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## Lean and Mean

**In a dramatic experiment, the army is remaking itself using theories perfected by business. Can Lean Six Sigma build a better, faster force?**

By SALLY B. DONNELLY

Colonel Douglas Evans sits in his modest office at Red River Army Depot, tracking the dozens of war-battered humvees from Iraq that arrive every week to be repaired. Spread across 36,000 acres in Texarkana, Texas, the World War II--era Red River facility is one of the Army's oldest and most important maintenance and storage bases. But Evans, a 24-year Army vet with combat tours in the Balkans and Iraq, says what soldiers need to understand these days is not only bombs and bullets but also diapers.

Changing babies, Evans tells everyone at Red River, is the best model for thinking about how the facility can best help the Army. The faster you can fix a beat-up humvee, the sooner you can get it back into the fight. "You have to be organized," says Evans, who has an M.B.A. from Babson College. "You can't put the baby one place, the wipes another, the baby powder still another. If you fail to streamline the process, you might never get that clean diaper on. It's all about eliminating the 'waste' in the process." He smiles at his play on words.

Evans is the tip of the spear on what may be the most ambitious business effort in the 231-year history of the U.S. Army: an attempt to adopt a management theory, Lean Six Sigma, across the entire service. More comprehensive than the attempt in the 1960s by Defense Secretary Robert McNamara to introduce the highly quantitative "system analysis" to the Pentagon, this is an enormous experiment: the Army has an annual budget of \$160 billion, with 1.1 million men and women in uniform, and it employs an additional 230,000 civilians. "This is the largest deployment of management science since the beginning of the discipline," says Mike Kirby, who holds the newly created position of deputy under secretary of the Army for business transformation.

Why shake up the Army now, in the midst of a difficult war? The U.S. defense budget has increased some 40% since 2001, to almost half a trillion dollars, but military experts expect the funding to slow. Secretary of the Army Francis Harvey, who signed the order last March to implement the effort, says the need for it is obvious: "We need to free up resources so we can apply them to the operating side of the Army. We need to equip our soldiers better and faster." Optimistic projections claim the Army could be

saving billions of dollars each year in a decade.

The two concepts of Lean and Six Sigma have been around the private sector for decades, and some parts of the Army have been using them since 2002. Lean is an outgrowth of the Toyota production system, developed in the 1930s, which focuses on increasing efficiency and reducing cycle time by eliminating waste. Six Sigma was first used on a wide scale by Motorola in the 1980s as an approach to improving quality through statistical measurements and benchmarking, Evans explains. Six Sigma entered the U.S. business lexicon in a big way in the 1990s when CEO Jack Welch embraced it at General Electric.

Today on the bookshelves of nearly every Army office in the Pentagon, alongside military-history tomes, sits a stack of business books that try to decipher what Lean Six Sigma means. Harvey, the spiritual godfather of the Army's transformation, tries to cut through the jargon. "We used to call it 'quality and productivity improvement' or 'total quality management,'" says Harvey, who worked for Westinghouse for nearly three decades. "The bottom line is, you take the extra steps out of the system, and improvement should be ongoing and forever."

While Lean and Six Sigma have traditionally been applied to manufacturing, the Army is using them in administrative offices as well. Last year for the first time, Harvey began requiring precise monthly figures on how many employees the service had. Then he gave commanders the responsibility of scrutinizing every new hire. Largely through attrition, the Army recorded a mere 2.6% increase in civilian employees in 2005. And Harvey did his part: his office now has 30% fewer than when he took the job in 2004.

His officers are doing the same. General Ben Griffin, the head of Army Matériel Command--the service's central procurement organization for equipment--has dramatically cut the number of meetings, reports and briefings. He installed seven senior officers around the world, in part to track progress on Lean Six Sigma, and gets Army-wide operational updates every week by videoconference rather than in-person meetings. Griffin says his command alone saved \$110 million last year, and military sources expect that to be doubled this year.

But it is on shop floors like Red River's where the changes are starting to show the most impressive results. Worn-out humvees used to be brought into a poorly lit, dirty and disorganized loading bay; now the vehicles move through a bright, gleaming shop floor--with American flags draped from the ceiling--in an assembly-line method, complete with a horn that blares every 23 min. to signal a move to a new station. Workers called waterspiders (named for the bugs that flit across the top of ponds) scurry back and forth to fetch tools and equipment for higher-skilled mechanics, who stay close to the humvees. Evans tracks the slightest delays. When an employee missed work for a family emergency last December and slowed the entire line, Evans realized that he had not cross-trained enough workers to fill in. Now he has at least one backup for every critical spot. Red River is also stocking more parts and requiring better quality from suppliers. The changes are paying off: the facility can turn out 32 mission-ready humvees

a day, compared with three a week in 2004; the Lean process has lowered the cost of repair for one vehicle from \$89,000 to \$48,000.

And employees are part of the equation. At Red River, for example, broken vehicle hub gears used to be carted off to an area where several mechanics worked on them at three different tables. Workers came up with the idea of building one long table with an oval track on it that could slide the parts smoothly and quickly to each of the mechanics, whose tools were within easy reach. Evans is also taking some employees on site visits to efficient private-sector plants, like the British company BAE Systems' facility in York, Pa., where Bradley Fighting Vehicles are built. John Moore, a Bradley repair manager who has worked at Red River for 30 years, says he was skeptical of the new management regime at first. "I thought it was just going to put me out of a job," Moore says. "But I've turned around 180 degrees--I can see what an efficient shop can do."

Other Army facilities have seen similar results. Arkansas' Pine Bluff Arsenal reduced repair recycle time 90% and increased its production rate 50% on M-40 protective gas masks. Letterkenny Army Depot in Pennsylvania has saved \$11.9 million in the cost of building the Patriot air-defense missile system.

In many cases, the Army is turning to the private sector for help. The service lets 200,000 contracts each year, and some companies, like Honeywell, Northrop Grumman and BAE Systems, work hand in hand with Army staff on the factory floor. At Red River, for example, BAE spent thousands of dollars for new equipment and physical improvements to the plant. The company has also posted an on-site representative at Red River to oversee repair work on transmissions for BAE's Bradley. Working together, the BAE--Red River team increased output from 1.5 to 4 units per shift. In many Army facilities, the physical work, or "touch labor," is done by military staff, "but the crucial technical support is private industry," says Griffin of the Army Matériel Command. There are more than 300 such partnerships throughout the Army, and Griffin says they accounted for \$225 million in cost savings last year alone.

But two large questions loom over the Army's efforts: Is Lean Six Sigma just a management fad? And can a system designed to maximize profits and market share work in an enterprise whose goal is national security? Says an analyst who studies government procurement: "How is the Army going to judge success? Cutting people or saving money is useful, but the challenge will be making sure all the changes are not only relevant to the soldier in the field but that there aren't negative impacts for war fighting." Some outside experts have also raised doubts about the Army's ability to systematically track processes in minute detail as Six Sigma requires.

Even advocates of the Army effort recognize the challenge. Employees at all levels must adopt a new work ethic, learn new systems and often work harder, with no immediate rewards. At Red River, Evans asked his 300 supervisors to volunteer for intensive Lean Six Sigma training but felt that not enough embraced it, so last month he required attendance. "Ninety-nine percent of my folks are onboard, but a few have said they will retire rather than adopt the concept of Lean Six Sigma," Evans says.

Of course, what works in a humvee repair shop may not translate to an air-conditioned cubicle. "While cost savings are easier to achieve and see in a production facility, how do we measure success in the legal department?" asks Ron Davis, a civilian executive at the Army Matériel Command. "We can't use 'cases lost.' But we could look at speeding up how long it takes to produce a paper. Or how we might be able to get a recruit into the system faster."

For Evans, the Army's efforts are much more than a business-school exercise. "This is not only an economic transformation but a huge cultural change," he says. In the corner of every office at Red River, and on all the shop floors, stands a black cutout figure of a soldier with a helmet and rifle at the ready as a constant reminder of who the customer is and that the smallest errors can have the most serious consequences on the battlefield. A sign affixed to the front of the silhouette soldier says, WE BUILD IT AS IF OUR LIVES DEPEND ON IT. THEIRS DO!

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