LAI Lean Academy Glossary v7.6

Term	Description
5 Whys	A process of asking “why?” five times in a row to get to the root cause for something. Five is a guideline or rule of thumb. Sometimes fewer or more questions are needed. 5 Whys is not a unique process. Different people may arrive at different root causes.
5S	Sort, Straighten, Scrub, Standardize, Sustain. A disciplined approach to improve workplace efficiency by eliminating non-value added clutter and materials, making it easy for workers to find just what they need, just when they need it. The original Japanese 5S terms are *Seiri, Seiton, Seiso, Seiketsu, and Shitsuke*. Various translations into English are found, each keeping S as the first letter. There is an implied progression to start with the first S and move towards the final S.
6S	Americans added Safety to 5S, and there are various versions of where Safety fits and its actual verbiage. The LAI Lean Academy uses Sort, **Safe**, Straighten, Scrub, Standardize, and Sustain.
8 wastes	Categories of waste (muda) used to help identify non-valued added activities: overproduction, inventory, transportation, unnecessary movement, waiting, defective outputs, over processing, unused employee creativity. The first seven originated from Toyota. The eighth was added, realizing that non-engagement of employees in continuous process improvement was a waste of human resources. Variations of these wordings are found.
A3	Named for the A3 size of paper (approx 11” x 17”) used to capture an improvement plan. A3 is both a tool (a formatted piece of paper) and a way of thinking about continuous process improvement.
Activity time	Another name for processing time, the time that work is being done on a task.
Andon	A specific visual control device, usually a set of red-yellow-green lights, to show the current status of a process station.
Balanced work	Having the time for each step of a multistep process be approximately the same as the overall takt time to enable smooth flow with no bottlenecks.

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Term	Description
Batch and queue	The practice of a given work station processing multiple units at one time (a batch), placing the outputs into a buffer (a queue) for the next step in the workflow.
Benchmarking	An activity of visiting operations external to the organization to observe their work practices to help in determining best practices.
Bottleneck	The activity with the greatest utilization or load. In a balanced work process, there are no bottlenecks.
Capacity	The maximum sustainable flow rate or throughput of an activity. Actual capacity takes into account detractors that reduce the theoretical throughput.
Castle wall	A graphical technique used on value stream maps that has alternating high and low flats, thereby looking like a rampart. Touch times for an activity are put on the low or high flat and wait times between activities on the other flat. It is both a visual display as well as an enabler for rapid calculation of total end-to-end touch and wait times for a process.
Cause and effect diagram	A root cause analysis tool to help identify the cause(s) of a particular event. The event is put at the “head” of the fishbone and the spines are used to group possible causes into categories. Frequently used categories are Measurement, Personnel, Materials, Methods, Environment, and Machines. Also called Ishikawa or fishbone diagrams.
Cell	A production unit organized so that the separate workstations for each production step are organized in a U shape layout to enable communication and coordination. Workers can visually see the whole production flow. The output of one step is immediately delivered to the next step, which is adjacent.
Check lists/sheets	Check sheets are structured tools for collecting data in a disciplined way. A typical format is a matrix with cells for entering data for the particular row/column instances, e.g. temperature (column A) and blood pressure (column B) for a patient at hour H (row). A checklist is a simplified check sheet with even more structure. Listed items are ticked off as they are executed to assure that no steps have been omitted.

Term	Description
Common cause variation	The sum of many "chances causes," none traceable to a single major cause. Common cause variation is essentially the noise in the system. When a process is operating subject to common cause variation it is in a state of statistical control.
Continuous process improvement	The use of plan-do-study-act (PDSA) cycles to continuously improve a given process in the pursuit of perfection.
Control chart	A plot of a measured quantity (input or output) versus time (hour, day, month, etc. or sample number), together with the average or mean value and Upper and Lower Control Limits (UCL, LCL). Control charts provide information about the stability/predictability of the process, specifically with regard to its central tendency (to target value) and variation.
Core enterprise	An enterprise (see definition) and other entities tightly integrated through direct or partnering agreements.
Cost of non-conformance	The cost associated with poor quality, including direct costs (scrap & rework, service calls, warranties & concessions) and indirect costs (excess inventory, overtime, non valued added steps, queues & delays, loss of image or reputation).
C_p	A term used to define the capability of a centered process. It is mathematically expressed by: $C_p = \frac{USL - LSL}{6\sigma}$
C_{pk}	A term used to define the capability of an off centered process. It is mathematically given by the smaller of: $C_{pk} = \frac{USL - mean}{3\sigma}$ or $C_{pk} = \frac{mean - LSL}{3\sigma}$
CPI	See definition for continuous process improvement
Current state	The "as is" state of a given process as represented by a current state value stream map.
Customer	The recipient of the output of a process. An external customer generally pays for the deliverable. For an internal customer, the output becomes the input for a downstream process.
CV	Coefficient of variation defined as the standard deviation divided by the average value.

Term	Description
Cycle time	The time required to execute all the activities in a process. Other names include lead time or span time or throughput time. Cycle time includes processing time and wait time.
Defect	Any process output that does not meet the customer's specifications.
DFMA	Design for manufacturing and assembly – a set of practices used during design to assure the component or product can be economically manufactured and assembled. One DFMA practice is reduction of part count.
DMAIC	Define-Measure-Analyze-Improve-Control. DMAIC is the six sigma process improvement cycle.
DPMO	Defects Per Million Opportunities – a measure of process quality.
Enterprise	One or more organizations having related activities, unified operation, and a common business purpose.
Extended enterprise	All the entities tied to an enterprise, from the supplier's supplier to the customer's customer.
Fishbone diagram	Another name for cause and effect diagram.
Five lean fundamentals	(1) Specify value; (2) Identify the value stream; (3) Make value flow continuously; (4) Let customers pull value; (5) Pursue perfection.
Flow chart	A diagram representing a process or algorithm, showing each process step in a {box, triangle, diamond, bubble…} connected to other {boxes…} with lines showing flow of {material, information}. Incoming {material, information} is from "suppliers" while outgoing {material, information} is sent to "customers" for the process.
Future state	A desired new state of a given process.
Gemba (genba)	The place where work is being done.
Genchi genbutsu	The act of going to the gemba to observe the actual work being done and talking to the actual people doing the work.
Histogram	A graphical representation of the distribution of a set of data in ranges of the independent variable, or "bins", with rectangles above the bin whose height represents the number of instances or "frequencies" or "count" of the dependent variable for that bin.

Term	Description
Ideal state	An ideal future state for a given process that might not be achievable with current constraints, resources or knowledge. The ideal state represents a “stretch goal”.
IPT	Integrated product or process team composed of representatives from all the functional stakeholder groups for a particular product or process.
Ishikawa diagram	Another name for cause and effect diagram, derived from its creator Kaoru Ishikawa.
JIT	Just in Time – the practice of delivering supplies to a customer just as the customer needs then. The contrast would be having supplies stored in inventory until the customer needs them. JIT is a specific example of maintaining flow.
Kaizen	The Japanese word for continuous improvement. It means constant improvement in an unending series of small steps.
Kaizen event	Another name for a Rapid Process Improvement Workshop. Ironically, Kaizen means continual improvement using small steps, where a Kaizen event is a focused workshop introducing a significantly larger improvement.
Kanban	Visual cuing system to indicate material, parts, and/or information is/are authorized to move downstream.
Kitting	Combining all relevant material, parts, and/or information into a single package that can be delivered to the point-of-use in a process to reduce unnecessary movement.
Lean enterprise	An integrated entity that efficiently creates value for its multiple stakeholders by employing lean principles and practices.
Lean thinking	The dynamic, knowledge-driven, and customer-focused process through which all people in a defined enterprise continuously eliminate waste and create value.
Little’s law	A conservation law for process flow expressed as WIP = (throughput rate) x (cycle time) = (cycle time)/(takt time). Given any two of these three variables, the other is determined by Little’s law. Little’s law strictly applies to long term averages of stable systems, i.e. ones which are not starting, stopping or surging. However, it is a useful relationship for normal systems.

Term	Description
Mistake proofing	The use of process or design features to prevent errors or the negative impact of errors. A simple example is a gas cap tether to prevent leaving the gas cap at the gas station.
Muda	Waste, or activities that do not add value (see 8 wastes).
Mura	Unevenness, or irregular or fluctuating production or workload due to poor planning, staffing, inoperative equipment, missing supplies, or irregular demand.
Muri	Overburden of people or equipment, often leading to muda.
Non value added	Something that does not create value for the customer. See definition of “value added”.
Non value added time (NVAT)	The time in a process allocated to non valued added activities.
Pareto chart	A chart named after Vilfredo Pareto which displays instances or counts of a (process) variable versus {categories, causes} of the variable in vertical rectangles above the {category, cause} name. The data is arranged with the tallest bar on the left hand location, with the next tallest bar next, etc. Often a superimposed line of cumulative instances is potted from left to right.
PDCA	Plan Do Check Act – a variant of the name for PDSA.
PDSA	Plan Do Study Act – the basic Deming improvement cycle used for continuous improvement.
PICK chart	A two by two matrix chart where one axis represents the effort or resources for an action and the other axis represents the impact of valued added of an action. The name of each quadrant characterizes the combination of the axis variables: Possibly implement, Implement, Consider, Kill. Candidate actions to address a need are placed in one of the four quadrants during a brainstorming event.
Point of use (POU)	The location where supplies, tools, information, human resources are needed to execute a task.
Poka yoke	The Japanese word for mistake proofing
Process capability	Broadly defined as the ability of a process to meet the customer’s expectations. Mathematically defined by Cp or Cpk.

Term	Description
Process map	A flow chart showing all the steps or activities in a process with the output of each step/activity being connected to the input of a downstream step/activity.
Processing time	The time that activities are being performed on work in process (WIP). Processing time may consist of Value Added Time (VAT) and Non Valued Added Time (NVAT) activities. Other names are: Touch Time (TT), In Process Time (IPT), Response Time (RT).
Pull system	A system where a signal from downstream activity for an input results in the upstream activity delivering an output. In a pure pull system, an end customer order cascades upstream with each process delivering one unit to its downstream customer. A pure pull system has no buffers or inventory.
Push system	A system where an upstream activity delivers output as completed into a buffer or inventory for the next downstream activity.
Quality	A broad term that represents the fitness of a product or service for the customer's expectations.
Queuing	The act or instance of waiting in lines or queues for some action to take place.
Rapid process improvement workshop	A three to five day workshop focused on a specific process improvement opportunity and involving representatives from all the stakeholders involved or affected by the process. The output of an RPIW is a new process design. Other names are: Kaizen events, rapid improvement events.
Relational coordination	An organizational paradigm centered on shared goals, shared knowledge, mutual respect supported by effective communication.
RPIW	See Rapid Process Improvement Workshop
Scatter diagram	A graph of unconnected {x,y} data points.
SDSA	Standardize-Do-Study-Act, a variant of PDSA that emphasizes a standardized process is undergoing continuous process improvement.
Sigma (σ)	The standard deviation of a distribution of data, defined mathematically as: $\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$ where x is the variable, x bar is the mean, and n is the number of data points in the distribution.

Term	Description
Single piece flow	The practice of having only one unit of work in each process step of a flow line. If there were only one worker, s/he would complete all the steps in the production process for one unit, before starting the next unit. In a flow line with multiple workers, the output from one workstation is immediately worked on by the next workstation; i.e. there are no buffers between workers.
Six Sigma	Six Sigma is a data driven philosophy and methodology to eliminate variation from all enterprise processes, named after sigma, the term for standard deviation.
Soft stuff	Refers to the people or organizational practices in a workplace.
Spaghetti chart	A plot that traces the movement of a person or object throughout a work cycle. The trace of movement back and forth from place to place resembles a pile of spaghetti on a plate.
SPC	See definition for Statistical Process Control
Special cause variation	Process variation due to differences between people, machines, materials, methods, etc. The occurrence of a special (or assignable) cause results in an out of control condition.
Stakeholder	Any group or individual who can affect or is affected by the achievements of the organization's objective.
Stakeholder value	How various stakeholders find particular worth, utility, benefit, or reward in exchange for their respective contributions to the enterprise.
Standard work	The best known process for a task, based upon the current evidence. Standard work is improved though continuous process improvement – see SDSA.
Statistical process control	The application of statistical process methods, particularly control charts, to monitor a process to determine if it is statistically stable.
Supplier	The person or organization that provides input material or information to a process.
Swim lanes	Process or value stream flows that occur in parallel, and sometimes or eventually connect or feed into each other.

Term	Description
Takt time	The available time for performing work divided by the customer demand rate for the product or services from the work unit; e.g. if there are 40 orders that need to be filled in an 8 hour day, the takt time would be (8 x 60)/40 = 12 min. Takt time represents the drumbeat or pace that the flow line needs to operate at in order to meet the customer demand. It comes from the German word Taktzeit. “takt” translates as “stroke” and “zeit” as “time.”
Third party logistics	A provider of logistics support between a supplier and a customer; e.g. FedEx might provide all shipping services between a supplier and customer.
Three actuals	Go to the actual place, see the actual work being done, and talk to the actual people doing the work – another name for genschi genbutsu
Throughput	The number of {units, patients, documents,…} processed during a standard unit of time; e.g. a throughput of 20 patients in a day
Throughput rate	The number of {units, patients, documents,…} being processed per unit of time; e.g. a throughput of 20 patients per 8 hour day would be a throughput rate of 2.5 patients per hour. Throughput is the inverse of takt time; i.e. throughput = 1/takt time. 20 patients per 8 hour day would correspond to a takt time of 24 min per patient.
Time in queue	Another name for wait time.
Time value chart	A horizontal bar chart for a process broken into sequential segments showing periods of wait time (usually in red) and process time (usually in yellow for non value added time and green for value added time). See definition for process time.
Total Quality Management (TQM)	A set of practices or management system focused on continuously improving the quality of products or services. TQM is based on the assumption that everyone involved in the production and delivery of the products or services is responsible for their quality. TQM practices are a subset of Lean practices.
UCL, LCL	Upper (Lower) Control Limits are horizontal lines drawn on a process control chart at the distance of +/- 3σ from the mean or average of the data.

Term	Description
USL, LSL	Upper (Lower) Specification Limits are the customer specified tolerances or variations for a specific process or product; e.g. a hole diameter specified to be 1 inch +/- .01 inches would have its USL = 1.01 inch and LSL = .99 inch. Or for patient falls per month, the LSL = 0, while an USL might be set from benchmark data or mandates.
Utilization	The ratio of work demand to work capacity, a number between 0 and 1. For example if demand for work is 13 hours and there are 2 workers who have 8 hours available, their utilization would be 13/(2x8) = 0.8125
Value	A broad definition is the features of a product or service divided by its cost. Specific definitions can be developed for a particular product or service, but generally value is a relative term that is evaluated by the customer, or "value is in the eyes of the beholder."
Value added activity	An activity in the value stream that directly contributes to customer value, and which satisfies three criteria (1) the customer wants it, (2) the activity transforms or shapes material or information or humans and (3) it is done right the first time.
Value added time (VAT)	The part of the processing time when value added activities are being performed.
Value stream	The linked end to end activities of a process which transform input {material, information, people) to output {product, components, data, services, people, …}. A value stream can consist of valued added and non value added activities, as well as wait time.
Value stream map	A process map with quantitative data added for each process step, including wait times and inventory. Data might include: processing, wait or cycle times; inventory; quality or yield data; labor hours; distance traveled, or more. Only valued added data should be collected and included.
Variation	The differences in the output of an activity for a given input due to Common Cause or Special Cause variation.
Vendor managed inventory	Inventory in a facility that is monitored and replenished by the vendor. An example would be items on a supermarket shelf that are replenished by the supplier's staff rather than the store's staff.

Term	Description
Visual control	Practices that make the state or steps in a process visible to the workforce. Examples include status boards, lights, colored sections of the floor for storing different items, and more.
Visual work instructions	Diagrams or graphic displays that show the instructions to produce a part or subassembly. Assembly instructions for IKEA products represent good examples of visual work instruction. The opposite would be the often frustrating wordy instructions of “insert tab A into slot B” type.
VSM	A value stream map
VSMA	Value stream mapping and analysis – the act of creating a value stream map and then performing analysis of the data to identify bottlenecks, throughput, cycle time, etc.
Wait time	The time that whatever is flowing in a value stream is sitting idle with no value added or non-value added work being done.
Waste	Any activity that does not add value.
WIP	Work in Process – the quantity of work that is flowing in a value stream.

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