

Deployed with his Stryker battalion north of Baghdad in April 2007, "...from day one I didn't want to do a mission without this. This is just as important as my weapon, my NODs [night observation devices], the ability to provide SA on the battlefield – and especially the battlefield of today where it's unconventional warfare. It's irreplaceable".

A contemporary avows: "We don't get lost – it cuts down the mission-planning time, the mission-execution time, because you don't have to stop and look at things – maps – and you don't have to talk as much on the radio. You can see where you are going, you can see what you are doing; it makes us faster, more lethal. And it also gives leaders [team leader level and upwards] confidence in what they are doing."

A company commander also relates how, "in one of our first combat situations, one of our platoons was in contact; they were [ambushed]. The squad leader had positioned his forces and immediately, as they sat in their position, they were attacked by a numerically superior force".

He continues: "Because of the Land Warrior system, the squad leader was able to give digital commands to his team leaders, who were separated, outside of direct vision of where they were.... They were [thus] able to effectively engage [when] in an ambush position – basically to kill or wound 19 of the 25 personnel that we identified. And it was because of the technology ... it took us to the next level."

Another company commander, a major, asserts: "In an asymmetrical fight, where there is not a linear line of advance, [Land Warrior] is phenomenally useful. It's great for being able to track where people are and understanding the situation, developing the demographics and understanding your environment a lot better."

Other practical operational benefits cited by 4/9 team leaders include the fact that Land Warrior extends digitisation to the dismounts, who would otherwise lose the associated capabilities as soon as they step outside their digitised Stryker vehicles. Typically it gives them the ability to sprint through an urban maze and pick out the correct building when arresting 'sensitive targets', with minimum disturbance to the local populace: the ability when in a contact to manoeuvre to a target from outside the line of fire; and it reduces the risk of 'friction' or fratricide when two friendly patrols try to come together under fire.

It also has utility for the mortarman, who employs the measurement tool on his helmet to obtain the distance in metres and the azimuth of targets emerging within his line of sight. This enables him to conduct a hasty fire mission within 30 to 40 seconds, without having to get out a map, a compass and a plotting board.

For one of the company commanders, Land Warrior brings "...a lot more than just a system with maps, graphics and a communications platform. It starts to meld a new mind-



■ One of the designated features of the Elbit Dominator IICS adopted by the Israel Defence Force is the handheld display developed by ITL Optronics.

ITL: 1332999



■ Cornerstone of ITL's AISS soldier ensemble is the micro tactical computer (centre), which is operated via the associated handheld display (right).

ITL: 1333000

set into that unit, and that's almost as valuable as the hardware package it provides".

For his part, the initially sceptical staff sergeant sums up thus: "If you give the guys on the ground the tools to be faster and more accurate and more lethal, that's where we need to go, and I think that enough people have gotten the point now – and have seen it – that they won't go back."

It remains to be seen whether any further-enhanced versions of the General Dynamics (GD) Land Warrior Strike ensemble will be acquired to support current operations.

## Ground Soldier Ensemble

In the meantime, the US Army – which nominally cancelled Land Warrior production in early 2007 on grounds of cost – has launched the successor Ground Soldier Ensemble (GSE) SA system programme, having issued a request for proposals in December 2008.

The GSE should be ready for fielding to infantry brigades in 2011. As previously reported by *Jane's*, at the lowest level, members of a fire team will each carry a GD/Thales Joint Tactical Radio System (JTRS) SFF-C(V)1 Rifleman Radio. In addition to the networking Soldier Radio Waveform, the Type 2-encrypted Rifleman Radio will

have integral GPS, enabling it to transmit the individual soldier's location to the team leader, who will be equipped with a GSE.

Reducing size, weight and power consumption is a key part of the project. All the GSE's communications elements, computers, power sources, GPS navigation systems, HMDs and peripheral controls have to be integrated with a total weight of less than 3.3 kg, and be able to run for 24 hours on a pair of rechargeable LI-145 or LI-80 lithium-ion batteries. The system is also required to be compatible with Nacre or Peltor headsets.

As with Land Warrior, team leaders are expected to be provided with a Type 1-encrypted Raytheon MicroLight 2G communication network radio subsystem – a networking data radio that uses the EPLRS waveform – while squad leaders will have Type 1-encrypted Thales AN/PRC-148 JEM narrowband software-defined multiband handheld JTRS radios for communicating with the chain of command.

On 15 April 2009 the US Army announced that it had downselected GD, Raytheon and Rockwell Collins to compete for the GSE programme, requiring them to submit 10 or more prototypes for Phase 1 field evaluation, starting in September. Additional

prototypes may also be ordered by the US Marine Corps (USMC). During Phase 2 technology development (TD), each contender will deliver another 60 systems incorporating Phase 1 lessons learned, and this will be followed by further development and limited user testing. Once approval has been obtained, the US Army intends to award a production contract to one of the companies successfully completing the TD stage.

## Designs in the mix

For the GSE, GD is understood to be designing a more tailorable ensemble than its current Land Warrior, with a more powerful and less power-hungry processor for the system computer, which will be available in varying and more readily upgradable configurations. The accuracy of the navigation system will also be significantly improved.

Raytheon's GSE team members are Black Diamond Advanced Technology, which is providing its SwitchBack hardened, wearable computing hardware; and CHI Systems (part of the Canada-based OSI Geospatial organisation), responsible for precise, GPS-denied navigation and other software components. The latter include the Dismounted Close Combat Command and Control System (DC4S) software suite, based on the SUSA (Small Unit SA) system originally funded by the US Department of Defense for special forces applications.

The DC4S has base station (company/platoon level), 'Commander' (squad leader) and 'Assaulter' (special forces) variants. Its key features include precise navigation and tracking in GPS-denied conditions, exploiting a Honeywell DMC and 'smart pedometry' techniques claimed to give sub-1 degree/sub-1 m accuracies. Other features of the DC4S software include: automatic CFF; automatic target handoff; integration



Silynx 1347334

■ A soldier equipped with Silynx in-ear active noise protection, a chest-worn C40ps control box and a dual, wireless press-to-talk switch on his weapon. The C40ps system can generate digital voice alerts for body-worn sensors and its integral GPS facility aids the plotting of other non-GPS radio users.



■ The C4I functionality of target acquisition binoculars such as the Vectronix Vector 21 can be augmented with ITL's CTAS docking station, which provides an interface and display for an associated battle management system, plus an integral GPS, in a 400 g appliqué unit.

ITL 1347332

with unmanned aerial vehicles (UAVs), unmanned ground vehicles (UGVs), laser range-finders and sniper detection systems; and interoperability with FBCB2, FalconView and C2PC battle management applications.

Rockwell Collins has teamed with Elbit Systems of America to devise its GSE prototype. This will exploit the navigation, display, video processing, mass storage, computing and information assurance capabilities of Rockwell Collins and a computer and handheld tablet display from Elbit. The latter's parent company is prime contractor for the Israel Defence Force's (IDF's) Dominator integrated infantry combat system (IICS). Among other things, Rockwell will supply its SO35A HMD, which is currently used with Land Warrior.

## New technology

Rough though the road has been for integrated soldier system ensembles, new-technology aids to meet perceived infantry C4I needs continue to be put forward in a variety of manifestations on both sides of the Atlantic.

Typical of those involved is Israeli company ITL Optronics, the subcontractor for the handheld display (HHD) for the Elbit Dominator IICS adopted by the IDF. ITL offers an infantry C4I subsystem of its own, known as the Advanced Infantry Soldier System (AISS). At the heart of the modular AISS ensemble are ITL's Windows XP-operated micro tactical computer (MTC), which weighs 600 g (including battery) and is cable-connected to the 350 g HHD (HMD or flat-panel display optional); a data transceiver; a GPS receiver; and the company's Cobra daylight target-acquisition sight.

The MTC's functions include such things as terrain and intervisibility analysis; navi-



IHS Jane's/IDR: 1347333

■ Qioptiq's Pointer sniper scope adjunct, which enables target cueing and situational awareness data to be injected into optical sights.

gation; route preparation; allocation of fire sectors; positioning of support weapons; and indication of rendezvous and rescue points, target positions and alternative routes. It can be used as both a personal navigation aid and an SA tool, based on a map or air photograph, and is suitable for issue to convoy drivers as well as combat infantrymen.

The associated HHD incorporates an 852x600-pixel OLED SVGA screen for viewing tactical data and images and also embodies a DMC, a vibrating message-notification unit and system-control buttons. It can be fitted with a shuttered eye guard to prevent light leakage at night. In addition to a dedicated VHF data transceiver for squad-level communication, reachback communications can be achieved by integrating a multiband handheld transceiver such as the Harris AN/PRC-152, Tadiran PRC-710MB or Thales AN/PRC-148 MBITR.

In order to avoid duplication of facilities, save weight and minimise the required range of power sources while reducing the risk of equipment failure through the loss of, or damage to, cable connections, some users have been urging industry to provide greater functionality in a unified device.

ITL has taken a step towards this with its Compact Target Acquisition System (CTAS), which enables a target acquisition sight to be integrated with a battle management system display in a single handheld unit. The CTAS takes the form of a 400 g docking station with its own eyepiece, which the user clips to any legacy laser rangefinder that has an RS232/422 serial communication port (such as the Vectronix Vector 21 or Denel LH-40C). The docking station, which can be used in place of an HHD or HMD as the operator interface for the MTC, includes an 852x600-pixel full-colour SVGA display for C4I data; GPS; DMC; and mouse, laser and compass-control buttons.

The amalgamation of functions also drives a number of developments being undertaken by Qioptiq in the UK. As a first step the company has been collaborating with QinetiQ on the Pointer scope, which weighs 1.4 kg in its prototype form and has an eight-hour operating life using four AA-sized batteries. Pointer is designed as an adjunct for optical sights into which it injects symbology derived from an offboard source (UAV, laser rangefinder or remote sensor) to cue a sniper onto the target. The sensor data reaches Pointer via a Windows XP base station to which it is networked by means of a patrol radio such as the Selex EZPRR. Pointer can be operated using a built-in raster map, or integrated into a user's full battle management system mapping software.

Next year the company is expected to roll out its VIPIR-3 thermal sight, which will further integrate the surveillance, target acquisition and C4I functions, exploiting its resident computing capability. As a company representative put it to *Jane's*: "If you've got processors running on weapon sights

like you have these days and you can have microdisplays that can show maps, symbology and so on, why carry other devices?"

Thus the operator will be able to use VIPIR-3 - which has resolution, weight and power-consumption improvements over its VIPIR-2 predecessor - to call up SA imagery or maps on its integral four-colour OLED display, using control buttons integrated into the foregrip of his weapon. Soldiers will also be able to use VIPIR-3 as an HHD when on the move.

### From QuietOps to C4Ops

Another approach to functional amalgamation is offered by Silynx Communications in the United States, whose QuietOps soft-

ware-defined modular headset and active-noise hearing-protection system is one of the constituents of the Elbit Dominator soldier system. The company has now evolved QuietOps into C4Ops, which not only provides hearing protection and sound amplification but has an integral GPS receiver and a 280 g control box with enhanced processing power for controlling both the user's radios and system computer.

The C4Ops is linked to the side connector of the soldier's radio and to the computer by 'smart' leads, a third such cable being employed to connect it to an intercom system should the wearer be vehicle-mounted.

The control box can also act as a hub for body-worn sensors, providing digital voice

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