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TAILORING THE TECHNO-WARRIOR

by

Richard J. Sterk

"Our suits give us better eyes, better ears, stronger backs (to carry heavier weapons and more ammo), better legs, more intelligence, more firepower, greater endurance, less vulnerability. . . . {T}his leaves you with your whole mind free to handle your weapons and notice what is going on around you . . . which is supremely important to an infantryman who wants to die in bed," states a lowly grunt in Robert A. Heinlein's 1959 science fiction story *Starship Troopers*. In 1999 the U.S. Army is scheduled to produce its first fully operational integrated soldier system, with the purpose described by Heinlein forty years earlier.

The U.S. Army's 21st Century Land Warrior is the lead program and technology developer for the overall Enhanced Land Warrior concept. Land Warrior is an integrated soldier system for dismounted infantry troops designed to keep pace with the Army's battlefield digitization efforts. It is also considered crucial to the individual digitization of the fighting soldier, as well as to supporting the Force XXI vision in which the Army's goal is to field an operational digitized force by the year 2000.

Force XXI is the Army's operational demonstration and experimentation with a large variety of new battlefield digitization concepts and technologies. In conjunction with the Army Research Laboratory, the Communications and Electronics Command (CECOM) is compiling a plan that defines the threats to the warfighting systems that integrate with Land Warrior and how to protect these digitized systems from potential vulnerability. Major General Gerard Brohm, commander of the Communications and Electronics Command, in an October 1995 interview with *C⁴I News*, likened the Force XXI effort to a tactical Internet that takes a small city of Internet users and changes their position every six hours.

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Everything the soldier needs for personal use in combat is being enveloped under the Land Warrior agenda. The major ambition is to amplify the ground soldier's lethality, command and control, mobility, sustainment and survivability. The chief component of this space-age soldier system will be the radio/computer/Global Positioning System (GPS) built into a head-mounted display. Additional gear will include weapon subsystems, protective clothing, and specialized software that integrates everything into the ultimate warrior. A great deal of this equipment will come from nondevelopmental items already in existence or presently under development in other programs in order to provide the most current digitized technology available.

The key to the entire concept rests in successfully bringing together these advanced technologies in a manner that will link each soldier directly to the battlefield via a digitized command and control network, coupled with other specific enhancements such as new weapon/fire control and small arms protection. This is to be accomplished by using modular subsystems that provide flexibility and variety in application. Integrated equipment allows mission tailoring without the burden of wearing or carrying annoying items unnecessary for the task at hand.

The issue of integration is being addressed by the Army's Logistics Advanced Technology Program Soldier Survivability project. The project focuses on the critical need to enhance the performance, lethality and survivability of the individual soldier. This necessity is being dealt with by the Generation II Soldier System technology demonstration, which is a part of the 21st Century Land Warrior program. The Generation II Soldier System integrates several elements, including advanced electronics, communications, sensors, individual equipment, weaponry and hazard protection items, into a balanced, fully functional, unified system. One advantage to this system is that it utilizes the technological advancements already made by commercial microelectronics and telecommunications industries to fabricate the lightweight, miniaturized components needed to produce the overall system. Both the U.S. Marine Corps and U.S. special operations forces are active participants in testing the Generation II Soldier System.

However, despite years of hoopla and talk of using science fiction technology, it wasn't until recently that the 21st Century Land Warrior program was truly brought together under one concept. The Soldier Integrated Protective Ensemble (SIPE), one of the forerunners of the 21st Century Land Warrior, was an effort started several years ago during the military buildup of the Reagan administration. Originally developed as part of a medical advanced technology program to enhance the performance, protection and sustainment of combat vehicle crewmen, it focused on lethality, command and control, survivability and mobility through development technology designed to improve individual and collective performance at night, as well as in ambiguous conditions ranging from bad weather to nuclear and chemical warfare.

Yet, save for the Soldier Integrated Protective Ensemble, most of the research involving soldier systems had been conducted under numerous programs not necessarily related to a common goal. In early 1995 it was announced that the Hughes Electronics Corporation would be the leader of a development team (composed of Motorola Inc., Honeywell Corporation, Arthur D. Little Company, Battelle Memorial Institute and Gentex Corporation) in pursuit of an engineering, development and manufacturing contract for the Army's Land Warrior program. The lead Army organization is the Natick Research, Development and Engineering Center, located in Natick, Massachusetts.

Hughes is to provide systems integration, weapons components and software. In July 1995, Hughes was awarded a $2.45 million increment of a $51.5 million Army contract for the design, development, integration, fabrication, test and support requirements for the Land Warrior system. The initial contract award is to develop and field a total of 65 Land Warrior systems, with the first ten prototypes to be tested in an early operational exercise tentatively planned for mid-1996. This effort will lead to a production contract to equip the Army's soldiers with the modernized Land Warrior system. Immediately following the initial phase, Hughes will have an opportunity to deliver enough of the systems to equip one full division as part of the Low Rate Initial Production run. This contract is expected to be completed by August 15, 1999.

Comprised of five major subsystems with more than 40 components integrated with the soldier as "the platform," the major Land Warrior subsystems consist of the following: integrated headgear and sensors; weapon; protective clothing and individual equipment; computer and radio; and software. Some of the many subsystem components include an individual soldier computer/radio with a GPS receiver; protective clothing and individual equipment; integrated helmet with head-mounted display and image intensifier; modular weapon subsystem with thermal weapon sight, video camera, laser rangerfinder/digital compass, and both visible and infrared laser aiming lights.

Miniaturized communications components, computer hardware and additional software will be produced by Motorola, who in August 1994 was awarded a $1 million dollar increment of a $44 million contract to begin development of the integrated infantry system as part of the Generation II Soldier System. Honeywell has been selected to furnish the Integrated Helmet Assembly Subsystem. Arthur D. Little will provide handwear, footwear and load-bearing components. Lightweight integrated protective suit technology and protective respirator systems will be developed by the Battelle Memorial Institute. Gentex will handle the overall subsystems for the individual soldier system, as well as the ballistic helmet shell and components.

An initial production run of 4,800 Land Warrior systems has been tentatively scheduled for mid-1999. The overall total of Land Warrior systems to be procured has yet to be decided. Prior to actual 21st Century Land Warrior production, at least 26 units of the Generation II Soldier System, with a possible total of 36, are expected to be produced between 1995 and 1998 for prototype testing and demonstration. The total value of the 21st Century Land Warrior program, including research, development and potential production, is estimated to be more than one billion dollars.

The concept of the space-age techno-warrior has not been without its antagonists, who claim the plan is far too ambitious. These critics cite past digitization demonstrations in which severe shortcomings in prototype software have underscored the realities of such overenthusiastic development. Unfortunately, cutting-edge high technology often brings with it inherent problems in the form of bugs, glitches and system crashes. Will this mean new amendments to the international rules of warfare, e.g., that when a soldier's system is down, the battle must halt until the manufacturer can send out a field representative and service the problem? What happens if the unit has to go back to the shop? Will the company provide a "loaner soldier"? Somehow the adage "save often" doesn't seem to apply here.

The introduction of high-tech soldier systems on the battlefield has other far-reaching implications as well, such as a possible requirement to revamp training right down to boot camp. Is this the end of hand-to-hand combat in basic training in favor of workshops on how to run a spreadsheet in a Windows environment? This would change the meaning of the term "conventional warfare." Rules would have to be drawn up and ratified outlining a code of conduct for nations using compatible operating systems. Can an IBM DOS army attack an opposing force that uses Apple MacIntosh? Will the army with the most RAM win? In reality, can a nation — even one as technically superior as the United States — whose people have trouble hooking together stereo systems in their living rooms, expect them to run a computer network while dodging bullets?

"Digitizing the battlefield is the application of information technologies to acquire, exchange, and employ timely digital information throughout the battlespace, tailored to the needs of each decider (commander), shooter, and supporter — allowing each to maintain a clear and accurate vision of his battlespace necessary to support both planning and execution." This is how the Army defines the digital battlefield. (Maj. Gen. Joe W. Rigby, "Digitizing Force XXI: A Team Effort," *ARMY*, May 1995, p. 38.)

Communication, specifically digital communication, is the answer to increasing the combat effectiveness of the future infantryman. When each combatant is linked with the total force, troops can provide one another with seamless, on-the-move multimedia communications. Escalating geopolitical conflicts throughout the globe, force projections, and evolving political doctrines are expected to require significantly more communications bandwidth, drastically altered traffic patterns, and new communications services (such as imagery, intelligence, logistics data and higher mobility, especially at echelons brigade and below) than is supported by today's communications capability.

As the technology carrier for the entire Enhanced Land Warrior concept, Land Warrior paves the way for Mounted Warrior, a system to enhance combat effectiveness, reduce vulnerability and integrate combat vehicle crewmen into the digital battlefield. These advances will eventually lead to an Air Warrior to link aviators with ground troops.

The Army tested the effectiveness of its initial digitization efforts in November 1995 in an advanced warfighting experiment titled "Warrior Focus." The exercise centered on equipping the 2nd Brigade of the 10th Mountain Division at Fort Drum, New York, with digital technology. This was the first time the Army had integrated digital equipment into a light brigade in order to provide digitized information from the soldier to the brigade commander. The results of the experiment are currently under study.

The United States is not the only country looking to give its troops the edge in combat; France is working on a similar program. The French plan to use off-the-shelf technology to build 15 integrated soldier system engineering development models for testing. Two years of trials are expected before a production contract is awarded; GIAT Industries, Thomson-CSF and Dassault have been identified as contenders for the award. The French individual soldier system is slated to be in active operation sometime after 2005.

While the day of cyborgnetic warriors is undoubtedly still a bit away, the Army is committed to developing technology that will enable today's troops to carry and operate the increasingly sophisticated and lethal combat equipment of the future. Not totally insensitive to the heavy and cumbersome gear carried in the field by the average soldier, the Army is planning a two-stage development of a self-contained upper body armor exoskeleton that can carry its own power system, computers, sensors, and command and control mechanisms, as well as bearing the brunt of a soldier's equipment weight. Such a system would afford the soldier increased strength and endurance without sacrificing mobility. It is this ability to exploit and leverage information that is expected to greatly influence tactical warfare doctrine as superior battlefield knowledge increasingly compensates for the geographical and numerical disadvantaged operations to which American soldiers are currently being deployed.

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