and operations orders are digitally transmitted to higher, subordinate, attached, and supporting units and greatly reduce the time and error associated with an otherwise lengthy analog process. Land Warrior provides the user with a greater degree of situational awareness than ever before available. Land Warrior situational awareness provides every Soldier the capability to view his position on the digital map and show his relationship to other friendly and known hostile elements on the battlefield. This enhanced SA capability also allows the leader to track the progress of subordinate elements as they maneuver allowing for on-the-move corrections as necessary. Situations that previously could take considerable time and effort to overcome are now streamlined to a common, accurate medium that facilitates informed individual and collective synergy. Real-time communications and employment of accurate supporting fires give forces the ability to maintain an unprecedented operational tempo.

"The Land Warrior system provides near real-time knowledge of where I am and where all my units are. That gives me a better ability to command and control the movement of the unit in the field, prevent fratricide, and determine what force I want to bring to bear on known or suspected enemy locations at a given time."
— Captain Patrick Roddy, Commander of C Company, 4th Battalion, 9th Infantry Regiment
(Army News Service, January 2007)

Voice Communications. Land Warrior provides voice communications between mounted and dismounted leaders and Soldiers. Land Warrior-equipped users are able to monitor up to three nets simultaneously, a feature that currently only resides in mounted forces. Mounted Soldiers are able to monitor internal and external communications within their vehicle and have the additional capability to monitor Land Warrior communications through a gateway. The Land Warrior Vehicle Integration Kit creates this gateway and allows GPS tracking and normal radio communication between mounted and dismounted forces on the move. This eliminates the need for an intercom headset and the associated communication lapse prior to dismounting. The Land Warrior Soldier radio and noise-reducing headsets facilitate briefing all Soldiers prior to dismounting. Each Soldier's ability to refer to his own helmet-mounted display and map products further enhances comprehension of the leader's plan. Real-time, secure voice communications bolster efficient vertical and horizontal digital communications. The coupling of these two mediums allows users to report quickly, exchange critical information between mounted and dismounted forces and discuss the situation while looking at a real-time depiction of the operational environment (friendly and enemy). A more holistic individual and collective understanding allows collaboration. This results in faster maneuvering and accurate, coordinated supporting and organic fires with less risk of fratricide. This ability to collaborate creates momentum within an organization. Coordination can be made on a common waveform for pick-up, drop-off, supporting fires, maneuver, etc., without having to repeat orders or change frequencies. Fifty percent of mounted leaders reported an increased ability to coordinate with mounted squads before they dismount (35 percent report "about the same" and 15 percent report a decreased ability).

When mounted, leaders are generally limited to monitoring radio traffic through a dedicated headset because current squad radios are incapable of receiving or transmitting through armored vehicle hulls. Monitored radio traffic provides leaders with a general understanding of the larger scale tactical situation, but provides little information on their immediate surroundings upon dismounting. When available, FBCB2 displays provide additional detail and terrain products, allowing general analysis of the terrain near the dismount point. This allows the leader to identify enemy positions and plan a tentative route for his assault. Currently, mounted leaders prepare their units for dismount by providing a verbal briefing of the expected situation upon dismounting. This can be difficult in the loud, dark, and cramped confines of a moving armored vehicle, and Soldier comprehension of detailed briefings in this environment can be limited. Squad leaders receive a general description of the situation and a direction to move when they are ordered to dismount, but this can still be insufficient to overcome the disorientation that accompanies exiting an armored vehicle in unfamiliar terrain. Immediately prior to dismounting, the leader must also remove his vehicle intercom headset. This prevents communication between the leader and the remainder of the platoon (including the vehicle crew) until the leader is outside of the vehicle. This can be particularly dangerous when dismounting in contact, as the leader has no means to receive reports of changes in the enemy situation. During dismount, the squad leader must rapidly assess his surroundings, identify terrain references for orientation, and find a covered position for his unit. He must accomplish all of these tasks before he can begin any offensive action. In a Land Warrior-equipped unit, this can all be accomplished before dismount.

Digital Communications. Land Warrior connects the dismounted leader and Soldier to the digital battlefield. Users send and receive digital messages (SALUTE reports, situational reports [SITREPs], unit position reports, known and suspected enemy positions, calls for fire, medical evacuations [MEDEVAC]), which are fully interoperable with FBCB2 and the entire suite of the ABCS. Digital graphics that are created, shared and leveraged are extremely beneficial. A picture is worth a thousand words to users and can be shared instantly to all members of a unit without having to print and distribute manually. Using mission data support equipment, units can distribute black, grey and white list pictures to checkpoints and patrols in a digital package that can be quickly referenced. In addition, Soldiers and leaders can send messages in a free text or preformatted message format. These messages streamline otherwise busy verbal radio communications. While inputting free text messages can be a lengthy process, they are effective. Radio silence can be maintained and purely digital messages can take their place. Creating preformatted digital messages prior to a mission has proven to speed up the process of reporting during movement. Phase lines, rally points, operational schedules and call-for-fire messages that are preformatted prior

to crossing the line of departure can be sent much like an instant message on e-mail. This method accelerates operational tempo during mission execution. Land Warrior-equipped units have proven that when voice communications fail, digital communications are still possible. Lastly, users can send an automated call for medic digital message, depicting their exact location on the battlefield. Medics equipped with Land Warrior can maneuver directly to the location of the injured Soldier. This streamlines the process if the Soldier is incapacitated and in a hard-to-find location.

Situational Awareness. Soldiers and leaders can view the current location of all Land Warrior-equipped personnel in the helmet-mounted display. The display allows the user to view a digital map, imagery, position location information, as well as view sight picture in thermal and daylight modes. The Soldier or leader views his common operating picture on a screen that replicates a 17-inch monitor. The helmet-mounted display allows the user to view information while maintaining light discipline during hours of limited visibility. He can move the display out of the way when he doesn't want to view it and rotate it in front of his eye when he needs to check his position or his unit's friendly and/or enemy situation. The user checks his situation in a similar manner to conducting a map check; however, unlike using a protractor and map, he can get digital updates while on the move. Real-time position location information provides improved, accurate and efficient knowledge of locations of all mounted and dismounted personnel. The shared common picture of geo-referenced maps and images enhances battle tracking, streamlines reporting and drives efficient application of combat power. Small units have greater maneuverability and can cover greater distances due to shared, accurate position location information. Accurate situational awareness allows all users to efficiently control fire and maneuver with increased dispersion. Shared, accurate fire control, position location information and real-time enemy situation updates facilitate efficient battlespace management. Users better understand and execute plans and orders because of collaborative understanding of the total picture. Leaders can mass and prioritize fires with less risk of fratricide while retaining the flexibility of better informed maneuver. Land Warrior's automatic execution of these reports enables more consistent reporting. Based on questionnaire data collected from the Land Warrior experimental unit, 60 percent of leaders reported a "better" or "much better" ability to monitor the activity of their own unit, and 63 percent reported "better" or "much better" ability to monitor the activity of adjacent units when using Land Warrior. Land Warrior is continuously updated and its use as a common reference mitigates the effects of adverse conditions or geographic dispersion on the unit's situational awareness. Sixty-six percent of leaders and 48 percent of non-leaders surveyed reported a "better" or "much better" understanding of other unit members' position. In addition, 38 percent of leaders and 26 percent of non-leaders reported that Land Warrior provided a "better" or "much better" ability to avoid situations of fratricide. The greater perceived benefit reported by leaders is likely due to their greater awareness of this issue and their application of greater significance to it.

Digital Mapping and Topographic Capability. Land Warrior-equipped Soldiers and leaders fight using recent, relevant imagery, rather than outdated maps, rough sketches, piles of acetate and/or memorization. Users can choose the map, map scale and imagery to use in current operations and have the ability to store these products for reference in the future. Land Warrior-equipped leaders can manipulate digital maps during the conduct of an operation to facilitate FRAGOs and/or follow-on OPORDs while on the move. Common graphic formats such as Falcon View, geo-referenced satellite images, Microsoft Office products, pictures and FBCB2 overlays can be loaded through the Land Warrior mission data support equipment. Land Warrior-equipped mounted personnel are also able to view all of these products.

4-2 Mission Rehearsal Exercise 12 Feb 07

The battalion commander and command sergeant major were in a meeting in the commander's tent inside the forward operating base, discussing operations with their Joint Readiness Training Center observer/controllers (OCs). During their discussions the battalion commander continued to track ongoing operations via his helmet-mounted display, and at one point a red chemlight icon appeared on his display. He noticed this and told his command sergeant major to check his Land Warrior ensemble for verification. Both had the same icon, and within seconds this icon changed to denote an enemy improvised explosive device. The situation unfolding on the ground was relayed to all Land Warrior-equipped leaders and Soldiers and noticed by the OCs. The battalion commander was informed by the OCs that the enemy IED was meant for him when he was to go to an upcoming meeting with local town leaders. The battalion commander was able to change his meeting location, secure the device, and accomplish the mission without incident.

Survivability. Land Warrior aids overall unit survivability. When leveraged by a unit, Land Warrior functionalities increase speed and accuracy of collective maneuver and allow greater tactical dispersion during a variety of dismounted and mounted missions. Land Warrior-equipped squads demonstrate enhanced movement and more accurate navigation as compared to Rapid Fielding Initiative-equipped units. Opposition forces and subject matter experts' observations concluded that the Land Warrior-equipped unit was less detectable than a standard modified table of organization and equipment (MTOE) unit. These same observers concluded that the observed unit could do extremely difficult, dispersed missions during hours of limited visibility and in difficult terrain with unprecedented success, while other observed non-equipped units took hours longer to conduct the same missions. The combination of these effects increases unit survivability because the unit can get the job done faster with total unit understanding and reduced tactical confusion. This constitutes a decrease in massed unit exposure to enemy direct and indirect fires during deliberate offensive operations. Land Warrior-equipped personnel survivability is enhanced by increased situational awareness, call-for medic function, reduced exposure fire and observation capabilities.

Land Warrior allows for better situational awareness through the common operating picture displayed in the helmet-mounted display. The COP shows mounted and dismounted friendly locations, known and suspected enemy forces and known and suspected friendly and enemy obstacles and hazards. In addition,

Soldiers with the 4th Brigade, 2nd Infantry Division from Fort Lewis, Washington, search the palm groves in the Taji area for insurgents May 15.

A Soldier with Company B, 4th Battalion, 9th Infantry Regiment, pulls security as an Iraqi man speaks with an interpreter on the outskirts of Baqubah.

Lieutenant General Raymond T. Odierno, as Staff Sergeants Ndifreke Aanam-Ndu Warrior systems May 24.

Photos by Staff Sergeant Antonieta Rico

A Soldier with the 4th Brigade, 2nd Infantry Division checks the position of his Soldiers through his Land Warrior helmet-mounted display during a raid near Baghdad.

commander of Multi-National Corps-Iraq, listens and James Young talk to him about their Land

the ability to manipulate situation reports and geo-referenced graphics, pictures and overlays allows for real time situational understanding on current visual products. Land Warrior-equipped personnel can avoid potential hazards, such as known or suspected IEDs. Known or suspected enemy locations can be taken into consideration during planning and execution. Updates to the situation are reported digitally and are not relayed by grid and plotted on the map using a protractor. Land Warrior-equipped personnel conducting operations over large areas do not have to carry around large sets of maps. Land Warrior-equipped leaders do not have to copy several sets of graphics that may or may not lose accuracy in translation that in the past has contributed to confusion and in some cases fratricide. Multiple maps, overlays and paper documents can fall into the hands of the enemy and may be used against friendly forces. This creates a substantial operational security issue for our forces. Instead, Land Warrior data is stored digitally in the Soldier's computer subsystem. Operational security is enhanced because Land Warrior-equipped personnel can purge their data if they feel imminent compromise. In addition, Land Warrior systems can be remotely purged by others. All equipped users have instant access to all materials that are relevant (because of messaging filters), accurate (real time) and tailorable (leaders can distill higher level graphics and make their part of the plan without loss of accuracy of the overarching order). The synergistic effect of having these materials has the potential to decrease fratricide and increase survivability and overall force effectiveness.

Land Warrior-equipped Soldiers also have the ability to remotely call for medical assistance using a digital message. This message can either be sent by pressing the call-for-medic button on the Soldier Control Unit or by text message. If a Soldier is wounded, he can press his call-for-medic button and send an instantaneous report to his leadership and medical personnel. If his buddy is incapacitated, he can send a preformatted call for medic. This streamlines the casualty evacuation process which takes up precious time and radio messages over the command net. A Soldier that is wounded and unable to move can be located more quickly on the battlefield by the aid and litter teams, medics or the platoon sergeant since the wounded's position is instantly available to all on the common operating picture. These support personnel are better

informed as to the situation around the casualty thereby setting the conditions for safe extraction.

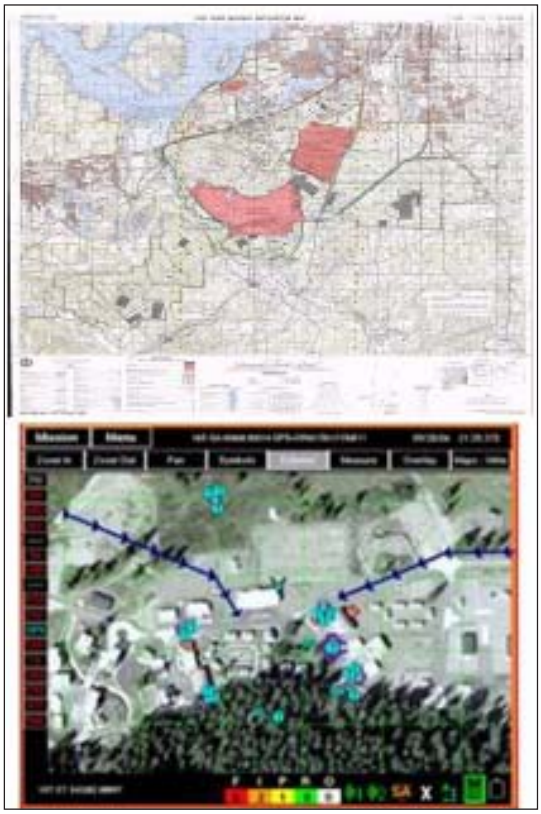
Land Warrior-equipped Soldiers in covered and concealed positions utilizing the Daylight Video Sight (with image displayed in the helmet-mounted display) for observation have a considerable reduction (40-80 percent) in individual vulnerability or exposure to direct fire survivability. The Daylight Video Sight can magnify 1.5x, 6x, and 12x. This capability has shown utility when scanning for snipers, obstacles, improvised explosive devices and other battlefield hazards by both infantrymen and sniper teams. Land Warrior-equipped personnel can conduct detailed reconnaissance of the surrounding terrain using the reduced exposure observation capability, only exposing their hands and a portion of their arms. Soldiers using their naked eyes or binoculars in the current fight must expose their heads, upper torso, hands and arms to the enemy. While reduced exposure observation improves Soldier survivability during stationary reconnaissance, he is still subject to detection due to the additional time required to scan a comparable area. This is due to the limited Daylight Video Sight field of view. This could increase scanning times and the enemy's chances of visually detecting the Soldier. Land Warrior also offers improved survivability while conducting reconnaissance before beginning individual movement under direct fire, but, again this advantage may be partially negated by a possible increase in likelihood of detection by the enemy.

Mobility. Mobility, as relayed by a 4-9 IN company first sergeant, is the balance between added capability to the Soldier/Unit and added weight to the Soldier/Unit. The Land Warrior Capabilities Production Document threshold for Soldier fighting load is 77 pounds. Recent additions to Soldier-worn body armor have increased the Soldier fighting load to 80.8 pounds. The total Manchu configuration ensemble fighting load is 96.6 pounds, 19.6 pounds over the threshold. The currently configured Land Warrior system has reduced weight from 34 pounds (FY 1998) to 15.8 pounds (FY 2007). A future weight reduction of 3 pounds is planned for FY 2008. This would equate to a total reduction in weight of 150 percent. At the same time, Individual Body Armor (IBA) has gone from 12.5 to 33.2 pounds — a 145-percent increase. The Land Warrior system offsets current Soldier equipment. The 15.8 pounds of added Land Warrior equipment offsets the need to carry a GPS, binoculars, separate aiming light (PAQ 2 or PEQ 4) and almost half of 22 separate batteries. The functionalities of Land Warrior replace the need to carry these items. This integration of functionalities renders a net gain of 9.3 pounds of equipment for the Soldier. Soldiers and leaders all agree the 15.8 pounds of Land Warrior equipment increases weight and degrades mobility. They also agree that 31 pounds of body armor increases weight and is restrictive when it comes to mobility.

The Soldiers load issue is an Army issue and not just a Land Warrior issue. Modularity changes to the Land Warrior ensemble have shown improvements in weight reduction, distribution and an overall increase to Soldier acceptance. Initial findings indicated Soldiers associated Individual Body Armor and Land Warrior weight as one. The unit was fielded both at the same time therefore no differentiation was made between the two. As Soldiers became more accustomed to the Land Warrior ensemble and more reliant upon its added capabilities, the added weight became tolerable. During the land navigation experiment, Land Warrior-equipped units maneuvered more rapidly and accurately than units without Land Warrior. It should be noted that every other Soldier system has increased Soldiers' load in a modular fashion with little regard to integration. Land Warrior has provided an integrated Soldier system that has decreased in weight and volume over time. See weight comparatives chart (Figure 3).

As stated, the Land Warrior system replaces approximately 8 pounds of current equipment, generating a net gain of 9.3 pounds. This represents a 14-percent increase in equipment weight compared to the average RFI-equipped Soldier's fighting load. This is an increase when one considers that it equates to degradation in Soldier agility of 10-15 percent and a 20-percent increase in energy required for movement. Sixty-two percent of Soldiers surveyed reported that Land Warrior made their ability to move tactically under direct

Figure 2 — At top, the view without Land Warrior (1/50,000), and bottom is the view with Land Warrior



(4-9 IN, Mission Rehearsal Exercise Feb 07)

Discussion between Brigadier General Daniel P. Bolger (JRTC commander) and some of his senior observer controllers: OCs relayed observations related to the battalion's high value target (HVT) mission during the 4-9 IN MRE conducted at Fort Lewis, Washington. The unit executed a dismounted infiltration without being detected by the Joint Readiness Training Center opposing forces. The battalion was able to infiltrate so quickly and efficiently that the opposing forces in the area of operations were unable to react in time to prevent capture of the HVT. This mission is rarely accomplished successfully. The senior observer controllers observed that the same type of unit would not have been able to execute the mission as successfully without the capabilities provided by Land Warrior.

Weight Comparatives	2002	2004	2006	2008
Land Warrior	26.12 lbs	16.62 lbs	15.83 lbs	*12.83 lbs
IBA	9 lbs	25.70 lbs	31.00 lbs	TBD

* Subject to General Dynamic Fusion efforts: CSC, NAV Box, HIA and SCU in one LRU.

Figure 3 — Weight Comparatives Chart

fire "worse" or "much worse." Land Warrior will affect the individual Soldier's ability to move under direct fire under some circumstances. The increase in the weight of Land Warrior-equipped Soldiers' basic fighting load will have the most significant consequences. While Soldier conditioning will compensate for this weight increase during limited-duration missions, current operations have shown that Soldiers' mobility will suffer greatly when their fighting load is excessive. Soldiers engaging in extended operations are likely to find the increased weight of Land Warrior to be an encumbrance.

During the equipping and conduct of the DOTMLPF assessment, dismounted Soldiers were fighting within task organized infantry companies, selected battalion command and staff personnel, and selected Soldiers in direct support of maneuver elements employed Land Warrior systems. Upon completion of the DOTMLPF assessment (September 06) and following subsequent program decisions, 4-9 Infantry asked to take the system with them to combat. The unit is currently conducting offensive, defensive, and stability and support missions across the full spectrum of military operations in theater now. Some of 4-9 Infantry's key likes and dislikes of the system:

Likes

- Friendly, enemy and environment SA when dismounted;
- Multi Functional Laser (MFL);
- Graphics on the move; and
- Stryker integration to the dismounted Soldier.

Dislikes

- Daylight Video Sight (DVS) as a weapon sight;
- Cables; and
- Space requirement on IBA (Units now have IOTV).

Fundamental principles of doctrine form the basis upon which Army forces guide their actions in support of national objectives. Throughout past analysis events and the Land Warrior DOTMLPF assessments there has been no indication that the capabilities provided by these systems will have any impact on these principles. The observations and analysis conducted during the Land Warrior DOTMLPF assessment indicate that there will be little or no impact on the basic way the Army conducts its missions. These systems' capabilities have the greatest doctrinal impact in the areas of techniques and procedures. Doctrinal impacts to terms and symbols are minimal. Two symbols were added to depict areas of interest and Soldier locations. These symbols are recognized by FBCB2 and are subject to further development by units as they incorporate them into their own standard operating procedures. All other Land Warrior symbols are doctrinally accurate and all Land Warrior messages are in compliance with Joint Variable Format Message standards and architecture.

Land Warrior Soldier systems have evolved over time and are continuing to evolve based on the current fight and current technology. These systems are not revolutionary, but evolutionary in their approach to answering evolving Soldier capability gaps based upon an asymmetrical and fluid threat. How the Army intends to conduct operations in the future, and the capabilities required to execute those operations, may determine the need for further doctrinal review, design, and/or development. Draft recommendations for techniques and procedures have been developed, but require validation through their use in an operational environment. To accomplish this, TRADOC Capabilities Manager-Soldier is conducting further assessment during combat operations in Iraq with 4-9 IN. This portion of the assessment will determine Land Warrior's impact to small units in combat, with a particular focus on fightability, lethality, survivability, battle command and situational awareness from squad to company-level operations. All unit leaders (from team leaders through battalion commander) are equipped with Land Warrior. TCM-Soldier teamed with the Computer Science & Information Assurance Department of the Samuel Ginn College of Engineering at Auburn University to create a dynamic, "change-on-the-fly" database for this operation. This database is a compilation effort from input received from TCM-Soldier, the U.S. Army Infantry Center Directorate of Combat Developments, TRAC WSMR, TRAC-Monterey, Army Research Institute (ARI), Program Manager Soldier Warrior and Product Manager Land Warrior. This information will provide valuable DOTMLPF insights regarding dismounted Soldier requirements, will inform future Army procurement decisions, as well as inform the Ground Soldier System and FCS.

Major Douglas Copeland is currently attending the Naval Postgraduate School in Monterey, California. He previously served as the Assistant TRADOC Capability Manager - Soldier at Fort Benning, Georgia, and was the Ground Soldier System/Future Force Warrior lead. He has also served as the deputy brigade S3 for the 3rd Brigade, 1st Cavalry Division and as a company commander for B Company, 2nd Battalion, 7th Cavalry (Mechanized).

Staff Sergeant Antonieta Rico

A Soldier with the 4th Stryker Brigade Combat Team, 2nd Infantry Division, sends a message using the helmet-mounted display.