Integrating CMMI® and Six Sigma in Software and Systems Engineering

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November 2004
Agenda

IS&S Training

Lean Thinking

Technology Change Management Working Group – a Case Study
Executive Lean Training
- Top Executives – one week off site
- Must understand and promote

Green Belt Training
- One week course (corporate initiated/ unit led)
- Certification (completion of course, 1 event, Black Belt Mentor)
- Considering expanding Green Belt training to keep Black Belt training at three weeks

Black Belt Training
- Three week DFSS/Lean course (corporate initiated)
- Certification (completion of course, 3 events, mentored one greenbelt to certification)
LMC IS&S Training & Implementation

Lean Event Training
  • 2-hour training session opens each lean event
  • covers tools and methodologies
  • geared for those without previous experience

Organizational Training Goals
  • green belts to be trained set annually
  • black belts to be trained set annually
  • $$$ challenge based on process changes
    • Functional/ business/ project
LMC IS&S Implementation

IS&S Program Process Standard (PPS)
- minimum mandatory set of development processes
- updated using industry standards in which certifications were desired

Example: Quantitative Management
- Key elements
  - program process standards
  - metrics program
- Map to CMMI Organizational Process Performance (OPP)
  - SG1: Establish performance baselines and models
- Map to ISO 9001 – 2001
  - 5.1 Management Commitment
  - 5.4.1 Quality Objectives…
- and so on
### LMC IS&S Process Standard Roadmap

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### Six Sigma links:
- Level 2 Measurement & Analysis PA, Level 4/5 PAs
Lean Methodology

“An organization working together to make continuous improvements without large capital investment”

Purpose

– brings the right people together to understand the process and make immediate improvements to the process.
– evaluates opportunities to reduce cycle time, cost, inventory and eliminate all waste.
Lean: Terms & Usage

Kaizen - Make people’s jobs easier by taking them apart, studying them, and making improvements.

– “KAI” - take apart and make anew
– “ZEN” - think, make good the actions of others, do good deeds and help others

Kaizen tips (VAL, M&A, QPM, CAR, OPP)

– Get rid of old assumptions.
– Look for ways to make things happen now.
– Say “NO” to the status quo.
– Don’t worry about being perfect.
– It doesn’t have to cost money.
– If something’s wrong, fix it on the spot.
– Ask “WHY” five times to get to the root cause.
– Look for wisdom from many people rather than one.
– Never stop improving.
– Full-time participation of team members.
– Keep all affected employees informed of changes.
Lean: Kaizen Procedure

- Top Mgmt Kick-off of event
- Determine Team Objectives and Goals
- Lean/Six Sigma Training
- Map as-is Process
- Identify Waste in the process
- Use root cause analysis to evaluate issues
- Brainstorm solutions
- Evaluate the solutions against the objectives
- Report to Sponsor
- Implement validated solutions to improve the process
- Standardize: Map the to-be / improved process
- Report to Sponsor
# Lean: Six Sigma Representation

## OVERALL YIELD vs SIGMA

(Distribution Shifted ±1.5σ)

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LM21 Operating Excellence
Lean: Staffing Analysis Example

“As Is” Logical Process Map

Inputs:
- Request for Analysis
- Import to Excel

Process:
- Query Exist?
  - Yes: Run Report
  - No: Mod Query?
    - Yes: Create New Query
    - No: Select Data Elements
- Run Test
- Analyze Report
- Works?
  - Yes: Deliver to Customer
  - No: Satisfied

Legend:
- Operation/Activity
- Inspection
- Transport
- Delay
Lean: Staffing Analysis Example

“To be” Logical Process Map

INPUTS

1. Need for Analysis
   - Self-Serve?
     - Yes: Run Report
     - No: Request for Analysis by Finance
2. Query Exist?
   - Yes: Select Data Elements
   - No: Mod Query?
     - Yes: Create New Query
     - No: Pivot Table, if needed
3. Deliver to Customer if appropriate
   - Satisfied
     - Yes: Analyze Report
     - No: Finance Generated
4. Self-Serve
   - Finance Generated
   - No: Select Data Elements
   - Yes: Run Test

OUTPUTS

- Deliver to Customer if appropriate
Lean: Staffing Analysis Example

Time Value Map:
As Is = 19 hours

Time Value Map:
To Be = 7 hours

Legend
R = Request
Q = Query
S = Select data
T = Test Report
A = Analysis
F = Format
P = Pivot table
D = Deliver
* = Variable wait time

63% reduction in cycle time
LMC IS&S Lessons Learned

Six Sigma is more than statistical analysis

- It is a toolbox of methodologies that align with an organization's process improvement.
- The alignment is directly related to high maturity but is not restricted to that.
LMC IS&S – Strategy

Analyzed Principles
- Value from the customers’ perspective
- Value Stream – measured
- Flow
- Pull
- Perfection – rapid feedback / mistake proofing

World-wide Benchmarking Results
- A 4 Sigma company will spend > 10% of revenue on internal and external repair.
- A 6 Sigma company will spend < 1 % of revenue on internal and external repair.
LMC IS&S Project Selection

1. Process Improvement Recommendation (PIR)
   - any one can submit
   - process suggestion passed to Process Owner to evaluate, determine feasibility, determine level of institutionalization (and determine if pilot is necessary)

2. E-Transformation
   - all business processes that affect overhead are applicable
   - selection based on ROI and relevance to business – firm understanding of the before state
     - Just do it Projects
     - Kaizen event with rollout plan
   - require use of Six Sigma methodologies/ tools to pursue optimization

3. Technology Change Management Working Group (TCMWG)
   - once a year call for ideas – process oriented
   - can also be used to pilot ideas from PIRs
   - selection based on understanding the before state to measure the after state
   - modeling techniques implementing a six sigma target
LMC IS&S Technology Change Management

Purpose (M&A, RSKM, TS, QPM, OPP, OID)
- identify and assess emerging process-related technologies (e.g., Tools, Commercial Practices)
- guide those having benefit into our development activities in an orderly manner

Implementation (OID)
- Technology Change Management (TCM) Working Group (TCMWG) formed to identify process improvement needs and oversee the planning, progress, and application of solutions
- each functional organization represented on TCMWG
- annual call for TCM project proposals
  - parallel effort with call for Independent Research And Development (IRAD) projects
    - based on needs expressed in the strategic plan
- meets monthly to review ongoing projects, assess new business needs, and communicate new technology
LMC IS&S Technology Change Management

Definition
- process-centric (as opposed to product-centric)
- separation of former and latter based on legal barriers
- Technology changes for product is accomplished by extensive IRAD effort
- enterprise wide

Focus on TCM motivated by Acquisition Reform in 1995
- considerable maturing of TCM process in six years
- business results rather than just “ticket punching”
- utilizes value added methodology – 6 Sigma Tools

Driven by LMC IS&S Strategic Plan
- TCM participants contribute to Strategic Plan

Harmonious with company-wide process philosophy
LMC IS&S TCM Summary

The TCM Program is driven by the strategic process needs of our product lines.

TCM projects have had a positive impact on new business pursuits.

TCM projects have resulted in cost savings as well as cost avoidance.

TCM projects can result in changes to the standard processes.

Our business leaders are encouraged to push process boundaries through TCM.

Lean and Six Sigma Activities have resulted in an increase in award fee, increased software productivity, and earlier detection of defects.
Thank You!!!

Questions???