

## An Introduction to Six Sigma

For over a decade, corporations in all industries have used the discipline of Six Sigma to increase their market share, raise turnover, improve profit margins, and ultimately, shareholder value. Six Sigma is credited with saving money in billions while simultaneously improving overall quality and customer satisfaction. As it has matured, Six Sigma has evolved into a management process capable of addressing virtually any problematic system or process within an organization.

The name Six Sigma is derived from a statistical heritage. Sigma is a Greek letter assigned to represent the amount of variation or inconsistency a measurable outcome exhibits. As a way of running a business, Six Sigma is a highly disciplined improvement system that helps individuals and companies eliminate costly problems, develop and deliver near perfect products and services and to manage the company more strategically.

Six Sigma establishes a leadership vision, framework and a set of metrics and goals to accomplish improved business results with a systematic five-phase problem solving methodology called DMAIC: Define, Measure, Analyze, Improve and Control.

Developed by Motorola as a way to improve their quality in the mid-1980s, Six Sigma only became well known after GE's Jack Welch made it a central focus of his business strategy in 1995. It is the culmination of many years of work by some of the best minds in business and management. The main core of the Six Sigma methodology is the application of statistical and other analytical tools in the context of a well-disciplined, easy-to-follow methodology. The tools of the methodology are easily applied in an operational (product oriented) environment and in a transactional (services and business process oriented) environment. Beyond the main core of the methodology and its tools, is an impressive management system that ties it all together.

With modern IT, Six Sigma enables organizations to obtain improvements significantly faster than before. Today's computer and software technologies now allow a broader employee population to participate in Six Sigma deployments at higher levels of contribution. Today, Six Sigma combines this speed and heightened involvement with its powerful disciplines of organizational infrastructure to support the methodology, knowledge transfers to improve employee capability and the establishment of goals and metrics to manage and measure the business.

To achieve Six Sigma from a goal or quality perspective, an output of interest from a process must produce no more than 3.4 defects per million opportunities, where an opportunity is defined as a chance for nonconformance, or not meeting the required specifications. To achieve Six Sigma from a business results perspective, waste that is generally called Cost of Poor Quality (COPQ), must be reduced in order to improve net profit margins twenty to forty percent or more.

Six Sigma is not about establishing a separate quality ivory tower within a company or organization and it is not about cost avoidance. It is an enterprise-wide strategy that effectively develops employees within a company to have the knowledge and capability to solve problems, to improve decision-making and subsequently improve the overall performance of the enterprise from a financial and customer perspective.

When Six Sigma is properly implemented as a roadmap and a management framework, it consistently delivers breakthrough results throughout the business. As a system, it combines the best problem solving tools and methods with capable employees under the umbrella of a comprehensive leadership framework, to rapidly achieve reduced costs, higher quality, lower cycle times, improved overall customer satisfaction and a lower investment in equipment and inventory; all leading to increased market share, revenue, profits, and ultimately shareholder value.

## Six Sigma Methodology

The fundamental objective of the Six Sigma methodology is the implementation of a measurement-based strategy that focuses on process improvement and variation reduction through the application of Six Sigma tools. As a way of running a business, Six Sigma is a highly disciplined process, which helps companies, and individuals develop and deliver near perfect products and services. It is an enterprise-wide strategy that effectively develops a capability and a desire within individuals to improve decision making, solve business problems and improve the overall performance of the enterprise.

The Six Sigma philosophy holds that every process can and should be repeatedly evaluated and significantly improved in terms of time required, resources used, quality performance, cost and other aspects relevant to the process. It prepares employees with the best available problem-solving tools and methods. At its core, Six Sigma utilizes a systematic five-phase problem solving methodology called DMAIC: Define, Measure, Analyze, Improve and Control (figure 1).

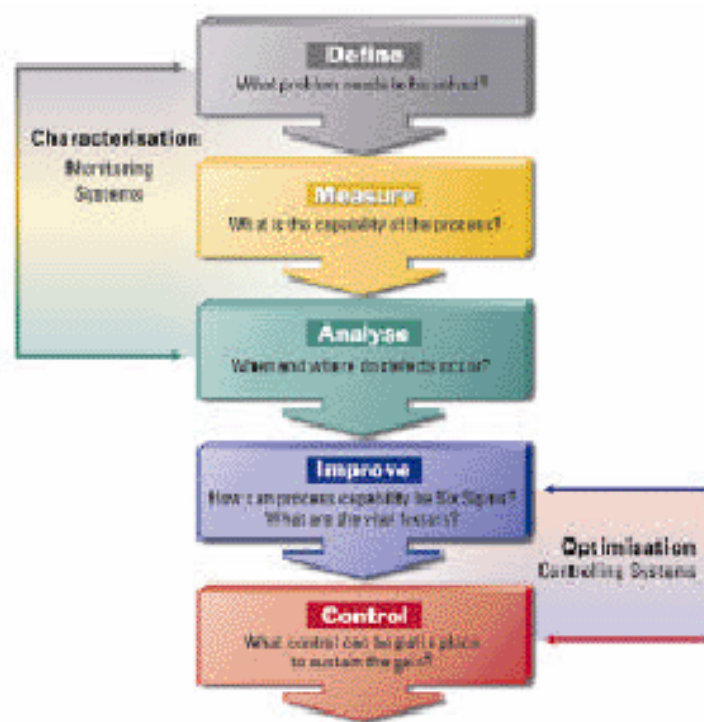


Figure 1.

**Define** – At the preliminary stage we identify poorly performing areas of the company, define and launch projects with well articulated problem and objective statements that have a financially beneficial impact to the company.

**Measure** – Here we identify the true process and determine the mostly likely contributors including the statistical determination of the accuracy and repeatability of the data characterizing the process. We ask, what is the capability of the process? Using process mapping, flow charts and FMEA (Failure Mode Effects Analysis), original data is collected that will act as a baseline for monitoring improvements.

**Analyze** – When, where and why do defects occur? This phase applies appropriate statistical analysis such as scatter plots, Input/Output matrices and hypothesis testing to accurately understand exactly what is happening within a given process.

**Improve** – In this phase, vital factors in the process are identified and experiments are systematically designed to focus on those that can be modified or adjusted to achieve the desired level of improvement.

**Control** – The Control phase incorporates the basic tools of Process Control to manage processes on a continual basis. Once the DMAIC process has begun, it must be managed continually to assure that benefits are sustained.

### The Participants

In the Six Sigma environment, participants – from senior management to factory floor workers – assume specific roles in the performance improvement process. The Champion, Master Black Belt, Black Belt, Green Belt and Yellow Belt (figure 2) each have unique perspective on a businesses' strategic priorities, key processes and the organization's culture.



Figure 2.

**Champions** are responsible for coordinating a business roadmap to successfully achieve Six Sigma within their organization. They are responsible for the logistical and business aspects of a Six Sigma project. Champions select and scope projects that are aligned with the corporate strategy, choose and mentor the right people for the project, and remove barriers to ensure the highest levels of success.

The **Master Black Belt** sits atop a skill and knowledge hierarchy that includes Black and Green Belts, with gradually increasing levels of sophisticated tool sets at their disposal. The primary activity for the MBB is being a leader and teacher. As a leader, the MBB will have responsibility for overseeing projects with multiple Black Belts and Green Belts participation that will significantly change the way the organization does business. As a teacher, the MBB is responsible for the on-going development of existing Black Belts, Green Belts and Yellow Belts and the training for new participants.

The **Black Belt** is a key change agent for the Six Sigma process. Typically from among the best performers these individuals lead teams working on chronic issues that are negatively impacting the company's performance. The Black Belt is usually assigned to a two-year dedicated position responsible for executing the Six Sigma process on selected projects.

**Green Belts** serve as specially trained team members within a function-specific area of the organization. This focus allows the Green Belt to work on small carefully defined Six Sigma

projects, requiring less than a Black Belt's full-time commitment to Six Sigma throughout the business.

**Yellow Belts** represent a large percentage of the workforce and is trained with skills necessary to identify, monitor and control profit-eating practices in their own processes. They are also prepared to feed that information to Black Belts and Green Belts working on larger system projects. The training of Yellow Belts builds and sustains the Six Sigma culture.

### **Summary**

Six Sigma is about people that acquire a new knowledge, a new way of viewing the business and a new way of thinking. It is not easy, at first. We must give up ways and methods we have learned in the past and build upon those that support the future. The results are remarkable and measurable with Six Sigma, as stated in the words of Jack Welch:

*"Six Sigma is the only program I've ever seen where customers win  
employees are engaged in and satisfied by, shareholders are  
rewarded – everybody who touches it wins."*