Six Sigma – Process Improvement

What is Six Sigma?

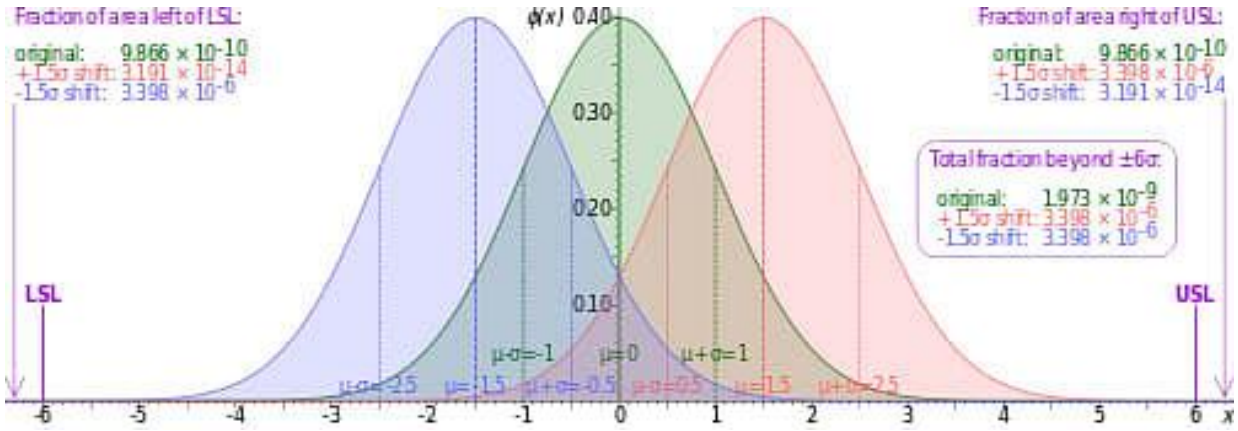
Six Sigma is a set of methodologies and tools used to improve business processes by reducing defects and errors, minimizing variation, and increasing quality and efficiency. It's a term used to define various techniques and management tools designed to make business processes more efficient and effective. It provides statistical tools to eliminate defects, identify the cause of the error, and reduce the possibilities of error. Thus, Six Sigma creates an environment of continuous process improvement, enabling businesses to provide better products and services to customers. It was developed by Motorola, Inc. in 1986.

Six Sigma can be applied to any process in any industry to establish a management system for identifying errors and eliminating them. It provides methods to improve the efficiency of business structure and quality of processes, enhancing the profitability of the business.

The etymology is based on the Greek symbol "sigma" or "σ," a statistical term for measuring process deviation from the process mean or target. "Six Sigma" comes from the bell curve used in statistics, where one Sigma symbolizes a single

standard deviation from the mean. If the process has six Sigmas, three above and three below the mean, the defect rate is classified as "extremely low."

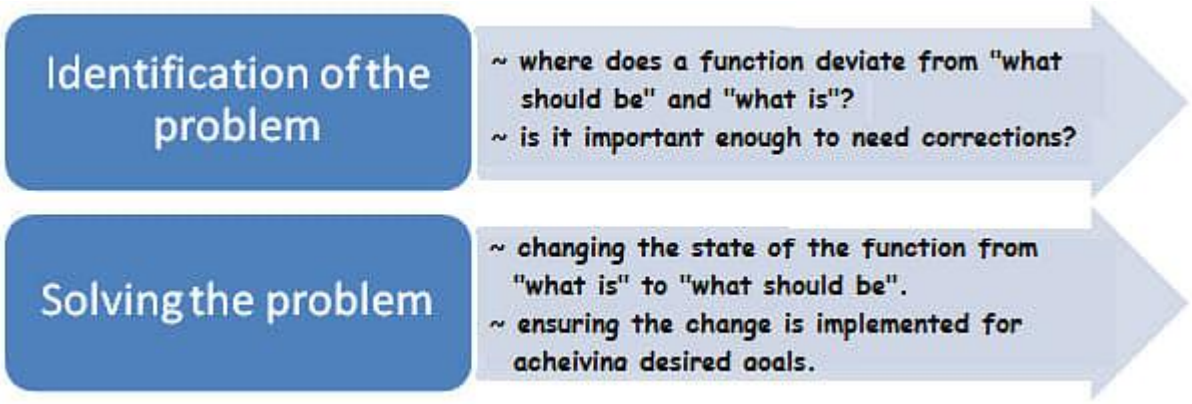
The graph of the normal distribution below underscores the statistical assumptions of the Six Sigma model. The higher the standard deviation, the higher is the spread of values encountered. So, processes, where the mean is minimum 6σ away from the closest specification limit, are aimed at Six Sigma.



The failure of a business process or product is regarded as a defect. When a process produces less than 3.4 defects for one million chances, it is considered efficient. The goal of Six Sigma is to achieve a level of quality that is nearly perfect, with only 3.4 defects per million opportunities. This is achieved by using a structured approach called DMAIC (Define, Measure, Analyze, Improve, Control) to identify and eliminate causes of variation and improve processes which will be explained later.

Six Sigma is a disciplined and data-driven approach widely used in project management to achieve process improvement and minimize defects. It provides a systematic framework to identify and eliminate variations that can impact project performance.

Goals are achieved through a two-pronged approach:



5 Six Sigma Principles

There are five main principles of Six Sigma:

1. Customer focus

The main objective is to maximize the benefits for customers. Hence, a business must understand the needs of their customers and the drivers of sales. It requires establishing quality standards according to the market or customer demands.

2. Assess the value chain and find the problem

Outline the steps of a process to find out unwanted areas and gather related data. Define goals for data collection, purposes for data gathering, and expected insights. Verify that the data is assisting in achieving the objectives, whether more information is needed to be collected, or if data cleansing is required. Find out the problem and its root cause.

3. Eliminate defects and outliers

After the identification of the problem, make appropriate modifications in the process to eliminate defects. Eliminate any activity in the given process that does not contribute to the customer value. If the value chain is unable to reveal the problem area, various tools are used to find out the problem areas and outliers. Eliminating the outliers and defects removes the bottlenecks in a given process.

4. Involve stakeholders

A structured process should be adopted where all stakeholders collaborate and contribute to finding solutions to complex issues. The team needs to achieve proficiency in the methodologies and principles applied. Hence, specialized knowledge and training are required to lower project failure risks and ensure optimal performance of the processes.

5. Flexible and responsive system

Whenever an inefficient or faulty process is eliminated, the employee approach and work practices need to be changed. A flexible and responsive environment to the changes in processes can lead to the efficient implementation of the projects.

The departments involved should be capable of adapting easily to the change. Companies that periodically examine the data and make appropriate changes to their processes may achieve a competitive advantage.

Six Sigma Methodology

The following are the two main methodologies of Six Sigma, which are used in different business environments:

DMAIC

DMAIC is a data-driven approach used for optimizing and improving the existing business designs and processes. It is an effective method of controlled change management. The five phases of DMAIC are listed below, and each phase involves tools and tasks to help find the final solution.

1. Define the problem and the goals of the project
2. Measure the different aspects of the existing process in detail
3. Analyze data to find the main flaw in a process
4. Improve the given process
5. Control the way the process is implemented in the future

TABLE 12-1. DMAIC: A five-phase approach to Six Sigma

Phase	Description
Define opportunities	Determine customer and core processes. Determine the customer's requirements for the products and services being produced. Map the processes that are being improved. Gain the customer's commitment.
Measure performance	Develop a plan to collect and measure the defect data. Collect data from many sources in the organization and determine the defect rates and other metrics. Compile and display the data.
Analyze opportunity	Analyze and verify the data collected. Determine the root causes for the defects and identify opportunities for improvement. Prioritize the improvement opportunities.
Improve performance	Design creative solutions to improve the processes. Create a problem statement and a solution statement for each problem. Test specific improvements with an experimental approach. Deploy the improvements.
Control performance	Monitor the improvement programs to control them. Develop an ongoing monitoring plan to keep the process on the new course and prevent it from reverting to its previous state. Assess the effectiveness of the improvement. Develop staffing and training incentives to make the improvements permanent.

The 5 Whys.

Five Whys, sometimes written as "5 Whys," is a guided team exercise for identifying the root cause of a problem. Five Whys is used in the "analyze" phase of the **Six Sigma DMAIC (define, measure, analyze, improve, control)** methodology.

The exercise begins with a facilitator stating a problem and then asking the question "Why?" (meaning "Why did the problem occur?"). The group brainstorms answers based on direct observation. Once the group agrees upon an answer, the facilitator again asks the question, "Why?"

The purpose of this exercise is root cause analysis, frequently included as part of a risk management plan for repeat problem prevention. By brainstorming repeated

answers to the same question, teams are forced to problem solve and arrive at several distinct possibilities.

The 5 Whys Six Sigma methodology was introduced by the executives at Toyota: their approach was to keep asking questions until they'd found weaknesses in the processes.

Example :

1. Why is the company in the red last quarter?
2. Why were there a lot of charge?
3. Why were they dissatisfied with the product?
4. Why were the products defective?
5. Why were there malfunctions?

DMADV

DMADV focuses on the development of an entirely new process, product, or service. It is used when existing processes, even after improvement, do not satisfy the customer's needs, and new methods are required to be developed. It comprises five phases:

1. Define the purpose of the project, product, or service
2. Measure the crucial components of a process and product capabilities
3. Analyze data and develop design alternatives, ultimately selecting the best design
4. Design the selected best alternative and test the prototype
5. Verify the effectiveness of the design through several simulations and a pilot program