Welcome to Yellow Belt
Lean Six Sigma Training

In partnership with:

Welcome to Yellow Belt Lean Six Sigma Training

Course Objectives

At the end of this course you will be able to:

- Learn how Lean/Six Sigma fits in CI’s DFA strategic plan
- Participate in Continuous Process Improvement events
- Apply problem solving tools to improve processes
- Use a common Lean Six Sigma language
- Recognize how the culture of CI is evolving
- Cheat with a clear conscience ("borrow" good ideas)

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System Perspective

Perspective Adds Meaning
Complexity = Specialization = Narrow Perspective / Barriers

Improving Our Systems

Fundamental truth
- All organizations are the same
- All organizations are collections of systems
- All work is part of a system

Continuous Process Improvement
- Tap our most valuable resource - You
- Culture of action, empowerment, change
- Awareness of your surroundings / Be curious

Where are you going?

Training Environment

- Supplies
  - Sign in sheet, name tents
  - Exercise equipment (Statapult etc.)
- Teams
  - Color coded, pick team names

Keys to Your Success in this Course

- Have fun
- Active participation in class activities
- Ask questions
- Notice the terminology
- Appreciate the concepts; no memorization
- Get the Sampler; Check out the specials

Team Agreements

HAVE FUN!!!
- Be on time returning from breaks & Listen fast
- Ask questions anytime - this is a learning experience
- Participate fully in all activities
- Listen to speakers - one speaker at a time
- Parking Lot - 3 knock rule
- Handle outside business on breaks
  - Set electronic devices to stun (silent mode)
  - This is a “iPhone-Free Zone”
  - “County bell"
Getting Acquainted

- Each table will be asked to answer a question:
  - If I had 8 extra hours...
  - If I could improve a process...
  - If I had to name a pink elephant...
  - If I had more resources...
  (Take 5 Minutes – Be ready to present at __:__) 

Ventura County Mission

- To provide public infrastructure, services and support so that all residents have the opportunity to achieve a high quality of life and enjoy the benefits of a healthy economy.

DFA Mission

- We support CI’s mission by transforming the delivery of services through continuous improvements, providing a foundation that is knowledge driven, flexible in approach, and entrepreneurial in spirit

Achieve Operational Excellence

- Service Excellence
- Continuous Improvement (Ex. Projects generating additional projects)
- Empirically Based Decision-making
  - Observation, Experience
- Measurable results
  - Quality, Consistency, Speed, Cost

Service Excellence Structure

- Vision & Direction
- Board of Supervisors
- Michael Powers, CEO
- Matt Carroll, Asst. CEO
- Agency Executive Team
- Lean Champion
- Infrastructure: Support it.
- Value Streams Champion
- Team Leaders
- Belts
- Execution: Do it.
**CI Deployment**

![Image of CI Deployment]

**Breathing Life Into Data**

  - Reduces number of separate forms from 31 to 1.
  - Reduces number of pages from 325 to 59.
  - Reduces 872 questions to 110.
  - Reduces duplicated questions from 180 to 0.

- **Blanket Purchase Order** General Services Agency. Increased productivity of BPO's from 163 to 1,686, 30 steps to 11 steps. Sustained for 3 years. Staff morale and teamwork "never better”.

- **Others**
  - PWA/GSA. Heavy Equipment tracking and purchase decisions.
  - GSA. Changed billing process to electronic. Eliminated 85,000 paper.
  - Animal Regulation. Eliminated annual dog tags. $35,000 (Why game)
  - HSA. Eliminated labels on forms, printed contact information.

**Three Gears**

![Image of Three Gears]

**Exercise - Process Simulation**

**Round 1**

![Image of Exercise - Process Simulation]

**Example of a Bad Process**

![Image of Example of a Bad Process]

**Learning Objectives**

*The Statapult exercises are designed to give students experience using the methodologies and tools taught in this course.*

Round 1: Current State
Round 2: Future State - Flow Improvements
Simulation Requirements

**Lean thinkers hear voices.**

1. **Exercise Requirements**
   Make the exercise work correctly and cannot be modified

2. **Customer Requirements (Voice of the Customer)**
   How the customer would like the product and/or service to function

3. **Business Requirements (Voice of the Business)**
   How your “Company” functions, internal policies

4. **Statapult Requirements (Voice of the Process)**
   Constraints or capabilities of the tool used

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**Round 1**

**Current State**

This round is intended to give the team experience running the current process. It includes the following three phases:

1. Baseline
2. Shoot
3. Calculations
4. *Pick your team name*

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**Baseline**

*In order to run the simulation, you must determine the accuracy and precision of the process in order to set up the target area.*

- Position your Statapult in designated area
- Take 20 test shots (164 degrees)
- Mark the landing of each shot with piece of tape
- Use masking tape to mark off target area
- Do not move Statapult during or after shooting

---

**Exercise Requirements Round 1**

- Each team member will be assigned a role
- The balls will be marked as a preparation for shooting and for rework
  - Blue dots symbolize inputs needed to complete a job function and are considered to be value added to the process
  - Red dots symbolize the time and effort required to fix a problem
- No permanent markings or modifications can be made to the Statapult or balls

---

**Customer Requirements Round 1**

- All shots must be fired at an angle of 164 degrees
- All shots must land on the floor in a stationary target area +/-3 inches long and +/- 6 inches wide with respect to the nominal target
- Pass/Fail data must be collected for each shot
- The balls must be sorted based on either Pass or Fail
- The balls must be delivered to customer with no markings (colored dots)
- The customer requires 20 passed balls to be delivered in 5 minutes
- All data must be collected "real time"

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**Business Requirements Round 1**

- Balls must be transported in batches of 5
- The Statapult must be recalibrated (remove & reattach rubber band) between every shot
- Workers should only be concerned with their assigned jobs
- All shots must originate from the floor
- Must use forms 50-5LO, RUK-1D-1NG, and 1-T5-L8
- Balls are aligned with blue dot facing up
Statapult Requirements
Round 1
- The Statapult settings and structure cannot be modified
- The Statapult cannot be aligned/modified with any tools, devices or aids
- The Statapult can only be handled/touched by the Shooter
- The Statapult must be placed so that the base is horizontal to the floor and in a stationary position

Roles
- Marker
- Shooter
- Inspector
- Sorter
- Customer Liaison
- Observer(s)

Take 5 minutes to review what your role is before the Round 1 shoot

Round 1 - Layout
- Customer
- Customer Liaison
- Inspector
- Target
- Free Fail Cups
- Shooter
- Marker
- Box of Balls
- Observer

Round 1 Shoot
Are you ready to start?
- Announce company name
- Statapult layout is ready
- Target area is taped off
- Roles are assigned
- Role instructions have been distributed

** (Leave Statapult in place when finished)
The simulation will start simultaneously for all teams!

Calculations - Round 1
1. Customer Order (How do you know what they want?) ______ (1)
2. Total Balls Fired (Effort-Quality) ______ (2)
3. Total Failures (Do customers care?) ______ (3)
4. Time to First Delivery (Do customers care?) VOP ______ (4)
5. Total Lead Time (seconds) (Expected response) ______ (5)
6. WIP (Work In Progress) ______ (6)
7. Yield (Customer Order(1)/Total Balls Fired(2)) ______ (7)

What do these metrics tell us?

Exercise: What Went Wrong?
- What went wrong with the process?
- No solutions allowed yet; only problems *

* At the end: ID which was the biggest problem of all
Module 2
Introduction to:
Continuous Process Improvement Methodology (CPI)

Module 2 Objectives
At the end of this module you will be able to:
- List and define 3 CPI methodologies
  - Lean
  - Six Sigma
  - Theory of Constraints (TOC)
- List and explain the “Five (5) Principles of Lean”
- Identify the five (5) Phases of Six Sigma

What is “Lean Six Sigma”?
A. A college sorority
B. A diet aid
C. A war on WASTE and VARIATION in business processes

Lean Six Sigma is . . .
Making common sense common practice
- A Combination of two schools of thought:
  - “Lean” - eliminating waste to reduce cycle times;
  - “Six Sigma” - reducing variation to ensure a standard, quality output;
- A set of methodologies characterized by:
  - customer satisfaction
  - a culture of continuous improvement
  - the search for root causes
  - and comprehensive employee involvement

Origin of Lean
- Japan - post WWII - struggling economy
- Edwards Deming - Quality guru
- Brought radical ideas not yet implemented in America
  - Acceptable quality level. cost/quality not a trade off
  - Daily incremental improvement (everyone involved). Don’t seek perfection...yet (80/20).
- Focus – Don’t improve work, eliminate waste
  - Find colors exercise
Lean Basics

**Lean Is . . .**

*A War on WASTE!*

Example: Firemen and Pit Crews

Examples of Wastes

- Time spent dealing with complaints
- Redundant capture of information
- Information not accurate
- Time spent looking for information, equipment, people
- Excess supplies stored in multiple locations
- Limited storage space - not properly used
- Variations -
  - Low process yields, low quality, shift changes,
  - Information/equip unavailability

Traditional Process Improvement vs. Lean

Traditional Focus

- Improve Value-Added work steps
  - i.e. Better tools, machines, instructions
- Result: LARGE time savings

Lean Focus

- Reduce or eliminate NVA/waste
- Result: LARGE time savings

Cycle of Lean Principles
What is “Six Sigma”?

Reduces variation in a process to achieve near perfect quality.

6σ

1st Time Quality

99.99966% or 3.4 PPM

Focuses on Operational Excellence

Six Sigma is a data-driven approach aimed at the near-elimination of defects from every process and transaction.

Why “Six Sigma”?

Hey, 99% is good enough right?

99%

99.99966% (6 Sigma)

- 20,000 lost postal mail items per hour
- 15 minutes of unsafe drinking water per day
- 2 long/short landings per day at a major airport
- 5,000 incorrect surgical operations per week
- 84 hours of lost electricity per year
- 240,000 wrong prescriptions per year
- 7 lost postal mail items per hour
- 1 unsafe minute every seven months
- 1 long/short landing every five years
- 1.7 incorrect operations per week
- 1 hour without electricity every 34 years
- 68 wrong prescriptions per year

Sources of Variability

- Information unavailability
- Equipment & tools unavailability
- Poor planning that results in rushed work
- Low process yields (Defects)
- Material condition not as expected
- Unique/custom products
- Change notices, holds, customer changes
- Vacations, illness = absent staff
- Many, many more... (obstacles to consistent outcomes)

Cycle of Six Sigma Discipline

It’s Scientific!

Y = f (x1, x2,...xn)

Process Improvement Filter

1. Y = f (x1, x2,...)
2. Define Y (Charter)
3. Identify the X’s (tribal knowledge)
4. Identify the red X’s (tribal knowledge) (Vital Few)
5. Validate the red X’s (Gemba/data)
6. Analysis
7. Solution

Don’t accelerate the excavation until you are sure you’re digging in the right place.
Theory of Constraints

Constraints and Barriers

A constraint is anything in an organization that limits it from moving forward or achieving its goal

“The slowest vehicle in a convoy sets the pace”

Checking In

1. Lean is a war on ______.
2. Six Sigma reduces ____________.
3. Lean Six Sigma engages and empowers ___________ to make process changes.
4. The Theory of Constraints strives to eliminate __________.

What other comments or questions do you have?

Module 3

Team Members
Roles and Responsibilities

Lean Thinkers

➢ It’s not about tools – don’t throw tools at a problem (Tools do not have solutions, people do)
➢ Turn the “mental corner” together (Use L6S lens)
➢ Filter the problem and problem solving through Cycle of 5 Lean Principles and Cycle of Six Sigma Discipline
➢ Your experience + Lean Six Sigma tools = solutions
   If all the same thinking still exists, little by little you will return to your prior state!

Module 3 Objectives

At the end of this module you will be able to:

➢ Describe a Lean Thinker
➢ Describe & articulate your role as a Team Member
➢ Have an appreciation for the impact of culture on change
Where do you find team members?

- **Process Step 1**
  - Suppliers
  - Stakeholders: Regulatory Agencies, Partner Agencies or Departments, Auditor-Controller, etc.

- **Process Step 2**
  - External Customer(s): Those who receive or use your product or service, outside your organization

**Two types of team members:**
- **Core Team Members**: Are there for the duration of the project.
- **Extended Team Member**: Are requested as needed for the duration of the project.

**Team Members**
- Represent your area
- Communicate back to your group
- Participate fully
- Think, think, think
- Participate in implementation planning
- Be a conduit for change
- Be personally accountable – own it!

**Culture Trumps Tools**
- Must address **BOTH Culture and Tools** to avoid unintended consequences & less than desirable long-term success with Process Management

**Change is Uncomfortable**
- Fold Arms Exercise
- ABC Exercise (2 volunteers)
- Change is difficult
- Need to develop a culture of change
- Look out for CAVE dwellers

**What other comments or questions do you have?**

**Module 4**
- Integrating the Toolsets Using DMAIC Approach
Module 4 Objectives

At the end of this module you will be able to:

- Recognize tools used in the Lean process
- Describe the Define Phase and its purpose
- List parts of a Charter
- Participate in a SIPOC (Suppliers-Inputs-Process-Outputs-Customer) Diagram

Lean Toolkit

- Value Stream Mapping
- 5S, and Visual Workplace
- Work Standardization
- Cellular Work Processing
- Push and Pull System
- Setup Reduction
- Error Proofing (poke yoke)

Just Do It

- Not every idea needs a team (Kaizen)
  - Do you already know what needs to be done?
  - Manager/supervisor or approves
  - Do It!
  - Report it!

Process for Process Improvement - DMAIC

DEFINE

- If I had one hour to save the world, I would spend 59 minutes defining the problem and 1 minute finding solutions.
  - Albert Einstein

PROJECT CHARTER

Business Impact
- How do we address the issue? Identify who benefits? How do the business processes create the problem? Value stream mapping and SIPOC to identify key issues and root causes.

Opportunity or Problem Statement
- What does this problem statement mean to the business? What is the definition? How do we know when it is done?

Do It Statement
- What steps need to be taken to resolve the issue? How will the improvement be validated and confirmed? What is the expected result?

Project Plan
- What are the next steps? What are the roles and responsibilities? What are the deadlines?

Team Definition
- Who is on the team? How are they qualified to perform their tasks?

Tools
- Charters
- SIPOC Map

Process for Process Improvement - DMAIC

DEFINE
Good Charter opportunity / problem statements should provide the following information:

- **What is the problem or opportunity for improvement (what)?**
- **Where is the problem? Is it in your workplace or someone else's (where)?**
- **How long has it been happening (when)?**
- **What is the extent of the problem (extent)?**
- **How large is the impact of the problem (impact)?**

Example of a bad opportunity or problem statement:

"It takes too long to process a material order form and wrong parts are ordered."

Example of a better opportunity or problem statement:

"The material ordering process for ACME Company - West takes in excess of 30 days. The problem has existed for the past year. 25% of the orders require rework due to wrong parts. This has resulted in the postponement of 60 projects in the last 6 months."

DEF I N E  

**DEFINE**

Review the Charter carefully.

Be sure to understand the scope.

Focus effort toward the goals and deliverables.

Team will be hunting for Red "X's" – Sources of Variance
Module 5

Integrating the Toolsets Using DMAIC Approach

What other comments or questions do you have?

Process for Process Improvement - DMAIC

- Objectives
  - Identify critical measurements that are necessary to meet customer requirements and develop a method of collecting data to measure process performance.
  - What measurements matter?
  - How will you collect the data?
  - Understand the data calculations and establish a baseline for the process being measured.
  - Current state

Tools
- Value Stream Mapping / Process Mapping

Value Stream Mapping
- Follow Products or People
- Transportation, Over processing

Spaghetti Map
- Follow Products or People
- Number of Handoffs: 18
- Total Time: 45 days
- Touch Time: 5 days
- Waiting 40 Days
- Distance traveled: 1000 feet

Number of Handoffs: 18
- Total Time: 8 days
- Touch Time: 5 days
- Waiting 2 Days
- Distance traveled: 1000 feet
Information Flow "Circle" Diagram

- Number of Handoffs: 11
- Total Time: 8 days
- Touch Time: 5 days
- Waiting 3 Days

Swim Lane Process Map

What other comments or questions do you have?
Module 6
Integrating the Toolsets Using DMAIC Approach

Objectives
- Identify and validate the root cause(s) that assure the elimination of waste, variation, and constraints.
- Identify, validate and prioritize all root causes.
- Determine the true sources of variation and potential failure modes that can lead to customer dissatisfaction.

Process for Process Improvement - DMAIC

Analysis: Determining Root Cause
- Root cause analysis is where the real cause of the problem is uncovered.
- A root cause, if corrected would prevent a recurrence of the problem.
- Problem-solving without root cause analysis, results in managing a symptom of the problem.
  (ex Aspirin for a headache)
- One technique is asking “Why” 5 times. By asking why, you can peel away the layers of symptoms that lead to the root cause of a problem.

Problem: The Lincoln Memorial is deteriorating at a high rate.

1. Why: We wash this memorial more than the others.
2. Why: Bird droppings make it unsanitary for tourists.
3. Why: Birds eat the Spiders that gather in masse.
4. Why: Spiders gather to eat the flying midges that swarm.
5. Why: Midges swarm around the bright, warm lights that are turned on at dusk.

Answer: Delay turning on the lights for one hour.

Process for Process Improvement - DMAIC

Cause and Effect Analysis aka Fishbone Diagram

Office Setting:
- People
- Process
- Policy
- Product

Fishbone Diagram Sample

Add Detailed Levels
Analyze the Diagram
### Process for Process Improvement - DMAIC

#### Exercise - Identify 8 Wastes

<table>
<thead>
<tr>
<th>Waste Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overproduction</td>
<td>Waiting for equipment to be set up, people to be hired.</td>
</tr>
<tr>
<td>Waiting</td>
<td>Waiting for equipment, people, or process to cycle, waiting for materials and tools.</td>
</tr>
<tr>
<td>Defects</td>
<td>Work not meeting requirements, missing information, errors.</td>
</tr>
<tr>
<td>Transportation</td>
<td>Too many reports, reviews, approvals. Batching paperwork.</td>
</tr>
<tr>
<td>Overprocessing</td>
<td>Non utilization of people/talent.</td>
</tr>
<tr>
<td>Inventory</td>
<td>Over or under staffing, talents not utilized, work load not balanced.</td>
</tr>
<tr>
<td>Motion</td>
<td>Paper-based data vs. electronic transfers, routing of unnecessary approvals/processing.</td>
</tr>
<tr>
<td>Underutilize People</td>
<td>Excessive backlog of work to be processed. Too much paper to be handled, processed or filed.</td>
</tr>
</tbody>
</table>

#### Review List of Statapult Process Problems

1. Waste or Variation?
2. Which Type of Waste?
   - Overproduction
   - Waiting
   - Defects
   - Transportation
   - Overprocessing
   - Inventory
   - Motion
   - Underutilize People

### Value-Added and Non-Value-Added work

- **Value-Added** is defined as adding value to the product or service in the eyes of the customer.
- **Non-Value-Added** is work in the process that the customer is not willing to pay for if they had a choice.

#### Value-Added Activities
- Adding value by transforming or shaping material or information
- Customer wants it
- Done right the first time (no rework)

#### Non Value-Added Activities
- Activities that consume resources but create no value in the eyes of the customer
- Pure waste
- If you can't get rid of the activity, it's "E"

#### Non Value-Added – Essential Activities
- Activities causing no value to be created but which cannot be eliminated based on current state of technology or thinking
- Required (regulatory, customer mandate, legal)
- Necessary (due to non-robustness of process, currently required; current risk tolerance)

### Customer Requirements - Review -

- All shots must be fired at an angle of 164 degrees
- All shots must land on the floor in a stationary target area +/− 3 inches long and +/− 6 inches wide with respect to the nominal target
- Pass/Fail data must be collected for each shot
- The balls must be sorted based on either Pass or Fail
- The balls must be delivered to customer with no markings (colored dots)
- The customer requires 20 passed balls to be delivered in 5 minutes
- All data must be collected "real time"
Module 7

Integrating the Toolsets Using DMAIC Approach

- Define, Measure, and Analyze before Improve stage.
- What is the problem, what are the red X’s, validate the red X’s.
- Don’t accelerate the excavation until you are sure you’re looking in the right place.

5-S (Workplace Org)

5S is a technique that results in a well-organized workplace complete with visual controls and order. It’s an environment that has “a place for everything and everything in its place, when you need it”.

Elements of a 5S Program

- **Sort** Remove from the workplace all items that are not needed for current operation.
- **Set in Order/Straighten** Arranging needed items so that they are readily accessible and labeled so that anyone can find them or put them away.
- **Shine** The key purpose is to keep everything in top condition so that when someone needs to use something, it is ready to be used
- **Standardize** The standard should be easily understood and easy to communicate (i.e. visual controls).
- **Sustain** Implementing solutions to address the root causes of work area organization issues. All employees must be properly trained and use visual management techniques

The 7th S

- Manifesting intent through thoughtful placement of objects/furniture

Prosperity Corner

*Before... After...*
Types of Error Proofing

Create **quality at the source** through error proofing
(This is called = Poka Yoke)

- Types of error proofing
  - Make it impossible to create error
  - Make it harder to create error
  - Make it obvious the error has occurred

Examples:
- Minivan - Gas tank/sliding door
  - Beeping when leave keys in car
- Trunk latch/remote lock
- Others: USB, Color coding, Edits, Checklists (Pilot,gas cap,Dr?)

**Poor Quality = Waste (Defects, rework, scrap)**
Learning Objectives

The Statapult exercises are designed to give students experience using the methodologies and tools taught in this course.

Round 2: Future State - Flow Improvements/Variation Reduction

exercise

Exercise Requirements
Round 2

- Team members do not have to perform the same roles as in Round 1
- No permanent markings or modifications can be made to the Statapult or balls

Customer Requirements
Round 2

- All shots must be fired at an angle of 164 degrees
- All shots must land on the floor in the target
- Pass/Fail data must be collected for each shot
- The balls must be sorted based on either Pass or Fail
- The customer requires 20 passed balls to be delivered in 5 minutes
- All data must be collected “real time”

Requirements – Round 2

Business Requirements
- None

Statapult Requirements
- The Statapult must be placed so that the base is on the floor and in a stationary position

Future State Map Exercise

Based on the new requirements and your team’s value analysis of the Current State Map, design the new process layout for the next Statapult round. Consider the following:

1. Strategies to reduce variation
   - Address list of items causing variation

2. Strategies to reduce waste
   - Create Future State Map
   - Eliminate steps / improve flow
   - New roles/responsibilities
   - Listen to voice of the customer
   - **Only keep value added and essential steps**

- 6/10/2013 - 20
Round 2 Shoot

Are you ready to start?
- The Future State Map is ready
- Statapult layout is ready

The simulation will start simultaneously for all teams!

What other comments or questions do you have?

Module 8

Integrating the Toolsets Using DMAIC Approach

Process for Process Improvement - DMAIC

- Objectives
  - Solution implementation
  - Establish control plan (Metrics: Avg/Std Dev; oven/bucket)
  - Verify improvements (Monitor targets)
  - Verify long term capability
  - Transition project to process owner

"What gets measured gets managed"

Process for Process Improvement - DMAIC

- Tools
  - Control Charts
  - Standard Operating Procedures
  - Process Control Plan
  - Communication Plan
  - Mistake Proofing
  - Team Feedback Session

- No Control Plan?
  - Like Shooting an arrow in the sky and expecting it to stick. Gravity!

Process for Process Improvement - DMAIC

- Maintaining Process Improvements
  - A Control Plan’s primary intent is to create a structured approach to control the process.
  - Control plans assure well thought-out reactions are in place if an out of control condition occurs.
  - They provide a method for documentation and communication of control methods.
  - Entropy- It just isn’t what it used to be
Celebrate!

- Team certificates
- Publicize results
- Brag!

Process for Process Improvement – DMAIC-V

- V-Validate
  - Improvements/Savings will be validated six months to one year after completion of your CPI project to insure improvements are realized and sustained.
- Tools
  - Metrics Collection System
  - Audits

What other comments or questions do you have?

Push to Change

“..you’ll have trouble creating a new culture if you insist on doing it in the ways that are consistent with the old one.”

Now What?

Be an advocate – tell your co-workers!

Get involved!
- Get Green Belt training
- Initiate a project
  - Contact Pamela Abbott-Mouchou x2098

Seven Deadly Words

“We have always done it this way.”
Congratulations Yellow Belts!