

Glossary of Lean Six Sigma General Terms

Activities - The things that go on within a process or subprocess. They are usually performed by a single unit (a person, a machine, or a department). An activity is usually documented in an instruction.

Affinity Diagram - A technique for organizing individual pieces of information into groups or broader categories.

Balanced Scorecard - Performance monitoring document that links long-term customer requirements, short-term objectives, measures, and targets to stimulate breakthrough improvements. Common categories are Quality Performance, Customer Service, Financial Performance, and Work Culture.

Black Belt - An individual who receives approximately four weeks of 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 percent over baseline performance of the as-is process characteristic.

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. Four common categories or "bones" are material, machine, man, and method.

Champion - A Champion recognizes, defines, assigns, and supports the successful completion of Six Sigma projects; he/she is accountable for the results of the project and the business roadmap to achieve Six Sigma within his/her span of control.

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

Cell - The location of processing steps to allow products to be handled in a continuous flow, either one at a time or in small batch sizes. A U shape is common because it minimizes distance traveled between process steps.

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

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

Continuous Flow - Producing and moving one item at a time (or a small batch) through a process in a continuous manner, with each step producing just what is needed by the next step. Also known as single-piece flow or make one, move one.

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

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 quantification of any waste that is not integral to the product or service which your company provides.

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 - Any entity or person who uses or consumes a product or service, whether internal or external to the providing organization.

Cycle Time (CT) - The time it takes one operator to go through all work elements before repeating them. Sometimes referred to as processing time.

Defect - Item of work that does not meet customer expectations or defined specifications, such as time, length, color, finish, quantity, temperature, etc.

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

Deployment (Lean Six Sigma) - The planning, launch, training, and implementation management of a Six Sigma initiative within a company.

DMAIC - Acronym for Six Sigma methodology used to solve process and business problems through data and analytical methods (define, measure, analyze, 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.

Enabling Process - Activities within a process that provide necessary support such as order processing, accounts payable, and hiring processes.

Failure Mode and Effects Analysis (FMEA) - A procedure used to identify, assess, and mitigate risks associated with potential product, system, or process failure modes.

First In, First Out (FIFO) - The principle and practice of ensuring the first input to a process step or storage location is the first output.

Fishbone Diagram - See Cause and Effect Diagram.

5S - Five related Japanese terms all beginning with S that describe workplace practices conducive to visual management and lean production. Translated into English they are Sort, Straighten, Shine, Standardize, and Sustain.

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

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 his/her local area, doing smaller-scoped projects and providing support to Black Belt projects.

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, utilized, or added to a process or system. Synonymous with X, characteristic, and input variable.

Ishikawa Diagram - See Cause and Effect Diagram and Fishbone Diagram.

Just-in-Time (JIT) Production - A system of production that makes and delivers just what is needed, just when it is needed, and just in the amount needed.

Kaizen - Continual improvement of a process to create more value with less waste. Japanese term for good change.

Kaizen Event - A group process improvement activity that utilizes a concentrated combined meeting and observation format to create significant improvement in a process within a short period of time.

Kanban - A signaling device that gives authorization and instructions for the production or withdrawal of items in a pull system.

Lean - A business system for organizing and managing product development, operations, suppliers, and customer relations that requires less human effort, less space, less capital, less material, and less time to make products with fewer defects to precise customer desires.

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 and support Champions.

Mean - See Average.

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

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

Milk Run - Refers to path given to a water spider in his/her parts delivery or pickup. This path should be optimized for maximum efficiency.

Muda - See Waste.

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.

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 or 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 presented in descending order of frequency.

Pareto Principle - The general principle originally proposed by Vilfredo Pareto (1848-1923) that the majority (80 percent) of influence on an outcome is exerted by a minority (20 percent) of input factors.

PDCA - Acronym for a process improvement methodology (Plan, Do, Check, Act), created by Walter Shewart in the 1930s. Also referred to as PDSA (Plan, Do, Study, Act).

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

Problem Statement - A succinct statement of a business situation which is used to 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.

- **Major Process** is a process that usually involves more than one function within the organizational structure, and its operation has a significant impact on the way the organization functions. When a major process is too complex to be flowcharted at the activity level, it is often divided into subprocesses.
- **Subprocess** is a portion of a major process that accomplishes a specific objective in support of the major process.
- **Key Process** is defined as a process that is important to the success of the business or the customer and/or is in need of immediate improvement to alleviate a business problem.

Process Flow Diagram - See Flowchart.

Process Management System - An approach used by managers and workgroups to ensure that the outputs of their work efforts are:

- Predictable (stable).
- Meeting customer requirements (capable).
- Performed quickly and at low cost (efficient).
- Aligned and optimized to deliver correct results/value to a customer (effective).
- Capable of quickly changing to meet market and customer demands (adaptable).

It is a structured approach to aligning and optimizing how business processes work together to repeatedly and consistently deliver results/value to a customer.

Process Member - An individual who is a key contributor or supporter for the successful completion of the deliverables from the process.

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 in their process.

Production Lead Time (PLT): The time it takes one piece to move all the way through a process, from start to finish. Also referred to as throughput time.

Project - A well-defined, documented improvement effort that states a business problem in quantifiable terms and with known expectations.

Project Charter - A written declaration of the purpose and expected result of a project.

Pull Production - A method of production control in which downstream activities signal their needs to upstream activities. Goal is to eliminate overproduction. Opposite of push production.

Push Production - Processing large batches of items at a maximum rate, based on estimated customer demand, then moving them to the next process step, regardless of the actual pace of work or actual customer demand.

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

Rework - Activity required to correct defects produced by a process.

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

Sigma Score (Z) - A commonly used measure of process capability that represents the number of short-term standard deviations between the center 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.

SIPOC Diagram - Acronym for a visual representation of a process or system (Supplier, Input, Process, Output, Customer).

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.

Six Sigma (Statistic) - A quality standard of just 3.4 defects per one million opportunities; 99.9996 percent perfect.

SMART Goals - Method to establish performance expectations; acronym stands for Specific, Measureable, Agreed-upon, Realistic, Time-specific.

Spaghetti Diagram - Illustrates the physical flow of a person, product, or information as it moves through multiple steps in a process. So called because the documented routes often look like a plate of spaghetti.

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 recognizable pattern of change and no special causes of variation are present.

Standard Work - Establishing precise procedures for each worker's activities in a process based on three elements: takt time, work sequence, and standard inventory.

Statistical Process Control (SPC) - The use of basic graphical and statistical methods for measuring, analyzing, 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" solution.

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

Takt Time - The speed at which an area needs to operate during normal working hours in order to meet demand. Takt time is independent of process capability and cycle time.

Takt Time = <u>Regular Available Time/Period (Shift)</u> Units Produced/Period (Shift)

Tasks - The individual elements and/or subsets of an activity. Normally, tasks relate to how someone or some machine performs a specific assignment.

Theory of Constraints - A management philosophy that concentrates on removing or managing constraints to improve throughput of a process.

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

Value - The inherent worth of a product as judged by the customer and reflected in its selling price and market demand.

Value-Added Cycle Time (VCT) - Value-Added Time divided by Production Lead Time.

Value-Added Time (VAT) - The time of those elements that actually transform the product in a way that the customer is willing to pay for.

Value Stream - All of the actions, both value-creating and non-value-creating, required in bringing a product from concept to development and from order to delivery.

Value Stream Mapping (VSM) - A simple diagram of every step involved in the material and information flows needed to bring a product from order to delivery.

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

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

Visual Workplace - Work system that allows immediate assessment of the current state of operational performance.

VOB - Voice of the business; 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.

VOC - Voice of the customer; represents the expressed and non-expressed needs, wants, and desires of the recipient of a process output, a product, or a service. It is usually expressed as specifications, requirements, or expectations.

VOP - Voice of the process; 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).

Water Spider - Refers to an employee who delivers parts to the various work stations. This is done so that others do not have to get up to obtain replenishment materials/specimens, minimizing interruption in workflow.

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 optimization methods. Yellow Belts participate in process management activities, participate on Green and Black Belt projects, and apply concepts to their work areas and their jobs.