

The Two Pillars of a Problem-Solving Culture

8D and DMAIC

Build Stability and Capability



Employees that convert their team's ideas into real improvements in their work, productivity, and quality also take pride in their work, job, team, and company.

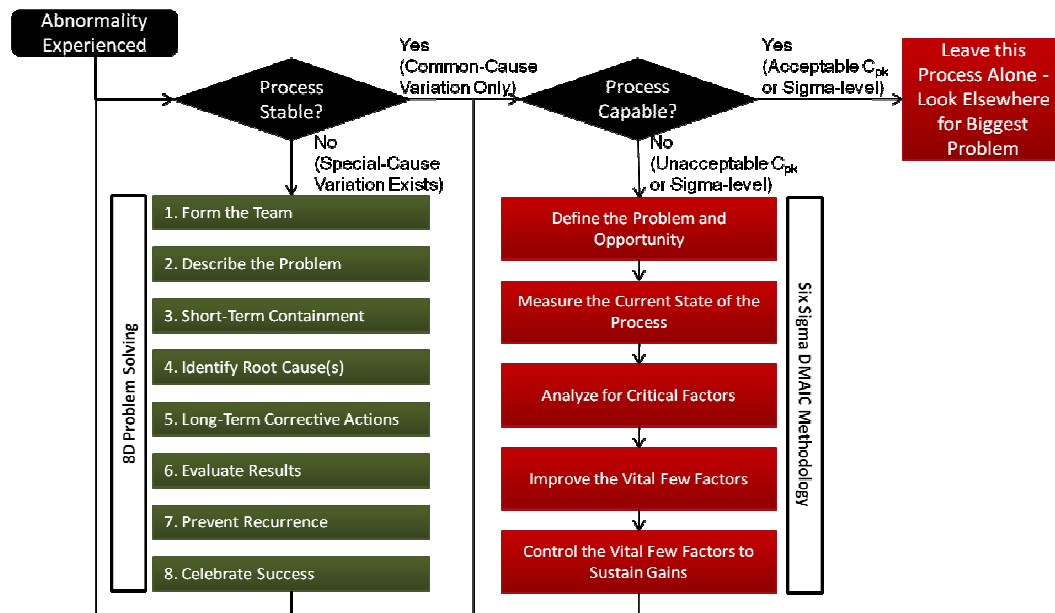
The responsibility and authority to solve their own problems and to get the help that is needed is fundamental to increasing productivity, quality, and employee engagement. The Xcellus process for identifying and solving problems is the most important strategy for creating a culture of effective problem solvers and mentors in the problem-solving process.

There are generally two primary types of problems that exist: the sporadic, or special-cause, problems that have an assignable root cause and the chronic, or common-cause, problems that require rigorous investigation. There are different methodologies for both problem types and application of the wrong methodology is mathematically incorrect, reduces workforce understanding and capability, and ultimately will not prevent the problem from recurring.

A system is required to ensure people react to problems with efficient problem-solving methodologies and tools as they arise. The system should include built-in, standardized, and consistent management follow up and reviews to ensure the system is working as expected.

Only by determining the real root causes and eliminating them can the effect be prevented from resurfacing. Through the relentless pursuit of root-cause elimination and coaching by leaders competitive advantage is achieved and maintained.

This proposal focuses on the DMAIC process for dealing with the difficult problems where there is no obvious root-cause. This requires a project team with a leader certified in the DMAIC methodology in order to ensure consistent success and sustainable results.



Xcellus-certified Green Belts learn the DMAIC problem solving methodology, how to identify a DMAIC opportunity, basic project management, and leadership skills. Candidates should be high-potential personnel that are respected by leaders and associates alike.



Six Sigma Green Belt Certification

Candidate Selection:

High-potential candidates are selected by the Continuous Improvement Steering Committee.

Description:

Lean Production is the concept of reducing the waste and variation in business activities and has a long history and evolution. Today Lean is synonymous with the Toyota Production System (TPS), developed by Taiichi Ohno and Shigeo Shingo.

Six Sigma (6σ), created by Motorola, is a systematic methodology to reduce variation with the goal to increase process capability, which means increase quality output, and, therefore, fewer defectives and happier customers. 6σ has a different history than Lean, employs different tools and methodologies, and follows the rigorous scientific method for problem solving.

Lean is a Continuous Improvement methodology that generally focuses internally on efficiency, productivity, streamlining, capacity, cycletime, and cost. Lean targets unacceptable, abnormal conditions (a.k.a. special causes) and organizations react with effective problem solving and kaizen to create short-term countermeasures and long-term solutions.

6σ is a Continuous Improvement methodology that tends to focus more externally on defects, defectives, yields, process capability, product quality, and Voice of the Customer (VoC). 6σ targets the unacceptable, normal conditions (a.k.a. common causes) using a sophisticated collection of statistical techniques and a multi-functional team to redesign processes to increase process capability.

Lean Six Sigma is the natural combination of the two disciplines which helps operations and supply chains focus efforts using the best practices available.

Goals:

- Understand and apply Lean Principles
- Understand and apply the Six Sigma Methodology
- Understand the difference between special-cause variation (abnormal) and common-cause variation (normal), how to determine the difference, and how to best respond to variation
- Develop scientific problem-solving skills
- Complete a project for hands-on application of the methods and tools

Requirements:

Complete attendance and participation, basic math skills, basic understanding of Microsoft Excel, PowerPoint, and Word.

Course Hours

- 75 hours in class plus homework and 4-hour exam

Text:

Six Sigma Green Belt Student Guide (Provided)

Optional: ; [An Introduction to Statistical Methods and Data Analysis](#), Ott & Longnecker; [Design and Analysis of Experiments](#), Montgomery; [The Toyota Way](#), Liker



Student Evaluation:

Exercises, Quizzes, and Final Exam

Six Sigma Course Schedule:

Session Topics

- | | |
|--------------------------|---|
| Day 1
(9 hr) | <ul style="list-style-type: none">• A Lean/Six Sigma Overview<ul style="list-style-type: none">• History of Continuous Improvement• What is Lean/Six Sigma (LSS)• LSS Benefits for Your Organization• Management Commitment• Roles & Responsibilities• Kaizen, Lean & The DMAIC Model• Critical to Quality (CTQ) Tree• Kano Model• Define:<ul style="list-style-type: none">• Project Management Fundamentals• Project Selection<ul style="list-style-type: none">• Making Problems Visible• Project Definition |
| Day 2
(9 hr) | <ul style="list-style-type: none">• Define:<ul style="list-style-type: none">• Problem Statements• Identify The Project's Purpose And Scope• Project Charter• SIPOC• Brainstorming• High-level Process Map• Project Communication Plan• Tollgate Reviews• Measure: Current State<ul style="list-style-type: none">• Data Collection• Histogram• Pareto Charts |
| Days
3 & 4
(18 hr) | <ul style="list-style-type: none">• Measure: Current State<ul style="list-style-type: none">• Process Mapping• Value Stream Mapping• Measure Systems Analysis (MSA)• Run Charts• Process Capability• Taguchi Loss Function• Cost of Poor Quality (CPQ)• Defects per Million Opportunities |

- Day 5
(9 hr)
 - **Analyze: Identify potential root causes & confirm with data**
 - Cause & Effect
 - Failure Modes & Effects Analysis
 - Graphical Methods
 - Probability
 - Confidence Intervals

- Day 6
(9 hr)
 - **Analyze**
 - Basic Statistics
 - Hypothesis testing basics
 - Means tests
 - Variance tests
 - Attribute Tests
 - Sample Size

- Day 7
(9 hr)
 - **Improve**
 - Lean Improvements
 - 5S, Identifying Waste
 - Kaizen
 - Pull, Cellular, One-Piece Flow, Kanban
 - Overall Equipment Effectiveness(OEE)
 - Total Productive Maintenance
 - Design of Experiments (DOE) – Basic understanding

- Day 8
(9 hr)
 - **Improve:**
 - Design of Experiments (DOE) - Application
 - DOE Activity

- Day 9
(8 hr)
 - **Control: Future State**
 - Control Plan
 - Poke Yoke
 - Statistical Process Control
 - Final Process Capability
 - **Project Closure**

Green Belt Certification Requirements

To be considered an Xcellus certified Green Belt, the following criteria must be met:

1. High-potential candidate with team leadership skills, aptitude in scientific problem solving, and deep desire to learn
2. Formal request and commitment letter signed by potential candidate and his/her manager
3. Ten days instruction in DMAIC, Lean, and project management
4. At least one completed project – complete means:
 - a. All stage gate reviews passed with attendance by Champion, Area Leader, Master Black Belt or Black Belt mentor, immediate supervisor, sponsor from area affected
 - b. Clear benefit to your company
5. XCELLUS GB exam passed (70% or higher proficiency)
6. ASQ CSSGB exam or equivalent passed

Black Belt Certification Requirements

To be considered an Xcellus certified Black Belt, the following criteria must be met:

1. At least 24 days instruction in DMAIC, DF Six Sigma, and project management
2. At least two completed projects – complete means:



- a. All stage gate reviews passed with attendance by Champion, Area Leader, Master Black Belt mentor, immediate supervisor, sponsor from area affected
- b. Clear and significant benefit to your company
3. Xcellus BB exam passed (70% or higher proficiency)
7. ASQ CSSBB exam or equivalent passed

Master Black Belt Certification Requirements

1. Exceptional performance as a Black Belt with the desire to pursue a career in Continuous Improvement for three more years
2. At least two years as an Xcellus-certified Black Belt
3. Four courses beyond the Black Belt level, one of which must include advanced statistical analysis, and one must be a project management course applicable to the PMP exam
4. Three MBB-level projects peer reviewed by a panel including no fewer than three certified Six Sigma professionals at the BB or MBB levels (at least one must be a MBB)
5. Four exams passed with 90% proficiency
6. Co-teach a Six Sigma Black Belt course with a Master Black Belt
7. Teach one Green Belt or Black Belt as lead instructor
8. Publish one paper or speak at a conference about a Lean or Six Sigma topic

Instructional Methods:

This course is taught using a variety of instructional methods including lecture, class discussions, small group work, project work, exercises, homework, quizzes, tests, and electronic discussion

This course is developed using Bloom's Taxonomy:

1. Knowledge
 - a. Exhibit memory of previously-learned materials by recalling facts, terms, basic concepts and answers
 - b. Knowledge of specifics - terminology, specific facts
 - c. Knowledge of ways and means of dealing with specifics - conventions, trends and sequences, classifications and categories, criteria, methodology
 - d. Knowledge of the universals and abstractions in a field - principles and generalizations, theories and structures
2. Comprehension
 - a. Demonstrative understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas
 - b. Translation
 - c. Interpretation
 - d. Extrapolation
3. Application
 - a. Using new knowledge. Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way
4. Analysis
 - a. Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations
 - b. Analysis of elements
 - c. Analysis of relationships
 - d. Analysis of organizational principles
5. Synthesis
 - a. Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions
 - b. Production of a unique communication
 - c. Production of a plan, or proposed set of operations
 - d. Derivation of a set of abstract relations
6. Evaluation
 - a. Present and defend opinions by making judgments about information, validity of ideas or quality of work based on a set of criteria
 - b. Judgments in terms of internal evidence and external criteria