

LEAN SIX SIGMA - AN OVERVIEW

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Six Sigma is a business management strategy, originally developed by Motorola that today enjoys wide-spread application in many sectors of industry.

Six Sigma seeks to identify and remove the causes of defects and errors in manufacturing and/or service delivery and business processes. It uses a set of management methods, including statistical methods, and creates a dedicated infrastructure of people within the organization who are experts in these methods. Six Sigma aims to deliver “Breakthrough Performance Improvement” (from current levels) in business and customer relevant operational and performance measures.

Business or operational measures are elements like:

- Customer Satisfaction Rating Score
- Time taken to respond to customer queries or complaints
- % Defect rate in Manufacturing
- Cost of executing a business process transaction
- Yield (Productivity) of service operations or production
- Inventory turns (or) Days of Inventory carried
- Billing and Cash Collection lead time
- Equipment Efficiency (Downtime, time taken to fix etc.)
- Accident / Incident rate
- Time taken to recruit personnel and so on...



Six Sigma initiatives are planned and implemented in organizations on “Project by Project” basis. Each project aims not only to improve a chosen performance metric but also sustain the improvement achieved.

Each Six Sigma project carried out within an organization follows a defined sequence of steps and has quantified financial targets (revenue increase, cost reduction or profit increase)

Six Sigma - Historical background

Six Sigma was originally developed as a set of practices designed to improve manufacturing processes and eliminate defects, but its application was subsequently extended to many other types of business processes as well. In Six Sigma, a defect is defined as anything that could lead to customer dissatisfaction and / or does not meet business set specifications.



The elements of the methodology were first formulated by Bill Smith at Motorola in 1986. Six Sigma was heavily inspired by six preceding decades of quality improvement methodologies such as quality control, TQM, and Zero Defects, based on the work of pioneers such as Shewhart, Deming, Juran, Ishikawa, Taguchi and others.

Like its predecessors, **Six Sigma** asserts that:

- Continuous efforts to achieve stable and predictable process results (i.e. reduce process variation) are of vital importance to business success.
- Manufacturing and business processes have characteristics that can be measured, analyzed, improved and controlled.
- Achieving sustained performance and quality improvement requires commitment from the entire organization, particularly from top-level management.

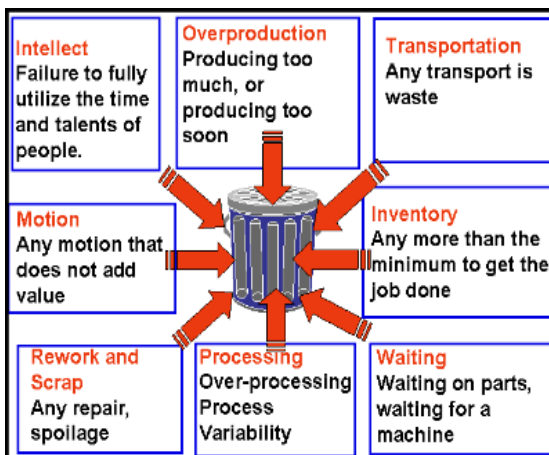
How is Six Sigma different?

Features that differentiate Six Sigma apart from previous quality improvement initiatives include -

- A clear focus on achieving measurable and quantifiable financial returns from any Six Sigma project.
- An increased emphasis on strong and passionate management leadership and support
- A special organization infrastructure of "Champions," "Master Black Belts," "Black Belts", "Green Belts" etc. to lead and implement the Six Sigma approach
- A clear commitment to making decisions on the basis of verifiable data, rather than assumptions and guesswork.
- The term "Six Sigma" is derived from a field of statistics known as process capability study. It refers to the ability of processes to produce a very high proportion of output within specification. Processes that operate with "Six sigma quality" over the short term are assumed to produce (long-term) defect levels below 3.4 defects per million opportunities (DPMO). Six Sigma's implicit goal is to improve all processes to that level of quality or better.



In recent years, Six Sigma has sometimes been combined with lean manufacturing (management) to yield a methodology named Lean Six Sigma.



What is Lean?

Lean is a philosophy and set of management techniques focused on continuous "eliminating waste" so that every process, task or work action is made "value adding" (the real output customer pays for!!) as viewed from customer perspective. Lean "waste elimination" targets the "Eight Wastes" namely:

- **Overproduction** - Making more than what is needed by customer / market demand
- **Over-processing** - Doing more to a product/service (but not perceived as value by customer)

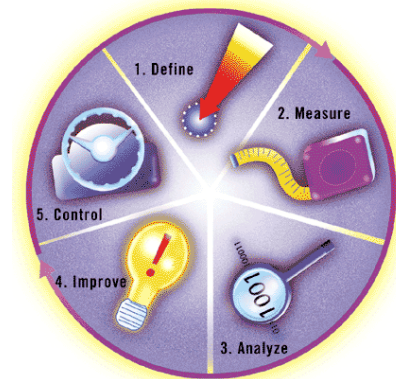
- **Waiting** - For material, information, people, equipment, procedures, approvals and more
- **Transportation** - Movement of products / items during or after production
- **Defects** - Errors, mistakes, non-complying products, services, documents, transactions
- **Rework and Scrap** - Products, transactions or outputs not meeting specifications and have to be fixed, redone, rectified, marked down or scrapped / unusable.
- **Motion** - Mainly people, document movement, searching etc.
- **Inventory** - Buffer stocks or resources (Raw, Work in process, FG, Bench staff etc..)
- **Unused Creativity** - People knowledge and skills that are not utilized by the company

Wastes make the organization slow, inefficient and uncompetitive. Lean methods help to remove / reduce waste and contributes to driving “business agility” (velocity) through smooth work flow across the organization resulting in rapid fulfillment of customer needs in an optimum manner.

Six Sigma Methodology

Six Sigma has two key methodologies:
DMAIC and DMADV, both inspired by Deming's Plan-Do-Check-Act Cycle.

- DMAIC is used to improve an existing business process;
- DMADV is used to create new product or process designs.



DMAIC

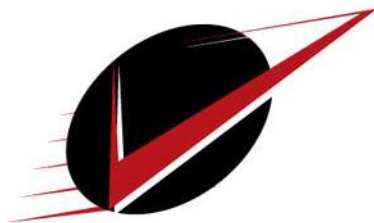
The basic DMAIC methodology consists of the following five steps:

- **Define** process improvement goals that are consistent with customer demands and the enterprise strategy.
- **Measure** key aspects of the current process and collect relevant data.
- **Analyze** the data to verify cause-and-effect relationships. Determine what the relationships are, and attempt to ensure that all factors have been considered.
- **Improve** or optimize the process based upon data analysis using techniques like Design of Experiments.
- **Control** to ensure that any deviations from target are corrected before they result in defects. Set up pilot runs to establish process capability, move on to production, set up control mechanisms and continuously monitor the process.

DMADV (also known as DFSS - Design for Six Sigma)

The basic methodology consists of the following five steps:

- **Define** design goals that are consistent with customer demands and the enterprise strategy.
- **Measure** and identify CTQs (characteristics that are Critical To Quality), product capabilities, production process capability, and risks.



- **Analyze** to develop and design alternatives, create a high-level design and evaluate design capability to select the best design.
- **Design** details, optimize the design, and plan for design verification. This phase may require simulations.
- **Verify** the design, set up pilot runs, implement the production process and hand it over to the process owners.

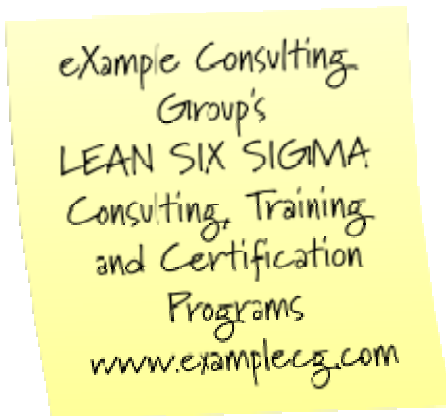


Six Sigma Implementation roles

One of the key innovations of Six Sigma is the **professionalizing of improvement management** functions. Prior to Six Sigma, quality and improvement management in practice was largely relegated to the production floor and to statisticians in a separate quality department. Six Sigma borrows martial arts ranking terminology to define a hierarchy (and career path) that cuts across all business functions and a promotion path straight into the executive suite.

Six Sigma identifies several key roles for its successful implementation

- **Executive Leadership** includes the CEO and other members of top management. They are responsible for setting up a **vision** for Six Sigma implementation. They also **empower** the other role holders with the **freedom and resources** to explore new ideas for breakthrough improvements.



- **Champions** are responsible for **Six Sigma implementation** across the organization in an **integrated manner**. The Executive Leadership draws them from upper management. Champions also act as mentors to Black Belts.
- **Master Black Belts**, identified by champions, act as **in-house coaches** and **subject matter experts** on Six Sigma. They devote **100% of their time** to Six Sigma. They assist champions and guide Black Belts and Green Belts. Apart from statistical tasks, their time is spent on **ensuring consistent application** of Six Sigma across various functions and departments.
- **Black Belts** operate under Champions and Master Black Belts to apply Six Sigma methodology to specific projects. They **devote 100% of their time** to Six Sigma. They primarily **focus on Six Sigma project execution**, whereas Champions and Master Black Belts focus on identifying projects/functions for Six Sigma.
- **Green Belts** are employees who undertake **Six Sigma implementation along with their other job responsibilities**. They operate under the guidance of Black Belts and Champions.

Six Sigma Benefits

Leading companies have implemented Six Sigma and realized gainful results. Motorola has reported over US\$17 billion in savings from Six Sigma as of 2006.



Other early adopters of Six Sigma who achieved well-publicized success include Honeywell International and General Electric (introduced by Jack Welch).

By the late 1990s, about two-thirds of the Fortune 500 organizations had begun Six Sigma initiatives with the aim of reducing costs and improving quality.

Interested in launching Lean Six Sigma initiatives at your organization?

eXample Consulting Group's Lean Six Sigma Breakthrough Corporate programs for organizations are delivered as a structured engagement covering:

- **Executive Overview**
Introduce Lean Six Sigma to the Top/Senior Management from a strategic perspective
- **Champion Program**
Create leaders in-company to identify breakthrough opportunities and oversee projects
- **Lean Six Sigma Green Belt**
Blends Classroom with On-site project guidance to develop Green Belt Practitioners
- **Lean Six Sigma Black Belt**
Blends Classroom with On-site project guidance to develop Black Belt practitioners
- **Lean Six Sigma Master Black Belt**
Blends Classroom with Coaching to develop Subject matter experts
- **Design for Six Sigma**
Blends Classroom with On-site project guidance to develop "Right First Time" Product and Process designers

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