EMS and Lean Six Sigma: Two Great Tastes Do They Taste Great Together?

23 May 2007

Dave Giffin
U.S. Army Environmental Command
Environmental Quality Division
Aberdeen Proving Ground, Maryland
dave.giffin@us.army.mil
(410) 436-1228; DSN 584-1228
1. Lean Six Sigma (LSS) is a new buzz phrase in the Army (and coming to the Air Force and Navy). You probably hear it referenced routinely in meetings, briefings and general conversation. But do you know what LSS is?

2. Do you know the principles and concepts behind it?

3. Do you know how it will affect you in the near future?

4. EMS and LSS are both continuous process improvement methodologies being implemented in the Army. Are these two initiatives duplicative? Do they overlap?

5. Do they work together or pull us in different directions?
1. Provide background on Lean Six Sigma and Business Transformation in the Army

2. Provide a comparison of Lean Six Sigma and ISO 14001

3. Describe overlaps and synergies between EMS and Lean Six Sigma

4. Describe what Army installations can do to leverage internal resources and integrate initiatives
Army Business Transformation

1. **Office of the Deputy Under Secretary of the Army Business Transformation (DUSA-BT)** stood up in 2005

2. **Goal**: “To free human and financial resources that can be better applied toward accomplishing our warfighting requirements and accelerating other aspects of transformation”. 2006 Army Posture Statement

3. **Objectives:**
   - Maximize return on taxpayers’ dollar
   - Instill culture that drives costs down versus driving budgets up.... “Defending the Nation is more important than defending the budget”
   - Drive fundamental change in how the Army does business
   - Promote a culture of continuous improvement
   - Reduce cost and cycle time
   - Achieve quality improvements
LEAN SIX SIGMA WAS BUILT ON HISTORY OF CONTINUOUS PROCESS IMPROVEMENT

1. Although LSS is new to the Army, the philosophies behind it have been around for some time. To understand the evolving concept of LSS, it’s best to know how it began.

2. The originations of the Lean philosophy are usually traced back to Toyota in the 1950s.

3. Toyota focused on cycle time and achieved Henry Ford’s cost with GM’s variety.

4. Motorola initiated “six sigma” to organize TQM tools into DMAIC.

5. GE evolved six sigma into a Prescriptive quality system.

6. Lean Six Sigma integrates lead time, cost and quality; strategy drives projects.
EMS and Lean Six Sigma

World Class Operating Excellence Demanded
Integration of Lean and Six Sigma

**Lean**

Speed + Waste +
Implicit Infrastructure

1. **Goal** – Elimination of waste, including time (anything that adds cost without adding value)
   Increase process speed
2. **Focus** – Bias for action/Implementing Toyota tools
3. **Method** – Rapid Improvement Events, Value Stream Mapping

**Six Sigma**

Quality, Cost +
Explicit Infrastructure

1. **Goal** – Improve performance on Critical to Quality (CTQ) Customer Requirements
2. **Focus** – Use DMAIC tools to eliminate variation
3. **Method** – Management engagement, 1% dedicated as Black Belts, 3-5% as Green Belts

**Lean Speed Enables Six Sigma Quality**
(Faster Cycles of Experimentation/Learning)

**Six Sigma Quality Enables Lean Speed**
(Fewer Defects Means Less Time Spent on Rework)
Six Sigma is a Measurement of Quality

<table>
<thead>
<tr>
<th>Sigma Level</th>
<th>% Good</th>
</tr>
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<tbody>
<tr>
<td>2</td>
<td>69.1%</td>
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<tr>
<td>3</td>
<td>93.32%</td>
</tr>
<tr>
<td>4</td>
<td>99.379%</td>
</tr>
<tr>
<td>5</td>
<td>99.9767%</td>
</tr>
<tr>
<td>6</td>
<td>99.99966%</td>
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</table>

(4 Sigma) **Practical Meaning** (6 Sigma)

**U.S. Postal System**
- 20,000 Lost Articles Of Mail / Hr VS. 7 Lost Articles / Hr

**Airline System**
- Two Short/Long Landings / Day VS. 1 Short / Long Per 5 Years
EMS and Lean Six Sigma

DMAIC Activities and Tools

**Define**
- Review Project Charter
- Validate Problem Statement and Goals
- Validate Voice of the Customer and Voice of the Business
- Validate Financial Benefits
- Validate High-Level Value Stream Map and Scope
- Create Communication Plan
- Select and Launch Team
- Develop Project Schedule
- Complete Define Milestone

**Measure**
- Value Stream Map for Deeper Understanding and Focus
- Identify Key Input, Process and Output Metrics
- Develop Operational Definitions
- Develop Data Collection Plan
- Validate Measurement System
- Collect Baseline Data
- Determine Process Capability

**Analyze**
- Identify Potential Root Causes
- Reduce List of Potential Root Causes
- Confirm Root Cause to Output Relationship
- Estimate Impact of Root Causes on Key Outputs
- Prioritize Root Causes
- Complete Analyze Milestone

**Improve**
- Develop Potential Solutions
- Evaluate, Select, and Optimize Best Solutions
- Develop 'To-Be' Value Stream Map(s)
- Develop and Implement Pilot Solution
- Confirm Attainment of Project Goals
- Develop Full Scale Implementation Plan
- Complete Improve Milestone

**Control**
- Implement Mistake Proofing
- Develop SOPs, Training Plan and Process Controls
- Implement Solution and Ongoing Process Measurements
- Identify Project Replication Opportunities
- Complete Control Milestone
- Transition Project to Process Owner

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**Tools**
- Project Charter
- Voice of the Customer and Kano Analysis
- SIPOC Map
- Project Valuation/ROIC Analysis Tools
- RACI and Quad Charts
- Stakeholder Analysis
- Communication Plan
- Effective Meeting Tools
- Inquiry and Advocacy Skills
- Time Lines, Milestones, and Gantt Charting
- Pareto Analysis
- Belbin Analysis
- Value Stream Mapping
- Value of Speed (Process Cycle Efficiency/Little's Law)
- Operational Definitions
- Data Collection Plan
- Statistical Sampling
- Measurement System Analysis (MSA)
- Gage R&R
- Kappa Studies
- Control Charts
- Histograms
- Normality Test
- Process Capability Analysis
- Process Constraint ID and Takt Time Analysis
- Cause and Effect Analysis
- FMEA
- Hypothesis Tests/Conf. Intervals
- Simple and Multiple Regression
- ANOVA
- Components of Variation
- Conquering Product and Process Complexity
- Queuing Theory
- RIE, 5S, NVA Analysis, Generic Pull Systems, Four Step Rapid Setup Method
- Replenishment Pull/Kanban
- Stocking Strategy
- Process Flow Improvement
- Process Balancing
- Analytical Batch Sizing
- Total Productive Maintenance
- Design of Experiments (DOE)
- Solution Selection Matrix
- Piloting and Simulation
- Mistake-Proofing/Zero Defects
- Standard Operating Procedures (SOPs)
- Process Control Plans
- Visual Process Control Tools
- Statistical Process Controls (SPC)
- Solution Replication
- Project Transition Model
- Team Feedback Session
EMS and Lean Six Sigma

**DMAIC Focus**

- Define
  - Problem & project scope

- Measure
  - Ensure we have data we trust

- Analyze
  - Identify solutions to the problem

- Improve
  - Implement solutions

- Control
  - Prevent problem return

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"Many Potential Projects"

Single Project Selected

"Where are we now?"

Project Baseline Measured

"Many Potential Root Causes"

Root Causes Identified And Verified

"What is the solution?"

Improvements Tested and Measured

"How do we sustain the gains"

Self-Sustaining Institutionalized Process
Army Process overseeing Key Value Streams will work with Deployment Directors and MBBs as Black Belts and Green Belts work the core projects identified from those value streams.
EMS and Lean Six Sigma

Army Realizing Successes

- **Faster**
- **Better**
- **Cheaper**

**M915 Projectiles**
- Armament Research, Development & Engineering Ctr
- Reduced cost of munitions by half
- Generated $1.2B in future cost savings

**Foreign Military Sales**
- United States Army Security Assistance Command
- Avoided $3.2M in administrative costs for FY05

**Biological Integrated Detection Shelters**
- Letterkenny Army Depot
- Shingo Prize for Excellence in Manufacturing
- Saved Joint Program Executive Officer $300K
- Reduced repair cycle time from 12 to 7 months

**AN/TPS-75 Radar**
- Tobyhanna Army Depot
- Increased mean time between overhaul from 300 to 1,450 hours
- Reduced overhaul cycle time from 261 to 81 days

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Think “It Is” versus “As Is” versus “Could Be”

**What you think it is...**

**What it actually is...**

**What it could be...**

PROCESS MAPPING REALITY
## NEPA EIS Process

### Preliminary Data

#### Baseline Measure

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle Time (Days)</td>
<td>795</td>
</tr>
<tr>
<td>Manual Touch Time (hours)</td>
<td>21,162</td>
</tr>
<tr>
<td>People in the Process</td>
<td>362</td>
</tr>
<tr>
<td>Approvals</td>
<td>184</td>
</tr>
<tr>
<td>Handoffs</td>
<td>175</td>
</tr>
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</table>
EMS and Lean Six Sigma

How is the Army Tracking LSS Projects?

“PowerSteering”

• COTS Software product that all Army Commands are using to document, report and share LSS project details

• Total transparency for purposes of replication

• Standardized project and financial elements
# EMS and Lean Six Sigma

## ISO 14001/EMS and LSS Comparison

<table>
<thead>
<tr>
<th></th>
<th>Lean Six Sigma</th>
<th>ISO 14001: EMS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scope</strong></td>
<td>Comprehensive Improvement System - potentially all org activities/processes</td>
<td>Comprehensive Management system. All environmental aspects associated with org activities</td>
</tr>
<tr>
<td><strong>Focus</strong></td>
<td>Speed and efficiency; precision, accuracy, quality, and data-driven decisions</td>
<td>Specialized env mgt standards; guidelines for a continuous improvement process; mgt structure</td>
</tr>
</tbody>
</table>
| **Strengths**               | • Powerful analytical & statistical toolset  
• Scientific rigor for improvements  
• Customer focus  
• Focus on cost savings | • Mgt / operational controls  
• Checking & corrective actions  
• Comprehensiveness  
• System requirements clearly described & easily understood  
• Accreditation ANSI/RAB |
| **Weakness**                | • Mgt controls structure  
• Corrective action not preventative | • Improvement tools  
• Perceived weakness - linkages to overall organizational strategy  
• If system describes junk – will make junk and be in conformance |
Where Should LSS DMAIC and ISO 14001 Come Together?

Define

ID Significant Aspects

ID Objectives & Targets for Sig Aspects

Establish Common Environmental Mgt Programs (EMPs) to Accomplish Objs and Tgts

Checking / Corrective Action

Env. Policy

Mgt Review

Rely on ISO 14001 Structure for Control

Control

Strategic Sustainability Goals

Define

Measure Analyze Improve

EMS and Lean Six Sigma
EMS and Lean Six Sigma: a Synergistic Relationship

- EMS and LSS form a synergistic relationship, the weakness inherent in each tends to line up with strengths of the other.
- Both focus on continual improvement and elimination of waste.
- EMS objectives and targets can be used to ID areas to focus LSS efforts.
- Leverage LSS process provides a more robust mechanism for analyzing alternatives to meet objectives and targets.
- LSS solutions feed into environmental management programs for control.
- Ensure maintenance of the improved status using ISO EMPs and measure / monitoring / corrective action components.
Conclusions

1. Lean Six Sigma and ISO 14001 system concepts can be synergistically combined to improve business results.

2. Utilize LSS to bring scientific rigor to your organization’s points of pain.

3. Army installations will be adding many LSS belt resources, leverage them to make your EMS more results oriented.

“If you always do what you always did, you’ll always get what you always got.” Today’s problems are not always easily solved by common sense – you need extraordinary sense.