

A Six Sigma Primer

The following information serves as an introduction to the methodology of Six Sigma, also referred to as Lean Six Sigma. It includes a review of the four basic keys of Lean Six Sigma, some other basic terminology, the five laws of Lean Six Sigma, and concludes with tips for successful program implementation. Sigma is a Greek word used in statistics for the amount of variation in a process.

Four Basic Keys of Lean Six Sigma

1. Delight Your Customers with Speed and Quality

- Customers are anyone who purchases your product/services (external) or uses output of your work (internal)
- Deliver what “they” want with higher quality in less time
- Concept of the ‘Voice of the Customer’ or VOC
- Defects are anything that does not meet your external or internal customer needs
- High quality makes it possible to attain fast speed; doing things that create process speed – or eliminating defects and delays – allows you to achieve the highest levels of quality
- Concept of ‘Critical to Quality’ requirements or CTQ
- Customer focus means knowing what “they” would define as quality work, how quickly “they” want your products/services or work output, and what “they” would see as a defect.

2. Improve your processes

- Utilize data to identify what causes systematic problems to occur in the first place
- Document how work gets done with process steps
- Examine physical path / electronic workflow between people and workstations
- Give people knowledge and methods they need, and that are proven to work, to constantly improve
- Eliminate variation in quality and speed, both a major source of defects
- Improve process flow and speed
- Concept of ‘Specifications’ as a range of acceptable values, mostly in manufacturing
- Flowcharting physical path, or using a mapping process, allows examination of each step, and determining if the step is necessary, and what value it adds to customers
- Unnecessary complexity in processes adds cost, time, and enormous waste
- Problems generally arise due to problems in the process, not people “screwing up.”

3. Work Together for Maximum Gain

- Specific skills for effective collaboration and productive meetings include Listening, Brainstorming & Discussion Techniques, Organizing Ideas, Decision-Making (and paying attention to how they are made), Goal Setting, Assigning Accountability, Handling Conflict, Continuous Learning, and Collaboration with Other Workgroups
- All of the above lead to more productive and effective meetings.

4. Base Decisions on Data and Facts

- All participants must support their opinions with facts – typically hampered by lack of available data, inadequate prior training in collecting/analyzing data, and historical pattern of using data for punishment/reward rather, than for making decisions to improve processes
- Data must be used for learning and monitoring process performance
- Process measures as data that reflects what goes on to produce a result
- Result measures as data that reflects the outcome of a process
- Four basic types of data including quality/defects (a number), speed / lead or cycle time, financial outcome (impact on revenue and/or expenses), and customer satisfaction (as measured by surveys or interviews)
- **Skipping data collection is NOT an option**
- Critical objective is determining what the data actually tells you.

Other Basic Terminology

WIP – Work in Process

Lead or Cycle Time = Amount of WIP divided by the Average Completion Rate

In Queue – Work that is waiting to be WIP

Waste – Non value-added work in the eyes of customer or VOC, as described previously

Process Cycle Efficiency = Value-Add Time divided by Total Lead or Cycle Time

Five Laws of Lean Six Sigma

1. **Law of the Market** – Customer needs define quality, are the highest priority for improvement, and are key to sustained revenue growth
2. **Law of Flexibility** – Speed of any process is proportional to its flexibility; you must eliminate anything that causes loss of productivity (e.g. missing information, need to change systems within a process, inordinate or cumbersome approval cycle)
3. **Law of Focus** – 20% of process activity causes 80% of problems and delays; you must focus on those 20%
4. **Law of Velocity** – Speed of any process is inversely related to the amount of WIP; you can increase process speed by reducing WIP
5. **Law of Complexity & Cost** – Complexity adds more cost and WIP than poor quality or slow speed; eliminating variety/options generates early process improvements.

Guidelines for Program Implementation

Typical participants include:

- Champion – executive level responsible for managing/guiding program
- Black Belts – responsible for leading and coaching project teams
- Master Black Belts – train and coach Black Belts and monitor progress
- Other Executives / Business Unit Managers – define criteria for selecting projects
- Line Managers / Process Owners – responsible for authorizing process changes
- Green / Yellow / White Belts & Other Team Members – work the project in their respective areas

Six Sigma must support corporate goals and be linked to business priorities. As such, there must be systems for project selection and for regular project evaluation (also known as 'tollgate reviews'). Once the Champion assists in drafting a Project Charter, a structured, data-based problem-solving process is initiated, commonly called DMAIC.

DMAIC

- **Define** – Share understanding of project’s business priorities, confirm opportunity, reach agreement with management on realistic project scope, agree on how success will be measured, and set up appropriate teams for success. Tools include a SIPOC simple process diagram (Suppliers, Input, Process, Output, Customers) and a Value Stream Map, displaying actual process data and flow, to understand what needs to be changed in the process.
- **Measure** – Evaluate existing measurement system (improve or develop a new one), observe process, gather data, and then map process in more depth. Tools include Process Observation, Time Value Charts, Pareto Charts, and Time Series Plots.
- **Analyze** – Sticking to the data is of utmost importance. Look for patterns, target places of wasted time, find clues for real causes, and identify ways to speed up process without compromising quality. Select the most critical processes to control. Tools include Cause & Effect Diagrams (Fishbone), Scatter Plots, and Failure Modes & Effects Analysis (FMEA).
- **Improve** – Identify range of possible solutions, review existing best practices, develop criteria for selecting solution, pilot solution, and then plan for full-scale implementation. Tools include Pick Charts and Four-Step Rapid Setup.
- **Control** – To make gains and improvements last, document new / improved procedures, train everyone, set up procedures for tracking key “vital” signs, and hand-off ongoing management of program to process owner(s). Tools include Control Charts.

Six Must-Do’s

1. **Pick the Right Projects** – those that are linked to corporate / business strategies and priorities, are realistic in scope, and have identifiable / measurable hard results
2. **Pick the Right People**
3. **Follow the Method** – the one based on data, that focuses on making “waste” visible; in other words, DMAIC
4. **Clearly Defined Rules & Responsibilities** – using RACI format by identifying all involved for expectations of **R**esponsibility, **A**ccountability, **C**onsultation, and **I**nformed of outcome
5. **Communicate Constantly** – with management, project team members, to and from all levels
6. **Support Education & Training**