An outline of:

# *Lean Six Sigma for Service*

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## Part I: Using Lean Six Sigma for Strategic Advantage in Service

## Chapter 1: The Return on Investment (ROI) of Lean Six Sigma for Services

- Work that adds no value in your customer's eyes typically comprises 50% of total service costs. Getting fast improves quality. Improving quality improves speed. Reducing complexity improves both.

**What Does Lean Six Sigma Mean for Services?**

- Six Sigma: eliminates defects, addresses variation, and requires data-driven decisions.
- Lean: increases process velocity, analyzes process flow and delays, separates "value-added" from "non-value-added" work, and quantifies costs of complexity.

**Applying Lean Six Sigma to Services – It's Not Just for Manufacturing**

- In service organizations, 30-50% of costs are caused by slow speed and rework.
- Unnecessary complexity adds cost, time, and waste. Learn to recognize complexity as time waste.

**Why Services Are Full of Waste - and Ripe for Lean Six Sigma**

- Service processes are usually slow and therefore expensive. Slow processes reduce quality, drive costs up and customer satisfaction down.
- Service processes are slow because there is far too much work-in-progress (WIP). Complexity increases WIP. Some WIP spends 90% of its time in in-boxes *waiting* to be worked.
- Usually 80% of the delay is caused by less than 20% of the activities. Find these activities, reduce cycle time 80% and guarantee on-time delivery.
- Most steps in a service process *add no value* in the eyes of the customer.

**The Strategic Imperative of Investing in Lean Six Sigma**

- Return on Invested Capital (ROIC) is key. Lean Six Sigma increases return without increase in capital.
- Projects should be prioritized by their ability to increase ROIC.

**Revenue Growth Drives Shareholder Value**

**Conclusion.** Lean Six Sigma attacks hidden costs. This can be tracked to the bottom line.

# Chapter 2: Getting Faster to Get Better (Why You Need Both Lean and Six Sigma)

See www.profisight.com
A 10% scrap rate increases process cycle time by 38% and things-in-process by 54%. That is NOT Lean!

**Defect-free Service: What Six Sigma has to offer**

- Outcome (Y) of a process is a function of inputs (X) to the process. Y = f (X1, X2, X3…)
- **Your job is to discover the Xs that will really drive Y.** To fix Y, you must focus on the critical Xs.

- **Core Elements of Six Sigma:**

  **CEO Engagement** – one set of ROIC goals
  **Resources** applied to high priority projects
  **Everyone needs training**
  **Variation has to be eliminated**. Variation in meeting Critical-to-quality (CTQ) requirements is the key guide to the improvement process. Define-Measure-Analyze-Improve-Control (DMAIC) problem-solving methodology and tools require *data-driven decisions*.

**Speed & Low Cost: What Lean can contribute.** Lean *accelerates any process by reducing all waste*.

**A Lean Primer**

- *Lead Time* is time from order to delivery. Little's Law shows:

  Lead Time = Amount of Work-in-Process (WIP) / Average Completion Rate

  Lead Time = 14 items to be worked / 7 completions per day = 2 days

- *Work-in-Process (WIP)* is things being processed: requests, checks, return phone calls, answer emails, reports. How many tasks are on your desk? That is WIP.
- *Delays and Queue Time.* WIP waiting to be worked on. All queue time is delay, regardless of cause.
- *Value Added and Non-Value-Added*. What processes add value in the eye of the customer? Would the customer pay for this process, if asked?
- *Process Efficiency*. What percentage of the total cycle time is spent in value-added activities?

  Process Cycle Efficiency (PCE) = Valued-Added Time / Total Lead Time

  Process Cycle Efficiency (PCE) = 100 minutes / 2000 minutes total = 5%

- *Waste*. Anything – time, costs, work – that adds no value in the eyes of the customer. There are seven types of waste: overprocessing, transportation, motion, inventory, waiting time, defects, overproduction.

**Basic Lean Lessons**

1. **Most processes are un-Lean**. Process Cycle Efficiency (PCE) < 10%. 90% non-value-added time!

2. **The primary goal is to reduce WIP**. In Little's Law, if you reduce the numerator, lead time shrinks, *even with no improvement in completion rate*! Limit the amount of work allowed into the process. This takes intellectual capital only. Increasing completion rates, with people or machines, takes capital.

3. **Every process should operate on pull, not push**. Minimize variation in lead time. WIP is like cars on the freeway. Limit access, control new work being introduced, to increase process speed. Triage what work is being started. Caution: This cannot be done with person-to-person customer processes.

4. **Process Cycle Efficiency allows you to quantify the opportunity**. A good Lean process exceeds 20% Process Cycle Efficiency (PCE). Use a Time Value Map to compare Value-Added Time to Non-Value-Added Time. Some NVA is required for business reasons. [See Diagram: Time Value Map]

5. **Only 20% of the activities cause 80% of the delay**. These 20% are called *time traps*. Remove everything that slows a process down.

6. **Invisible work cannot be improved**. You need visual management, based on data. Map your processes to make the invisible become visible, and show complexity and redundancy.

**Service Example of "Hard" Lean Tools.** Lockheed Martin example.

**Why Does Lean Need Six Sigma?** Six Sigma explicitly prescribes a culture and infrastructure.

**Why Does Six Sigma Need Lean?** Lean requires data to identify and eliminate NVA waste.

**Blending Lean and Six Sigma to Optimize Service**

**0: The Law of the Market**. Customer Critical-to-Quality is highest priority. ROIC is second.
**1: The Law of Flexibility.** The velocity of any process is proportional to the flexibility of the process.
**2: The Law of Focus.** 20% of the activities in a process cause 80% of the delays.
**3: The Law of Velocity**. The velocity of any process is inversely proportional to the amount of WIP. WIP is increased by long setup times, rework, variation in supply and demand, and complexity.
**4: The Law of Complexity and Cost.** Complexity adds more non-value-added cost and WIP than either poor quality (low Sigma) or slow speed (un-Lean).

## Chapter 3: Seeing Services Through Your Customer's Eyes:

**Becoming a customer-centered organization**

- "Quality can *only* be defined by the customer."
- Voice of the Customer (VOC) data is needed. This costs time, energy, money – collect efficiently.

**VOC Use #1: Strategic Business Decisions**

- How well does product meet customer needs? What needs exist that are NOT being met?
- What offerings are unnecessary? Competitors? What world-class performance level is expected?
- Use the customer's metrics, not yours. "Critical-to-Customer," "Critical-to-Quality" metrics.

**VOC Use #2: Product / service evaluation and design**

- For new or existing products: "Most important features of product." [See Diagram: Customer Priorities]

**VOC Use #3: Process improvement and problem solving**
**VOC Use #4: Shaping job descriptions & skills sets around customer needs**

**Conclusion:** "Quality can *only* be defined by the customer."

# Chapter 4: Executing Corporate Strategy with Lean Six Sigma

- Return on Invested Capital (ROIC) is the way to select priority projects.

**Applying Value-Based Management to Project Selection**

**Stage 1: Identifying the Burning Platform of shareholder value creation**

**Stage 2: Mapping the value streams with highest potential for increasing shareholder value**

**Stage 3: Prioritizing projects (finding the Time Traps)**

- Based on likely value, eliminate non-value added (NVA), reduce complexity.
- "Time is the universal currency of improvement."
- Clue #1: Find excess WIP
- Clue #2: Think about the impact of quality on time. Defects add time delays.
- Clue #3: Reduce complexity. Varieties of products add NVA time.
- All process problems – defects, WIP, low productivity, process complexity – add time delay.
- Time and Time Traps:

  Process Cycle Efficiency (PCE) = Value-Added Time / Total Process Time
  Usually 20% of the activities cause 80% of the delays. These are *Time Traps*.

- Focus on Time Traps. The size of time traps is related to:

  Process Inefficiencies → Need Lean
  Variation in Supply and Demand
  Variation in process capacity
  Quality-related delays → Need Six Sigma

- Finding the Time Delays: Pinpointing Time Traps for Improvement Efforts. (3) Techniques:

  (1) Try Everything (Not recommended)
  (2) Target WIP with intuition (But sometimes WIP piles up downrange of actual problem)
  (3) Analysis (Recommended)

- Time Traps (insert delays in process) are NOT always Capacity Constraints (limits to output)

  Look again at Little's Law: Lead Time = WIP / Average Completion Rate
  Adding capacity (denominator) is expensive, consumes capital
  Reducing WIP (nominator) requires brainpower, not capital

- Time Trap Analysis Step 1: Create a Complexity Value Stream Map

  Combine (3) elements: process flow, data on time, data on number of products (complexity)
  Define "Value-Added": Would your customer pay for it?
  Define "Business Non-value-added" (NVA): Must be done for legal or reporting requirements
  Define "NVA": Work that adds no value in the eyes of the customer

  Create a diagram showing the actual flow of work. [See Diagram: Complexity Value Stream Map]

For each step, calculate cost per activity, process time, changeover time, queue time, takt time, complexity, uptime, defects. Collect data for a week on a Process Data Collection Form.

### Process Data Collection Form

| Activity # | Activity Description | Process Description | Process # | Time in Queue | Number in Queue | | Setup Time | Avg Down Time | Process Time per Task | Date Performed | | Hours Late to Demand | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | On Arrival | On Depart | | | | Last | Current | | |
| | | | | | | | | | | | | | |
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- Time Trap Analysis Step 2: Finding the Cause of the Time Trap

  Waste Driver $_{WIP} = \lambda N S / 2 [1 - X - \lambda PHM]$

  $\lambda$ = total demand
  N = number of offerings
  S = setup time
  X = defect rate
  P = process time
  H = human down time
  M = machine down time

  Equation is useful to understand relative power of adjusting each variable. See www.profisight.com

  Two products:
  **Time Delay Diagram**. [See Diagram: Time Value Map] Work in queue time is wasted time.
  **Cost Driver Analytic**

- Time Trap Analysis Step 3: Linking improvement projects to Time Traps

  Complexity (N). Cut numerator and you cut WIP.
  Setup Time (S). Cut numerator in half, cut WIP in half.
  Quality (X). As it expands, WIP explodes. Six Sigma is needed to reduce (X).

**Value Creation Through Acquisitions and Divestitures**

**Conclusion:** Lean Six Sigma principles – customer-focus, defect reduction, waste reduction, improving speed, reducing complexity – are applicable to *all* processes.

# Chapter 5: The Value in Conquering Complexity

### Face-to-Face with the Cost of Complexity

### The Forces Driving Increased Service / Product Complexity

- Businesses offer many services to meet customer needs, but complexity creates opportunities to fail the customer. Companies need to balance more offerings against the drawbacks of complexity.

- Impact of complexity on revenue: Customers navigate complex catalog. Ineffective sales processes. Impact of complexity on organizational effectiveness: Management not focused. Increased NVA costs.

### Strategies for Reducing Complexity

- Standardization of internal tasks. Like Lego blocks. Standardization reduces tasks, reduces setup time between these fewer tasks, and prevents future NVA cost by design decisions.

- Optimization. Elimination of offerings altogether.

### Calculating the Cost of Complexity

- Complexity adds WIP, even more than setup time. See Waste Driver Equation.

- Complexity adds rework, which increases WIP.

- Complexity lowers productivity, increases training.

  The *rate* of NVA costs drops with each increment of WIP reduction. This is a logarithmic reduction. As WIP is cut, there a much greater drop in NVA costs.

**Conclusion.** Conquer complexity with two standardizations: Less WIP, less setup time. Then optimize by cutting low-profit offerings. Wal-Mart and Southwest Air are based on complexity reduction.

# Part II: Deploying Six Sigma in Service Organizations

There are nine common mistakes when implementing changes:

(1) No performance focus
(2) Lack of winning strategy
(3) Failure to make an urgent case for change
(4) Not distinguishing between decision-driven and behavior-dependent change
(5) Failure to mobilize pivotal groups
(6) Over-reliance on structure / systems to change behavior
(7) Lack of skills / resources
(8) Leaders' inability to confront how their roles must change
(9) Inability to align all the initiatives

Only (1) of the above reasons is strategy. Everything else is *implementation*.

## Chapter 6 Phase 1: Readiness Assessment

- Fully Understand your organization
  Step 1: Select the Champion
  Step 2: Establish a baseline snapshot of the organization
  Step 3: Interview Top Management – implementation challenges, "not invented here," cynicism
  Step 4: Engage key influencers – get them on-board to influence your people
  Step 5: Assess what you've learned

- Common issues: Turnover, no history with process improvement or data, people – not technical focus, "We're already overworked."

- Conclusion: Don't start with a blank slate. Know what exists, what came before.

## Chapter 7 Phase 2: Engagement (Creating Pull)

- Insure improvements tie into key goals. This insures key people are compelled to support, not resist, nor simply comply. Train all top managers. The link to improvements in shareholder value sustains the effort. "What's in it for me?" (WIIFM)

- Engagement Strategies. Key leaders are accountable for key performance indicators: WIIFM.

- Education, Communication, Involvement of key influencers
  People recognize and will contribute to a "burning platform" issue.
  Create a vision of how lives will be different.
  Change management meeting agendas to include new metrics and projects.

- Conclusion: Start off on the right foot. Lean Six Sigma must be seen as an asset to *pull* people in.

## Chapter 8 Phase 3: Mobilization

- Lean Six Sigma must be integrated fully into normal business structure.

- Mobilization Goal 1: Executive team closes gap between current and expected performance.

- Mobilization Goal 2: Create the infrastructure.

  A: Positions with line responsibilities: CEO / managers / sponsors-process owners / green belts
  B: New positions: Champions / Black Belts / Master Black Belts
  C: Selecting Candidates: Future leaders. Volunteers to accept risk and recognize need for change
  D: Balance (clarify) the roles and responsibilities. Use a RACI chart.
  E: Decisions: full-time, part-time, reporting relationships, compensation tied to results.

- Mobilization Goal 3: Develop Training.

  Executives: 3-day overview
  Process Owners: 5-day
  Black Belts: 6 weeks with leadership training
  Green Belts: 1 to 2 weeks

  (1) Focus curriculum on relevant tasks
  (2) Incorporate example projects
  (3) Tailor instruction to competency of students

- Mobilization Goal 4: Select and Charter first-wave projects - important, well-scoped projects.

- Mobilization Goal 5: Consensus on common metrics. Include Ys (results) and processes (Xs).

- Conclusion: Critical mass of infrastructure is key.

## Chapter 9 Phase 4: Performance & Control

- Constant attention is needed. Capture the hearts and minds of your people.

- Issue 1: What happens when you do the same work in less time? Temptation to lay people off should be balanced with re-deployment plans.

- Issue 2: Can you really rotate Black Belts into management positions? Yes. Key leader success sends message to the company.

- Avoiding pitfalls in Six Sigma deployment:

  Project drift. Need champions to review. Watch key metrics.
  Too many projects. Be judicious. Don’t flood the workplace with less-important projects.
  Inadequate tracking
  Little sharing of best practices. What results are applicable to other areas of the company?
  Ignoring non-project areas of business.

- Vigilance: Warning signals

(1) Downward trends: Longer projects. Due dates missed. Financial returns drop. Black Belt certification takes longer. Project goals become increasingly modest. Projects are sandbagged.

(2) Flagging support: Absence of key leaders. Less attendance. More questions on involvement. Lower-quality volunteers. Black Belts depart.

(3) Six Sigma isolation: Development of Six Sigma clique. Cynicism mounts. Metrics are set independent of corporate strategy.

(4) People slide backwards: Customer focus dissipates. Executives stop making decisions based on data, make decisions on outputs (Ys) not drivers (Xs).

(5) Erosion of Six Sigma roles: Champions pulled to non-Six Sigma work. Sponsors focus on day-to-day operations, Six Sigma relegated to zealots.

Results must be tied to financial improvements. Six Sigma must be folded in as part of the culture: "The way we do things around here."

- Conclusion: Achieving transformational change. Deployment practices that work:

(1) Executive engagement. Train CEO and direct reports.

(2) Respected Champion reports directly to CEO.

(3) Profit & Loss Managers own Black Belt resources – accountable for project results.

(4) Deploy critical mass of full-time resources.

(5) Six Sigma resources selected from future leaders of the company.

(6) Identify projects by value. ROIC%.

(7) Reduce projects to reduce cycle times. (Little's Law)

(8) Track results rigorously. Lean Six Sigma should "Pay as you go," confirmed by CFO.

(9) Black Belts must receive team leadership training.

(10) Provide a "performance improvement" platform that allows for future innovations.

# Part III: Improving Services

# Chapter 10: Service Process Challenges

- How do you improve a process defined twelve different ways?
  Lack of documented standards makes improving service processes challenging.

**Process Challenges in Service**

- Tracking invisible flow. Lack of documentation.
- Tradition of individuality. Resistance to standardization.
- Lack of meaningful data. Lack of data-driven decision-making. Expect to spend time collecting data.
- People cannot be controlled like machines. Pay attention to people.
- Customers cannot be treated like inventory. Complexity exacts enormous cost on service processes.

**The Biggest Challenge in Service: Learning to Recognize Waste**

- Waste 1: **Overprocessing** – adding more value than your customer would pay for. Do you know what your customer wants? Have you allowed NVA to creep into the process?
- Waste 2: **Transportation** – excessive movement of materials or information. Paperwork loop-backs are especially wasteful. Cut the hand-offs in half and you cut the queue time in half.
- Waste 3: **Motion** – excessive movement of people. Multiple computers or drives, multiple keystrokes, poor office setup or workstation arrangements.
- Waste 4: **Inventory** – WIP exceeding customer needs causes NVA waiting, longer lead times. Look for piles of requests, callers on hold, people in line. Excess WIP is often overproduction.
- Waste 5: **Waiting time between processes**. Since much service work is invisible, mapping techniques are essential for finding delays. [See Diagram: Process Map]
- Waste 6: **Defect** – anything that does NOT meet customer needs. Missing information, missed deadlines. Misinformation in a process results in re-work. Mapping shows how corrections are done.
- Waste 7: **Overproduction** – production over what is needed for immediate use.

**Running Projects in a Service Environment**

- For fast results, experts recommend 1% full-time Black Belts, leading teams of 5-8 with 1-day of training, maybe some Green Belts. Meet weekly for 3-6 months. Complete every step of DMAIC.

- In service environments, some adjustments may be necessary:
  Creative meeting times: free lunch, uncompensated overtime, use existing meetings.
  Look for quick-hit opportunities: enthusiastic "just do it" projects before data analysis.
  Include improvement events (**Kaizen** approach) to accelerate DMAIC: 4-day brainstorm.
  Reach out beyond team boundaries whenever possible, including suppliers and customers.
  Set realistic expectations: Services are littered with variation as well as velocity issues.
  Fix variation first, then improve capability. Pay attention to people - individuals have preferred roles: monitors / evaluators / finishers / implementers / shapers / investigators / specialists.

- A Final Tip: Service people may be intimidated by Six Sigma. **Use your heritage language and terminology.** Relate projects to specific work. All training examples should be from your industry.
  Lead by example. Black Belts should be adept at explaining terminology to people unfamiliar with data.
  Emphasize the basic suite of tools – Pareto charts, value stream maps, and time plots, not the advanced.

**Conclusion.** Avoid "all or nothing." Successful companies make adjustments to fit their implementation.

# Chapter 11: Using DMAIC to Improve Service Processes

The standard DMAIC model serves as a roadmap to help teams organize their efforts.

### Lean Six Sigma DMAIC Tools

| Define | Measure | Analyze | Improve | Control |
|---|---|---|---|---|
| • Project Selection Tools | • Operational Definitions | • Pareto Charts | • Brainstorming | • Control Charts |
| • PIP Management Process | • Data Collection Plan | • C&E Matrix | • Benchmarking | • SOPs |
| • **Value Stream Map** | • Pareto Chart | • Fishbone Diagrams | • **TPM** | • Training Plan |
| • Financial Analysis | • Histogram | • Brainstorming | • **5S** | • Communication Plan |
| • Project Charter | • Box Plot | • Detailed "As-Is" Process Maps | • **Line Balancing** | • Implementation Plan |
| • Multi-Generational Plan | • Statistical Sampling | • Basic Statistical Tools | • **Process Flow Improvement** | • **Visual Process Control** |
| • Stakeholder Analysis | • Measurement System Analysis | • **Constraint Identification** | • **Replenishment Pull** | • **Mistake-Proofing** |
| • Communication Plan | • Control Charts | • **Time Trap Analysis** | • **Sales & Operations Planning** | • Process Control Plans |
| • SIPOC Map | • **Process Cycle Efficiency** | • **Non-Value Added Analysis** | • **Setup Reduction** | • Project Commissioning |
| • High-Level Process Map | • **Process Sizing** | • Hypothesis Testing | • **Generic Pull** | • Project Replication |
| • **Non-Value-Added Analysis** | • Process Capability $C_p$ & $C_{pk}$ | • Confidence Intervals | • **Kaizen** | • Plan-Do-Check-Act Cycle |
| • VOC and Kano Analysis | | • FMEA | • **Poka-Yoke** | |
| • QFD | | • Simple & Multiple Regression | • FMEA | |
| • RACI and Quad Charts | | • ANOVA | • Hypothesis Testing | |
| | | • **Queuing Theory** | • Solution Selection Matrix | |
| | | • **Analytical Batch Sizing** | • "To-Be" Process Maps | |
| | | | • Piloting and Simulation | |

### Project Chartering: The Transition into Define

- The single-page project charter clearly defines the goal of the project. This helps the Champion convince management to select this project over other nominees.
- Project Charter: Title / Description / Background / In Scope / Out of Scope / KPOV / Numerical Goals / Assumptions / Other Benefits / Team member roster – role – FT/PT – dates.

### Basic Elements of Define

- Team agrees on what the project should achieve. Agree on the problem. Draw the link to corporate strategy. Agree on the boundaries. Select metrics for success.
- Metrics focus on customer satisfaction. Speed & lead time. Sigma level of defects. Financial outcomes.
- Key tool: SIPOC. S: Suppliers, I: Input, P: Process, O: Output, C: Customers. [See Diagram: SIPOC Process Diagram] "Defects" are *anything* that makes customers unhappy. Examine entire process.
- Key tool: Multigenerational Plan. If there are many goals to meet, divide them into generations.
- People side of Define. Get the right people. Insure they start on the same page, with same expectations.

### Basic Elements of Measure

- Six Sigma *demands* data-driven management.

- Roadblocks to data: Never collected before, unavailable, access, cannot separate, data does not measure.
- 1: Establish baselines. Monitor Work-in-Progress (WIP), average completion rate, lead time (cycle time), demand variation, first-pass yield, approvals and handoffs (slow process have many), setup time, downtime, learning curves, defects / six sigma capability (defects per defect opportunity), complexity.
- 2: Observe the process. Track processes, especially "invisible" processes like email or electronic orders.
- 3: Collect data by participating in the process. Act as a customer – call for customer service.

  Key Measure Tool #1: Process description tools. Complexity value stream maps [Chapter 4], Process cycle efficiency [PCE = Value-added Time / Total Time], Time value analysis [See Diagram: Time Value Map].

  Key Measure Tool #2: Pareto charts. Bars represent the relative contribution of each cause of a problem. Typically, only a few contributors account for most of the problem. [See Diagram: Pareto Chart] Failure Modes and Effect Analysis (FMEA): Table showing potential failures based on *likelihood*, *detectability*, *severity*. [See Diagram: FMEA Form]

  Key Measure Tool #3: Data collection & accuracy. Gage Repeatability and Reproducibility (Gage R&R). Measures the accuracy of your measurements.

  Key Measure Tool #4: Quantify and describe variation. Control Charts. [See Diagram: Control Chart]

- The People Side of Measure. Overcome mistrust by explaining everything.

**Basic Elements of Analyze**

- Stick to the data. Opinion and experience are an *individuals* data points. Explore cause-and-effect.
- Scatter plots show relationship between two measures or indicators. [See Diagram: Scatter Plot]
- Time trap analysis. 80% of the delay is usually caused by only a few time traps. Find them.
- The People Side of Analyze. Work to overcome unfamiliarity with data.

**Basic Elements of Improve**

- Nominate changes to eliminate defects, waste, and costs. PICK charts help prioritize ideas. [See Diagram: PICK Chart]

- Lean Improve Tool #1: Setup Reduction. Switching between jobs (learning curve), tracking down information, or waiting until enough work piles up (batches) is wasted setup time.

  Four-Step Rapid Setup method eliminates anything that interrupts of hinders productivity.
  Step 1: Identify anything that (a) delays start of work, (b) interrupts work, (c) requires ramp up to "full speed," (d) is similar or identical to another task.

  Step 2: See if any of the interruptive / delaying tasks can be offloaded. The goal is have people zip through value-added work without delays or interruptions.

  Step 3: Streamline or automate any interruptive / delaying talks that cannot be offloaded. If you batch similar tasks to one employee, batch only if you cannot solve the setup problem. Try to reduce complexity to avoid setup times in the first place.

  Step 4: Bring the process under statistical control, plus or minus three sigma.

- "Ten times setup rule." Stay on one task only ten times as long as it takes to do the setup.

- Lean Improve Tool #2: Queuing methods for reducing congestion and delays. Congestion occurs because of a variation in demand, similar to hotel check-in delays. To reduce congestion:

  Pooling: Cross-train staff to step up during peak times.
  Triaging: Sort jobs by level of effort required. Address each with different solution to reduce variation in processing time.
  Back-up capacity: For sustained demand, cross-train staff, reschedule to match peak times.

- Lean Improve Tool #3: 5S + 1. Clutter and disorganization contribute to wasted time. Clearly lay out all work areas. "Visual Management" posts bulletin boards with graphics, goals, report cards in order to inform everyone immediately of priorities, current status, and events.

  S: Sort. Organize, separating needed from the unneeded.
  S: Straighten. Arrange for ease of use.
  S: Shine. Keep it clean.
  S: Standardize. Maintain the first three Ss.
  S: Sustain. Discipline to stick to the rules.
  Plus one more:
  S: Safety. Remove dangers.

- The People Side of Improve. Improve is critical, so pay attention to people issues – communication, involvement, and commitment. The sponsor or process owner must be closely involved at this stage.

**Basic Elements of Control**

- Make sure any gains made will be preserved. Hand off all information to the process owner. Insure everyone is trained on the new process.

  1. Make sure the process is well-documented, well-trained, and easy-to-use. Prevent slip-back.
  2. Turn results into dollars. Validate by the finance department. Report to the CEO.
  3. Verify maintenance of gains months down the road.
  4. Install automatic monitoring system to identify "out of control" performance.
  5. Piloting the implementation. One region, one product, one department.
  6. Develop the control plan. Charts and reports. Communicate performance to whom?

- The People Side of Control. Controlling a service process depends entirely on the people who execute that process. The process owner takes over and assumes responsibility. Success is communicated throughout the organization to share ideas.

- In addition to control charts, *mistake prevention* and *mistake proofing* help maintain control.

  Mistake prevention. Working to find ways to make it difficult for people to make mistakes.
  Mistake proofing. If a mistake occurs, it cannot by passed along to the next step.

**Improving Your Improvements**

- Analyze your DMAIC process itself to find improvements. Adjust training.

**Conclusion.** There is no "right" way to run a project.

# Chapter 12: First Wave Service Projects

Despite initial enthusiasm, new Six Sigma teams should NOT target complex problems. Avoid failure.

Early gains come from developing complexity value stream maps and data collection systems.

**Case #1: Understanding the process – Lockheed Martin**

- **Why?** We think we know a process until we start to document it. Existing documentation usually does NOT show the 50% of non-value-added activities. Initial goal was to document the current reality.
- **Analysis**. Collected data built a value stream map (VSM). VSM showed that four-day purchase order time would only be shortened seven minutes(!) if buyers doubled their productivity. Real savings would have to come from cutting non-value-added queue time.
- Order clock was NOT started until order was entered into system. Measurement system errors are common in transactional processes.
- 41% of orders were for less than $50. 38% were for less than $500. Process cost more than order(!)
- Orders with insufficient information had to be sent back for re-work – pure non-value-added activity.
- **Solutions**. New full-time position handled low-dollar orders. New cycle time metric was tracked daily. New buyer training aid pamphlet.
- **What it took to make this work.** Undocumented processes always have easy improvements. Key task is to *observe the process in action*. The people who work the process solved the issues.

**Case #2: Blaming the Visible part of the process – Bank One**

- **Why?** It is common to blame the delivery man for late deliveries, but hidden factors throughout a process are the root cause. Bank One provided paper copies of checks on-request. 10% of these transactions failed.
- **Analysis.** Three failures – check not on time, unreadable copy, no copy on file – were traced back to source issues. Pareto chart revealed most common information errors. Fixing top two would solve majority of problems.
- **Solutions.** New software to submit requests. Educated staff. Developed tracking. Maintained equipment. Error rate dropped by half by *preventing* failures.
- **What it took to make this work.** End-to-end perspective including vendors. Realistic expectations.

**Case #3: Turning a customer hassle into a delighter – Fort Wayne**

- **Why?** Building permits took 60 days. Impacted jobs and business opportunities.
- **Analysis**. Collected VOC input. Process was mapped to identify most critical parts of process from the customer's point of view. Permit process was rife with non-value-added delays – Overproduction.
- **Solutions**. Requests are now completely correct – no rework. Developed better tracking. Developed triage criteria to separately route simple versus complex requests. Improved inter-department communications. Collected data regularly to monitor improvements: From 0% to 95% permits released in less than ten days. From 72 requests in the cycle (WIP) to 30 requests in the cycle.
- **What it took to make this work**. Give teams the green light to fix obvious problems. Build cross-functional teams. Focus on process, not finger-pointing. Direct contact with customers for input.

**Case #4: Getting rid of backlog – Fort Wayne**

- **Why?** 2800 contractor "curb cut" permits on backlog.
- **Analysis.** Poor communications between city departments.
- **Solutions**. FMEA helped discover causes of delays. Permits were completed correctly. Locations where no permit was required were identified early. Daily updates on work progress. Educating contractors not

to request permits until work was started (eliminates WIP). Work closely with largest contractor. WIP was reduced from 2,843 to 342 in just a few months. All permits were now cleared in forty-five days.
- **What is took to make this work**. Looking at the process from the customers view. Making changes to both internal processes and customer processes. Recognizing that "one size fits all" was inefficient.

**Case #5: It's not just WIP piling up – Fort Wayne**

- **Why?** Robbery cases should be disposed in less than thirty days.
- **Solutions**. Set minimum staffing goals. Trained officers on guidelines. Assigned backup responsibility. Established triage procedures to divert cases with low probability of success. Average days to disposition dropped from 58 days to 24 days.

**Lessons We Can Learn**

- First wave projects should focus teams within their work area, projects that mean a lot to the people involved. Use VOC. Be patient with first time data collection. Set simple Lean goals –get rid of WIP, visible waste, improve flow. Just getting the people to agree on the process flow will eliminate waste.

- See more cases at www.georgegroup.com

## Chapter 13: Raising the Stakes in Service Process Improvement

Some problems cannot be addressed initially: complex problems resistant to previous efforts, issues that require sophisticated Six Sigma methods, problems with external suppliers, a culture that needs to evolve, and problems with no single silver bullet solution.

Your organization needs well-developed people and project-management skills. Failure to solve a long-standing problem could disillusion staff.

**Case #6: Gaining control over process complexity – Bank One**

- **Why?** Overnight courier packs were not processed the following day.
- **Kaizen Event.** Day 1: Training. Day 2: Measure. Day 3: Improvement. Day 4: Simulation. Day 5: Report out. Solutions: Not over-promising turnaround time, limit transactions that qualify, and being clear about capability, especially staff limitations. Results improved turnaround time 35%.
- **What it took to make this work.** Adjusting readiness of organization. No radical changes. Sponsor involvement. Wise use of IT. Best Practice dissemination to all bank sites.

**Case #7: Collaborating with internal customers – Lockheed Martin**

- **Why?** Complex procurement requests required too much buyer expertise and input. 2% of requests (1600 a year) were incapable of being filled. Lead time: mode = 11 days, average = 37 days.
- **Analysis.** No process consistency. No data. No documentation. Collected data on Pareto Chart showed five of twenty four problems caused 80% of delay. Impact / Effort Assessment weighted how much effort it would take to solve each problem.
- **Solutions.** Document process. Standardize work. Put form online with mistake proofing software. Implement queue ownership to monitor aging.
- **What it took to make this work.** Developing reliable data collection.

**Case #8: Improving response time on signature services – Fort Wayne**

- **Why?** Street repair backlog required huge overtime expense. Goal was to increase preventative maintenance and improve pothole response time.
- **Analysis.** Average pothole response time was 20 hours. Inefficient process: too much wasted time driving from point to point, poor prioritization, and poor communications.
- **Solutions.** Initiative: "If you see it, fix it." Orders picked up three times a day. Creation of specialized pothole repair team. Overnight capability. Central dispatch. New radios. Results: Average repair time is 9 hours. No WIP to clog process.
- **What it took to make this work.** Empowering employees to act.

**Case #9: Cleaning up you workspace (a 5S+1 project) – Lockheed Martin**

- **Why?** Productive buyers can work from a standardized workspace: Files, labeling, IT best practices. Sort / Straighten / Shine / Standardize / Sustain / Safety.
- **What it took to make this work.** Empowering employees: bottom up solutions, not top-down edict.

**Case #10: Knowing what's here (and where it is) – Lockheed Martin**

- **Why?** Poor tracking of government equipment. Violations fined under government contract.
- **Analysis.** Data showed numerous process inconsistencies, resulting in only 10% "proper" transactions. Little understanding of correct process. No process owner. Inconsistent ordering processing.
- **Solutions.** Goals were to develop metrics, reduce cycle time, reduce labor, and document the process. Training, new process owner, and feedback mechanisms saved 2700 man-hours a year.
- **What it took to make this work.** Including customers, U.S. Navy, on the team. Convincing people of the importance of documentation. Recognizing over-reliance on expediting "heroes."

**Case #11: Changing professional practice**

Doctors at Stanford Hospital had different discharge procedures. Standard procedures reduced complexity and cost. Hospital had years of process improvement work before it took on doctor's professional practices.

**Case #12: Developing supplier relationships through Lean Six Sigma**

Lockheed Martin developed relationships with small suppliers, provided training, convinced them that waste was a common enemy, set goals for each supplier, and launched dozens of supplier development projects.

**Lessons We Can Learn**

Rational project selection process increases likelihood of project success. Experienced teams can address problems that cross organizational boundaries, that require Six Sigma tools that seem threatening to new teams, or that require a degree of cultural readiness and enthusiasm.

## Chapter 14: Designing World-Class Services (Design for Lean Six Sigma)

The DMAIC toolkit is not optimized when new processes are invented.

**Designing Services with DMEDI.** Also called "Design for Six Sigma" (DFSS).

**Define.** Charter linked to strategy and financial goals. Similar to DMAIC charter, plus project risk.

**Measure.** Voice of the Customer (VOC). Segmented, internal plus external.
VOC is the single most important determinant of success.

**Explore.** Develop courses of action. Focus on Critical-to-Quality (CTQ) requirements.
Weigh and compare courses of action.

**Develop.** Create a detailed design.

**Implement.** Conduct a pilot, measure, and then launch.

**Conclusion.** Keep requirement lists reasonable. Address conflicts in requirements.

## Reviewer's Comments

Lean Six Sigma for Service *describes the basic tools of two complementary disciplines: Lean, which is a family of tools used to improve the speed of processes by reducing waste and complexity – and Six Sigma, which is a continuous effort to eliminate defects and improve quality. The over-riding lesson of both disciplines is the importance of* ***reducing process complexity****.*

Lean *has three key concepts which can be easily be applied to Marine Corps training processes:*
*(1) Cycle time importance. Why fast, tight, efficient processes are more important than you might think.*
*(2) Value-added activities versus Non-value-added activities. Why 90% of our time is often wasted. And,*
*(3) Identifying the seven types of waste in any process.*

Six Sigma, *being a collection of statistical analysis tools to measure and track quality, may seem overwhelmingly technical to most people. The book recommends avoiding any Six Sigma language that is threatening, and using your own organization's legacy terms. This requires skilled implementation people.*

Lean Six Sigma for Service *suffers from being assembled by a committee. The book is poorly organized, with multiple cross-references and an uneven flow. Most of the practical examples are from the same small sample of organizations. Nevertheless, the tools are explained clearly and the real-world examples do much to clarify the concepts and challenges of process improvement. Although analytical tools are being described, the book does emphasize people. Training, educating, and leading people are the key actions required to implement successful process improvement projects.*

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