

# Weapon Against Waste

LEAN SIX SIGMA  
IMPLEMENTATION IN  
THE U.S. ARMY

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**L**ean Six Sigma (LSS), as the name suggests, is a combination of lean production and Six Sigma methods. And it's a program the U.S. Army has adopted as its weapon of choice for fighting off process inefficiencies that result in wasted time, money and material.

LSS enables organizations to “simultaneously do business faster (time reduction) and better (defect reduction)” by improving the mean of the process performance while also reducing the process variation.<sup>1</sup>

Many firms, including the Army Office of Business Transformation (OBT),<sup>2</sup> have realized the potential of LSS as the most effective approach to business improvement. Since its implementation throughout the Army's manufacturing depots and logistical units, LSS has resulted in highly successful improvement transformations.<sup>3</sup> LSS provided the Army with the tools it needed to meet its transformation goals, and the Army provided the grounds for unleashing LSS's great potential.

## **Military mission**

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To better understand the rationale behind LSS and its implementation by the Army, it is important to understand what the Army's mission is and how it differs from other organizations.

Unlike the private sector, the military is not driven by profit. The Army's unique mission is to defend the United States and its Constitution; preserve the peace and security, and defend the United States, its territories, Commonwealths and possessions; support national policies; and overcome any nations responsible for aggressive acts that imperil the peace and security of the United States.<sup>4</sup>

The Army's operations are funded by the government via taxpayer dollars, and its manpower is supported by Department of Defense (DoD) civilian personnel and typical business transactions pertaining to Army missions. In other words, the Army's bottom line is combat readiness, and its customers and clients are U.S. citizens.

As the Army's mission continually adapts to world politics and objectives set by the National Security Council, so has its manpower and funding. During the Cold War, the Army had an average of 547,000 soldiers serving at home in the United States and at forward operating bases such as Germany and Italy. The transformation of the Army's forces began in the 1990s as the Cold War ended. Traditional operation forces were downsized as more agile operational forces were taking shape.<sup>5</sup> As depicted in Figure 1 (p. 10), the strength of Army forces has changed considerably during the last half-century.

Currently, the Army has about 498,000 soldiers and is more flexible when responding to worldwide conflicts, humanitarian efforts, and peacekeeping missions at home and abroad.<sup>6</sup> The change in manpower has not affected

operations during the current era of conflicts in the Middle East; the Army has fought two wars while operating at a high operations tempo.

The major challenges facing the Army today are supporting an uncertain political environment, changing resource conditions and sustaining current garrison operations. The objectives of the Army’s new organizational design have been mitigating near-term risk and restoring balance to the current and future demands of the Army.

In Executive Order (EO) 13450, dated Nov. 13, 2007, President George W. Bush required all government agencies to become better stewards of U.S. taxpayer dollars.<sup>7</sup> The Army selected the implementation of LSS practices as a course of action to achieve its dynamic mission while using current resources more efficiently. But it couldn’t have done it without four factors that sets the Army apart from other organizations:

### 1. Leadership

In the military, a chain of command exists to ensure direction, guidance and adherence to protocol. The execution of efforts is aligned with the person or agency for which the subordinate is responsible.

This tiered and aligned decision-making structure will always refer to the support of senior Army leadership, whose architecture is essential to ensuring all missions are strategically planned in a top-to-bottom manner. This allows for the execution to occur at all levels of the chain and is crucial for several reasons.

As described in the *Army Lean Six Sigma Deployment Guidebook*, leadership “leverages executive talent and capability involving all of the Army’s most senior insti-

tutional leaders in advising the Secretary of the Army and the Army Secretariat.”<sup>8</sup>

Leadership also establishes transparency throughout the chain of command to ensure all relevant perspectives are considered and well-coordinated while courses of actions are vetted and implemented. In addition, it assigns accountability throughout the decision-making processes and encourages proper decision making at all levels.

Clearly defined roles and responsibilities are published in the LSS guidebook to ensure personnel involved with LSS processes understand its objectives, roles and responsibilities, and that these operating procedures are standardized throughout the Army.

The enterprise concept is the Army’s approach to institutional adaptation of the LSS program. At the top of the chain are the Secretary of the Army and the Army Secretariat. Following instruction from the top, the Army enterprise concept has three tiers of hierarchy (see Figure 2). At the top is the Army Enterprise Board (AEB), which is comprised of senior, strategic-level advising bodies in the Department of the Army. They are responsible for framing courses of action to support the Secretary of the Army and to ensure decisions made that will affect the Army enterprisewide are discussed prior to implementation.

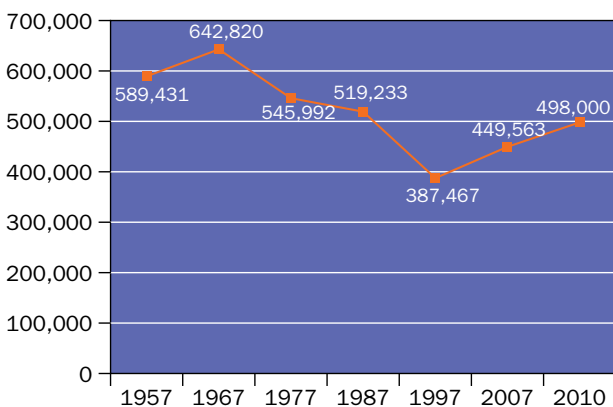
Within the AEB is a panel of LSS experts that advise the board on current LSS issues, along with another supporting tier, the Headquarters, Department of the Army (HQDA), which identifies opportunities for streamlined and improved policy development and implementation.

The HQDA ensures continued compliance with laws, directives, regulations and orders while LSS testing and implementation occur. The strategic direction of the AEB is carried out by the chief management officer (CMO). The OBT’s activities are integral in enabling the CMO to bridge policy and execution gaps. The LSS program directorate is within the OBT.

Finally, there are four core enterprises (CE) that identify, prioritize and raise strategic issues in existing HQDA or AEB forums. The leaders of these CEs manage Army-wide priorities in their respective functional departments but align their functions, processes and working relationships across all areas.

The hierarchy of the Army’s LSS leadership is important because many of the critical decisions made—such as whether to employ LSS—occur at the top; but execution of these decisions typically occurs

Figure 1. **Soldiers serving in the U.S. Army**



at the tactical level—or unit level—of the military, so information must be disseminated throughout the organization to encourage shared knowledge and practices.

As previously mentioned, the enterprise concept is the Army’s approach to institutional adaptation. It ensures the Army operates in a spirit of collaboration, synchronization and transparency. The defined roles and responsibilities pertain to the chain of command as specific personnel are assigned the duties of LSS implementation and management. These roles, responsibilities and processes established by the LSS guidebook help the Army think, act and operate as a single enterprise.

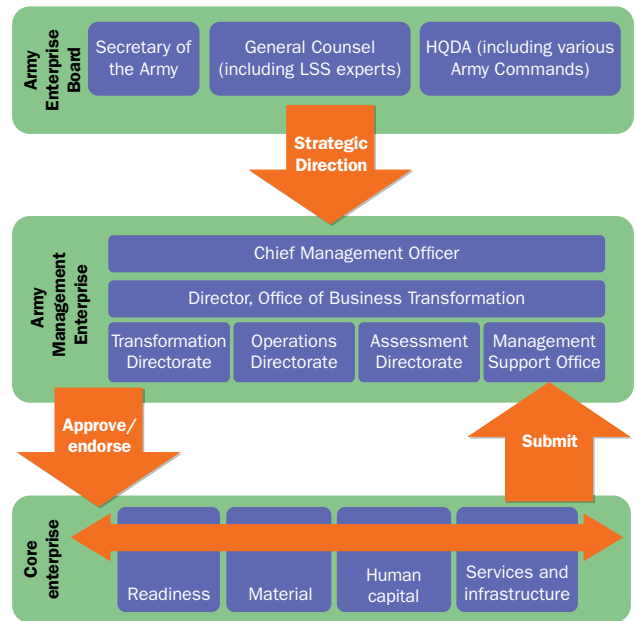
This guidebook is similar to other standard operating procedures that exist within the Army to ensure standardization of daily operating practices for specifically assigned duties. If at any point there is deviation from the roles and responsibilities, the chain of command will be involved, and corrective actions will occur.

The Army has a well-established formal training program for LSS. The program offers training for all Six Sigma belts:

- White Belt training is offered to expose a critical mass of its workforce to the power of LSS.
- Yellow Belts are trained to maintain a general knowledge of LSS and help identify processes in their organization that need improvement.
- Green Belts (GBs) are expected to apply LSS to their daily work environments by driving improvements in their facility, department or workgroup.
- Black Belts (BBs) work on large-scale and cross-organizational process improvements.
- Master Black Belts (MBBs) coach and mentor GBs and BBs while guiding multiple LSS projects. They are also expected to teach and facilitate LSS training.
- Executive or project sponsors own the processes GB and BB projects work to improve. Project sponsors assign belts to a project, help write project charters and push projects forward. They are critical to the Army’s LSS success.<sup>9</sup>

The Army’s LSS program has trained more than 1,450 senior leaders and has completed nearly 5,200 projects. More than 1,900 projects are currently in progress. The completed projects have resulted in significant financial and operational benefits across the Army. Since 2009, it has submitted projects worth a combined savings of \$96.6 million to support

Figure 2. U.S. Army’s enterprise concept



HQDA = Headquarters, Department of the Army

President Barack Obama’s goal of \$100 million in savings throughout the government.<sup>10</sup>

## 2. Culture

The culture of the Army is rooted in tradition and customs, and is subject to adherence of federal, DoD and Army policies. Implementation and management of continuous improvement processes and LSS were mandated in DoD Instruction No. 5010.43, which was a response to EO 13450.<sup>11</sup>

When the Army established its program in 2006, only a few enthusiastic and knowledgeable professionals in the Army knew about LSS and how to employ its tactics in a military environment. And, as with any type of change, there was bound to be resistance.

Knowing that a new way of doing business will be met with reluctance is why leaders at all levels need to embrace enterprise thinking and adopt a mindset of doing what’s good for the Army, good for the DoD and good for the nation. As more people become aware of LSS implementation, the acceptance and willingness to change will follow.

The LSS guidebook recommends that strategic leaders be involved in circulating communication about the Army enterprise, mindset and LSS program.<sup>12</sup> Every rank from general to private should

understand this program, its terminology and desired outcomes. Project sponsorship at all levels will engage the troops to come up with innovative ideas to drive efficiency and save taxpayer dollars.

It should be noted that the majority of personnel exposed to LSS training and LSS projects have been in the logistics, IT and acquisition fields. In the DoD and Army, these personnel include officers and senior DoD civilians. Although they inherently embody the Army and military culture, they operate in an enterprise environment. Currently, it's not clear how LSS implementation can be extended to the field operations—or whether it can at all.

### 3. Commitment

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The Army is committed to ensuring a fault-proof deployment strategy for the successful implementation of LSS. Beginning in 2006, the Army launched its LSS efforts toward achieving business transformation. In 2007, the Army achieved breakthroughs as it continued to build momentum with the program.

By 2008, the plan was to accelerate these changes and LSS implementation across the Army. In 2009, the Army built upon self-sustainment to institutionalize implementation across the organization. In 2010, the goal was to achieve a steady state to maintain institutionalization in the Army.

### 4. Community of practice

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Other reasons for the Army's success include availability of data and information. The Army is the leader in the service groups for LSS implementation and has established a website that highlights community practices, reduces redundancy and benchmarks operations organizationwide within different services. In April 2009, the Army launched the OBT as mandated by Congress and in accordance with General Order No. 2010-01.<sup>13</sup>

The OBT enables the Army to institutionalize business transformation, including cultural change, and supports Army leadership with the resources, skills and commitment to adjust the way the Army does business and dramatically improve Army business operations.<sup>14</sup>

### Case studies

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At the Anniston Army Depot in Alabama, successful LSS implementation resulted in processes that are more cost effective and less demanding in terms of

man-hours. The depot's bottom line is to continually process high-quality products on time and within constraints of the budget so equipment can be returned to the warfighter quickly at the lowest possible cost to the taxpayers.<sup>15</sup>

Due to the current state of war, the depot needs to support a higher demand in workload for receiving and returning equipment to warfighters. The depot's workload increased from 4 million direct labor hours in 2004 to 6.3 million hours in 2006.<sup>16</sup>

One of the most successful cases of LSS implementation is the improvement of the Army Depot's M1 Abrams tank assembly line. Prior to LSS implementation, each employee assembled an entire module of the M1 from start to finish in typical vehicle maintenance "bay style," in which workers are assigned to and focused on the equipment they're working on.

After analyzing, organizing and reviewing operations, the Anniston Army Depot determined that a one-piece flow operation could reduce assembly time by 2.2 man-hours for each module and staffing requirements from five to four workers. Those successful efforts resulted in a reduction throughput time of 56%—from 4.5 days to two days.<sup>17</sup>

After workers at the depot saw how valuable LSS implementation was to that particular process, other workers began reviewing operations in their areas and analyzed ways to improve performance.

The M2 machine-gun assembly line eliminated waste and transformed work cells to a continuous, one-piece flow system, thus reducing assembly time of the weapon from 2.5 man hours to one and staffing from 18 to 15. As a result, production increased from 50 to more than 100 machine guns per month.<sup>18</sup>

The most significant finding was that prior to LSS implementation, mechanics spent significant time chasing down parts. Now, with their improved workstations, the mechanics are able to focus on doing their job and assembling or fixing equipment.<sup>19</sup>

Other LSS stories published in the *Defense Acquisition, Technology and Logistics* journal documented successes across different agencies in the Army. In 2006, the Red River Army Depot in Texarkana, TX, saved \$30 million on its High Mobility Multipurpose Wheeled Vehicle line using LSS, resulting in a higher rate of production. The depot can now produce 32 mission-ready vehicles per day compared with three a week in 2004.<sup>20</sup>

U.S. Army Recruiting Command also reduced the number of steps it takes to process new recruits by 66%. It also decreased the time it takes to get applicants through the process by 40%. Finally, during

fiscal year 2005, Army Materiel Command saved \$110 million by implementing LSS and removing waste by better controlling output.<sup>21</sup>

### Continuing improvement

The OBT strongly emphasizes continuous process improvement (CPI), which includes such activities as:

1. Benefit reporting and tracking.
2. Ongoing performance measurement and reporting.
3. Institutionalization of new roles and responsibilities.
4. Identification of additional competencies.
5. Improved communication processes.
6. Ongoing risk assessment.
7. Formalized knowledge transfer and learning processes.
8. Formalized lessons-learned processes.
9. Identification of areas that need further improvement.
10. Reassessed customer needs and expectations.<sup>22</sup>

Although the Army has achieved many successes in applying LSS, there are limitations to its full implementation. It's not clear if there are sufficient resources to support all potential LSS projects in the Army. It's also unclear whether units would be successful implementing all potential LSS projects in an environment subject to frequent political changes.

LSS requires going beyond a simple mechanical process. The Army still has the challenge of changing the mindset of its personnel to accept this new way of doing business. The OBT has not published the number of GBs and BBs in the Army, and most of the successes have been in the enterprise areas of manufacturing, production, logistics and acquisitions.


There have been no published studies to illustrate whether operational units in the field have sufficient expertise in LSS theories and whether there are sufficient numbers of LSS-trained soldiers and leaders to use LSS in all of their operations.

Going forward, everyone should be exposed to LSS and receive basic training because they are the ones who are most familiar with how work is conducted in their areas and thus would be the best candidates to recommend ways to improve those operations.

### The new Army

As with any major business management initiative, LSS requires leadership buy-in from a top-down perspective. The Army has transitioned to become a more

resilient, expeditionary force that operates in a cost-management culture. The leadership, complementary culture and strong commitment inherent to the Army have ensured the successes of LSS implementation thus far.

Additionally, DoD Instruction No. 5010.438 facilitated the Army's senior leadership endorsement and support for LSS. The recommended policy and procedures in effect for implementation have been set in motion via the OBT, which resulted in numerous successes since LSS was initiated. Further programs of instruction, education and communication of LSS will ensure the Army continues its success. 

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