



Six Sigma Terminology

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A comprehensive glossary of Six Sigma terms and acronyms used in managing Six Sigma projects.

Affinity Diagram

A technique for organising individual pieces of information into groups or broader categories.

ANOVA

Analysis of Variance: A statistical test for identifying significant differences between process or system treatments or conditions. It is done by comparing the variances around the means of the conditions being compared.

Attribute Data

Data which on one of a set of discrete values such as pass or fail, yes or no.

Average

Also called the mean, it is the arithmetic average of all of the sample values. It is calculated by adding all of the sample values together and dividing by the number of elements (n) in the sample.

Bar Chart

A graphical method that depicts how data falls into different categories.

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An individual who receives approximately four weeks training in DMAIC, analytical problem solving, and change management methods. A Black Belt is a full time Six Sigma team leader solving problems under the direction of a Champion.

Breakthrough Improvement

A rate of improvement at or near 70% over baseline performance of the as-is process

characteristic.

Capability

A comparison of the required operation width of a process or system to its actual performance width. Expressed as a percentage (yield), a defect rate (dpm, dpmo), an index (C_p , C_{pk} , P_p , P_{pk}), or as a sigma score (Z).

Cause and Effect Diagram

Fishbone Diagram: A pictorial diagram in the shape of a fishbone showing all possible variables that could affect a given process output measure.

Central Tendency

A measure of the point about which a group of values is clustered; two measures of central tendency are the mean, and the median.

Champion

A Champion recognises, defines, assigns and supports the successful completion of Six Sigma projects; they are accountable for the results of the project and the business roadmap to achieve Six Sigma within their span of control.

Characteristic

A process input or output which can be measured and monitored.

Common Causes of Variation

Those sources of variability in a process which are truly random, i.e. inherent in the process itself.

Complexity

The level of difficulty to build, solve or understand something based on the number of inputs, interactions and uncertainty involved.

Control Chart

The most powerful tool of statistical process control. It consists of a run chart, together with statistically determined upper and lower control limits and a centerline.

Control Limits

Upper and lower bounds in a control chart that are determined by the process itself. They can be used to detect special or common causes of variation. They are usually set at 3 standard deviations from the central tendency.

Correlation Coefficient

A measure of the linear relationship between two variables.

Cost of Poor Quality (COPQ)

The costs associated with any activity that is not doing the right thing right the first time. It is the financial qualification of any waste that is not integral to the product or service.

CP

A capability measure defined as the ratio of the specification width to short-term process performance width.

CPk.

An adjusted short-term capability index that reduces the capability score in proportion to the offset of the process centre from the specification target.

Critical to Quality (CTQ)

Any characteristic that is critical to the perceived quality of the product, process or system. See Significant Y.

Critical X

An input to a process or system that exerts a significant influence on any one or all of the key outputs of a process.

Customer

Anyone who uses or consumes a product or service, whether internal or external to the providing organisation or provider.

Cycle Time

The total amount of elapsed time expended from the time a task, product or service is started until it is completed.

Defect

An output of a process that does not meet a defined specification, requirement or desired outcome such as time, length, color, finish, quantity, temperature etc.

Defective

A unit of product or service that contains at least one defect.

Deployment (Six Sigma)

The planning, launch, training and implementation management of a Six Sigma initiative within a company.

Design of Experiments (DOE)

Generally, it is the discipline of using an efficient, structured, and proven approach to interrogating a process or system for the purpose of maximising the gain in process or system knowledge.

Design for Six Sigma (DFSS)

The use of Six Sigma thinking, tools and methods applied to the design of products and services to improve the initial release performance, ongoing reliability, and life-cycle cost.

DMAIC

The acronym for core phases of the Six Sigma methodology used to solve process and business problems through data and analytical methods. It stands for define, measure, analyse, improve and control.

DPMO

Defects per million opportunities. The total number of defects observed divided by the total number of opportunities, expressed in parts per million. Sometimes called Defects per Million (DPM).

DPU

Defects per unit. The total number of defects detected in some number of units divided by the total number of those units.

Entitlement

The best demonstrated performance for an existing configuration of a process or system. It is an empirical demonstration of what level of improvement can potentially be reached.

Epsilon S

Greek symbol used to represent residual error.

Experimental Design

See Design of Experiments.

Failure Mode and Effects Analysis (FMEA)

A procedure used to identify, assess, and mitigate risks associated with potential product, system, or process failure modes.

Finance Representative

An individual who provides an independent evaluation of a Six Sigma project in terms of hard and/or soft savings. They are a project support resource to both Champions and Project Leaders.

Fishbone Diagram

See cause and effect diagram.

Flowchart

A graphic model of the flow of activities, material, and/or information that occurs during a process.

Gage R&R

Quantitative assessment of how much variation (repeatability and reproducibility) is in a measurement system compared to the total variation of the process or system.

Green Belt

An individual who receives approximately two weeks of training in DMAIC, analytical problem solving, and change management methods. A Green Belt is a part time Six Sigma position that applies Six Sigma to their local area, doing smaller-scoped projects and providing support to Black Belt projects.

Hidden Factory or Operation

Corrective and non-value-added work required to produce a unit of output that is generally not recognised as an unnecessary generator of waste in form of resources, materials and cost.

Histogram

A bar chart that depicts the frequencies (by the height of the plotted bars) of numerical or measurement categories.

Implementation Team

A cross-functional executive team representing various areas of the company. Its charter is to drive the implementation of Six Sigma by defining and documenting practices, methods and operating policies.

Input

A resource consumed, utilised, or added to a process or system. Synonymous with X,

characteristic, and input variable.

Input-Process-Output (IPO) Diagram

A visual representation of a process or system where inputs are represented by input arrows to a box (representing the process or system) and outputs are shown using arrows emanating out of the box.

Ishikawa Diagram

See cause and effect diagram and fishbone diagram.

Least Squares

A method of curve-fitting that defines the best fit as the one that minimises the sum of the squared deviations of the data points from the fitted curve.

Long-Term Variation

The observed variation of an input or output characteristic which has had the opportunity to experience the majority of the variation effects that influence it.

Lower Control Limit (LCL)

For control charts: the limit above which the subgroup statistics must remain for the process to be in control. Typically, 3 standard deviations below the central tendency.

Lower Specification Limit (LSL)

The lowest value of a characteristic which is acceptable.

Master Black Belt

An individual who has received training beyond a Black Belt. The technical, go-to expert regarding technical and project issues in Six Sigma. Master Black Belts teach and mentor other Six Sigma Belts, their projects and support Champions.

Mean

See average.

Measurement

The act of obtaining knowledge about an event or characteristic through measured quantification or assignment to categories.

Measurement Accuracy

For a repeated measurement, it is a comparison of the average of the measurements compare to some known standard.

Measurement Precision

For a repeated measurement, it is the amount of variation that exists in the measured values.

Measurement Systems Analysis (MSA)

An assessment of the accuracy and precision of a method of obtaining measurements. See also Gage R&R.

Median

The middle value of a data set when the values are arranged in either ascending or descending order.

Metric

A measure that is considered to be a key indicator of performance. It should be linked to goals or objectives and carefully monitored.

Natural Tolerances of a Process

See Control Limits.

Nominal Group Technique

A structured method that a team can use to generate and rank a list of ideas or items.

Non-Value Added (NVA)

Any activity performed in producing a product or delivering a service that does not add value, where value is defined as changing the form, fit or function of the product or service and is something for which the customer is willing to pay.

Normal Distribution

The distribution characterised by the smooth, bell-shaped curve. Synonymous with Gaussian Distribution.

Objective Statement

A succinct statement of the goals, timing and expectations of a Six Sigma improvement project.

Opportunities

The number of characteristics, parameters or features of a product or service that can be

classified as acceptable or unacceptable.

Out of Control

A process is said to be out of control if it exhibits variations larger than its control limits or shows a pattern of variation.

Output

A resource, item or characteristic that is the product of a process or system. See also Y, CTQ.

Pareto Chart

A bar chart for attribute (or categorical) data categories are presented in descending order of frequency.

Pareto Principle

The general principle originally proposed by Vilfredo Pareto (1848-1923) that the majority of influence on an outcome is exerted by a minority of input factors.

Poka-Yoke

A translation of a Japanese term meaning to mistake-proof.

Probability

The likelihood of an event or circumstance occurring.

Problem Statement

A succinct statement of a business situation which is used to bound and describe the problem the Six Sigma project is attempting to solve.

Process

A set of activities and material and/or information flow which transforms a set of inputs into outputs for the purpose of producing a product, providing a service or performing a task.

Process Characterisation

The act of thoroughly understanding a process, including the specific relationship(s) between its outputs and the inputs, and its performance and capability.

Process Certification

Establishing documented evidence that a process will consistently produce the required outcome or meet required specifications.

Process Flow Diagram

See flowchart.

Process Member

A individual who performs activities within a process to deliver a process output, a product or a service to a customer.

Process Owner

Process Owners have responsibility for process performance and resources. They provide support, resources and functional expertise to Six Sigma projects. They are accountable for implementing developed Six Sigma solutions into their process.

Quality Function Deployment (QFD)

A systematic process used to integrate customer requirements into every aspect of the design and delivery of products and services.

Range

A measure of the variability in a data set. It is the difference between the largest and smallest values in a data set.

Regression Analysis

A statistical technique for determining the mathematical relation between a measured quantity and the variables it depends on. Includes Simple and Multiple Linear Regression.

Repeatability (of a Measurement)

The extent to which repeated measurements of a particular object with a particular instrument produce the same value. See also Gage R&R.

Reproducibility (of a Measurement)

The extent to which repeated measurements of a particular object with a particular individual produce the same value. See also Gage R&R.

Rework

Activity required to correct defects produced by a process.

Risk Priority Number (RPN)

In Failure Mode Effects Analysis, the aggregate score of a failure mode including its severity, frequency of occurrence, and ability to be detected.

Rolled Throughput Yield (RTY)

The probability of a unit going through all process steps or system characteristics with zero defects.

RUMBA

An acronym used to describe a method to determine the validity of customer requirements. It stands for reasonable, understandable, measurable, believable, and achievable.

Run Chart

A basic graphical tool that charts a characteristic's performance over time.

Scatter Plot

A chart in which one variable is plotted against another to determine the relationship, if any, between the two.

Screening Experiment

A type of experiment to identify the subset of significant factors from among a large group of potential factors.

Short Term Variation

The amount of variation observed in a characteristic, which has not had the opportunity to experience all the sources of variation from the inputs acting on it.

Sigma Score (Z)

A commonly used measure of process capability that represents the number of short-term standard deviations between the centre of a process and the closest specification limit. Sometimes referred to as Sigma level, or simply Sigma.

Significant Y

An output of a process that exerts a significant influence on the success of the process or the customer.

Six Sigma Leader

An individual that leads the implementation of Six Sigma, co-ordinating all of the necessary activities, assures optimal results are obtained and keeps everyone informed of progress made.

Six Sigma Project

A well defined effort that states a business problem in quantifiable terms and with known

improvement expectations.

Six Sigma (System)

A proven set of analytical tools, project management techniques, reporting methods and management techniques combined to form a powerful problem solving and business improvement methodology.

Special Cause Variation

Those non-random causes of variation that can be detected by the use of control charts and good process documentation.

Specification Limits

The bounds of acceptable performance for a characteristic.

Stability (of a Process)

A process is said to be stable if it shows no recognisable pattern of change and no special causes of variation are present.

Standard Deviation

One of the most common measures of variability in a data set or in a population. It is the square root of the variance.

Statistical Problem

A problem that is addressed with facts and data analysis methods.

Statistical Process Control (SPC)

The use of basic graphical and statistical methods for measuring, analysing, and controlling the variation of a process for the purpose of continuously improving the process. A process is said to be in a state of statistical control when it exhibits only random variation.

Statistical Solution

A data driven solution with known confidence/risk levels, as opposed to a qualitative, "I think" solutions.

Supplier

An individual or entity responsible for providing an input to a process in the form of resources or information.

Trend

A gradual, systematic change over time or some other variable.

TSSW

Thinking the Six Sigma way. A mental model for improvement which perceives outcomes through a cause and effect relationship combined with Six Sigma concepts to solve everyday and business problems.

Two-Level Design

An experiment where all factors are set at one of two levels, denoted as low and high (-1 and +1).

Upper Control Limit (UCL) for Control Charts

The upper limit below which a process statistic must remain to be in control. Typically this value is 3 standard deviations above the central tendency.

Upper Specification Limit (USL)

The highest value of a characteristic which is acceptable.

Variability

A generic term that refers to the property of a characteristic, process or system to take on different values when it is repeated.

Variables

Quantities which are subject to change or variability.

Variable Data

Data which is continuous, which can be meaningfully subdivided, i.e. can have decimal subdivisions.

Variance

A specifically defined mathematical measure of variability in a data set or population. It is the square of the standard deviation.

Variation

See variability.

Voice of the Business (VOB)

Represents the needs of the business and the key stakeholders of the business. It is usually items

such as profitability, revenue, growth, market share, etc.

Voice of the Customer (VOC)

Represents the expressed and non-expressed needs, wants and desires of the recipient of a process output, a product or a service. Its is usually expressed as specifications, requirements or expectations.

Voice of the Process (VOP)

Represents the performance and capability of a process to achieve both business and customer needs. It is usually expressed in some form of an efficiency and/or effectiveness metric.

Waste

Waste represents material, effort and time that does not add value in the eyes of key stakeholders (customers, employees, investors).

X

An input characteristic to a process or system. In Six Sigma it is usually used in the expression of $Y=f(X)$, where the output (Y) is a function of the inputs (X).

Y

An output characteristic of a process. In Six Sigma it is usually used in the expression of $Y=f(X)$, where the output (Y) is a function of the inputs (X).

Yellow Belt

An individual who receives approximately one week of training in problem solving and process optimisation methods. Yellow Belts participate in process management activates, participate on Green and Black Belt projects and apply concepts to their work area and their job.

Z Score

See Sigma Score.

Rizalito Garcia is the author of Six Sigma for Newbies, to be released 2009.

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