Lean Applied to MRO Business Processes

Maybe your organization’s constraint to revenue (or even airworthiness) is not on the shop floor?

William Peterson
Business Processes vs. Production

Cell
Flow
Cell
Flow
Cell
Flow
Cell

Purchasing
Internal Policy Police
IT and Accounting
Logistics
Sales & Marketing
Engineering
Facilities
Mgt. Decisions

Dept. A
Dept. B
Have your Lean Efforts Stalled?

Maybe your organization’s constraint is not on the shop floor?
Your constraints may be hidden in:

• Sales and Marketing
• Purchasing
• Engineering
• Human Resources
• Legal
• Accounting/Finance
• Inspection and Internal Auditing
• Strategy and Business Development
• Management Decision Making

Lean Applied to Business Processes is a proven methodology.
Thesis

Business processes:
• Can constrain production or operations
• May be solely administrative
• Have waste similar to operating processes
Thesis

Therefore, lean tools applied to business processes can

• Alleviate the constraints
• Eliminate wastes in process
Need to Focus on Other than Mfg.

<table>
<thead>
<tr>
<th>Real Numbers, Cunningham and Flume, 2003</th>
<th>Material</th>
<th>Touch Labor</th>
<th>Overhead</th>
</tr>
</thead>
<tbody>
<tr>
<td>Then</td>
<td>30%</td>
<td>60%</td>
<td>10%</td>
</tr>
<tr>
<td>Now</td>
<td>60%</td>
<td>10%</td>
<td>30%</td>
</tr>
</tbody>
</table>

MRO Overhead represents on average 21% of Mtc. costs, with a maximum of 51%

*(Exclusive Benchmark Analysis (FY2012 data) by IATA’s Maintenance Cost Task Force)*
LABP Is a Proven “Big Idea”

Lockheed Martin F-22 Engineering Change Order Processes
• Reduced cycle time by 35%, touch time by 29%, number of steps by 55%

Zodiac Aerospace – Warehouse Distribution and Aircraft Seat Repair

Air Force Tech Orders (Predator and Reaper)
• Urgent Tech Orders from 300 days to 15 days with less rework

Director of Purchasing Aircraft Component MRO
• Purchasing and Invoicing, P&W Gold Supplier, Capacity
• Warranty repairs down 50 percent, inventory down 39 percent
• Late delivery penalties down by 93 percent, gross profit margin up 5 percent

Air Force
• Aircraft Scheduled Checks, Wheels and Brakes (Dover AFB)
• Aircraft Ground Equip. (Ramstein AFB)
Value And Waste

Focus of Traditional Improvement Programs:
- Work Longer/Harder
- Work Smarter
- Build Business Case to Add
  - People
  - Machinery
  - Technology

Focus of Lean:
Eliminate Waste
What are the Eight wastes?

- Lack of Organizational Focus
- Inventories
- Transportation (materials)
- Motion (people)
- Waiting
- Defects
- Over-processing or Variation
- Overproduction
Lean Applied to Business Processes SA&D Guide

Strategic Alignment
- Mission
- Vision
- SIPOC
- High Level Process Map
- SWOT Analysis
- Metric Gap/Constraint Analysis
- Opportunities/Targets

Constraint/Gap Focus
- Opportunity/Target #1
- Opportunity/Target #2
- Opportunity/Target #3
- Opportunity/Target #4

Process Improvement
- Mission (Prep)
- Vision (Prep)
- SIPOC (Prep)
- High-Level Process Map (Prep)
- Value Stream Mapping/Analysis (Prep)
- Root Cause Analysis
- Lean Countermeasures

Implementation
- Report Out
- Action Plan
- Just Do Its
- Rapid Improvement Events
- Projects
- Metrics

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THE UNIVERSITY of TENNESSEE
KNOXVILLE
GRADUATE & EXECUTIVE EDUCATION
Lean Applied to Business Processes

Improvement Guide

**Seeing the Process**
- Strategic Alignment & VOC
- SIPOC / High Level Map
- Constraint / Gap Analysis
- Value Stream Mapping
- Value Added (NVA) Discussion
- Walk the Process
- Spaghetti Diagram
- Ideal State / BPR
- Theory of Constraints

**Lean Countermeasure**
- Information at Point of Use
- 5S - Sort, Set in Order, Shine, Standardize, Sustain
- Visual Management
  - Method Sheets / WIP Boards
  - Situational Awareness
- Standard Work / Error Proofing
  - Templates / Checklists
- Cells - No Multitasking
  - Battle Rhythm Meetings
  - Single Text Negotiation

**Root Cause Analysis**
- Brainstorming Eight Wastes
- Cause & Effect Diagrams
- 5 Whys
- Check Sheets / Pareto Analysis

**Implementation**
- Future State
- Action Plan / Implementation
- Feedback Loop
RFI » Invoice Process

Avg. 3.1 Days with Huge Variation

80 steps/ 30 Hand-offs
Spaghetti Diagram – Waste of Transportation / Motion / TAT

Travel of Unit after Repair
225’

Travel of Paperwork after Repair
1080’
RFI » Invoice Future State

Sales units now follow same process as customer parts

Int’l Shipping no longer extra steps

Last minute process improvements at final presentation

<table>
<thead>
<tr>
<th>RFI » Invoice</th>
<th>Current State</th>
<th>Future State</th>
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</thead>
<tbody>
<tr>
<td># of Steps</td>
<td>80 / 24</td>
<td></td>
</tr>
<tr>
<td># of Hand Offs</td>
<td>30 / 10</td>
<td></td>
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<tr>
<td>Cycle Time (Days)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RFI » WOC</td>
<td>2.1 / 1</td>
<td></td>
</tr>
<tr>
<td>WOC » Mail</td>
<td>1.0 / .25</td>
<td></td>
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<tr>
<td>Travel Packet</td>
<td>1080 ft</td>
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<tr>
<td></td>
<td>477 ft</td>
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Eliminate Subs (30% of ppwk volume)
Hi Level Process Map

1. Req. Dev.
2. Writing Tech Sol.
3. Tech Sol. Aprvl
4. Incorp. Supp/Chg
5. Cert.
6. Dev. Test
7. Verification
8. Pre-Pub Review
10. Fielding

WIP

GCS=21  GCS=362  GCS=69
MQ1=28  MQ1=577  MQ1=46
MQ9=14  MQ9=316  MQ9=311

WIP

GCS=34  MQ1=9  MQ9=207

MX AFTOs in Process
GCS=536
MQ1=704
MQ9=827
Total=2,037

Work in Process
Req. Dev. – Cert.
Value Stream Map

1. Requirement Development
2. Writing Technical Solution
3. Technical Solution Approval
4. Incorporate Supplement Change
5. Certification
Certification & Lean Metrics

- Cycle Time: 386-726 days (calculated)
- Touch Time: 45 days
- 32 Value Added
- 4 Value Add
- 22 Hand-Offs
- Rolled Throughput Yield = .0002%

<table>
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<tr>
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<th>FLT</th>
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<tbody>
<tr>
<td>GCS</td>
<td>536</td>
<td>N/A</td>
</tr>
<tr>
<td>Q1</td>
<td>704</td>
<td>32</td>
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<td>Q9</td>
<td>827</td>
<td>51</td>
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<tr>
<td>TOTAL</td>
<td>2,067</td>
<td>83</td>
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</tbody>
</table>

Future State
- Cycle Time: 99-218 calendar days
- Touch Time: 11.72 work days
8 Wastes

Pre-Affinitized Cause and Effect Diagram

Lack Of Org. Focus

Inventory

Transportation

Motion

Waiting

Over-processing

Defects

Overproduction
Summary

• There are limits to the application of Lean to shop and hangar floor processes
• MRO business process may be the new constraint
• Lean tools apply to MRO business processes
• Leaders have a tremendous opportunity to apply Lean tools to business processes to increased revenue and speedier airworthiness
Course / Contact Info

Lean Applied to Business Processes
Sept 22-26, 2013

Lean MRO
Sept 15-19, 2014

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Bill Peterson Bio

• Bill Peterson is a Lean best practices teacher and consultant who draws on over 30 years of hands-on experience using Lean, Six Sigma and other continuous improvement tools to enhance process efficiency, job satisfaction and organizational performance.

• Combining the ideas of the great process improvement thinkers with his own experiences and insights, Bill began developing his approach to Lean methodology during a 26-year career with Delta’s Technical Operations Division.

• While focused primarily on operational processes, he saw firsthand that the productivity and job satisfaction of frontline workers was often constrained by the impact of processes in other areas such as HR, purchasing, engineering, and sales/marketing. This awareness put him at the forefront of one of today’s most important trends: applying Lean to business processes.

• Since 2006, Bill has been dedicated to teaching professionals in diverse industries how to apply Lean best practices to improve business processes. He does this as a faculty member in the University of Tennessee’s Center for Executive Education (CEE). In addition to creating and teaching Lean Applied to Business Processes, an intensive one-week course available through CEE, he is also a lecturer in CEE’s Aerospace & Defense Executive MBA program. His consulting clients have included Asurion, Team Health, Zodiac Aerospace, and Fokker Services, and he has done extensive work with Air Force Acquisition contracting processes. In the classroom or on site, Bill emphasizes practical application over academic theory, personal engagement, and the alignment of processes with the organization’s mission and the creation of customer-defined value.

• Bill holds an MBA in Lean Aerospace from the University of Tennessee, a BS in Professional Aeronautics from Embry-Riddle, Six Sigma Black Belt certification, and FAA Airframe and Power Plant Licenses. Search YouTube.com for Bill’s Peterson’s TEDx presentation on how lean applies to the human potential.