

Process Improvement Concepts and Terminology (A Guide to the Jargon)

Disclaimer: Some statements/definitions are broad generalities intended as an initial introduction to Lean and Six Sigma concepts.
(Not in alphabetical order)

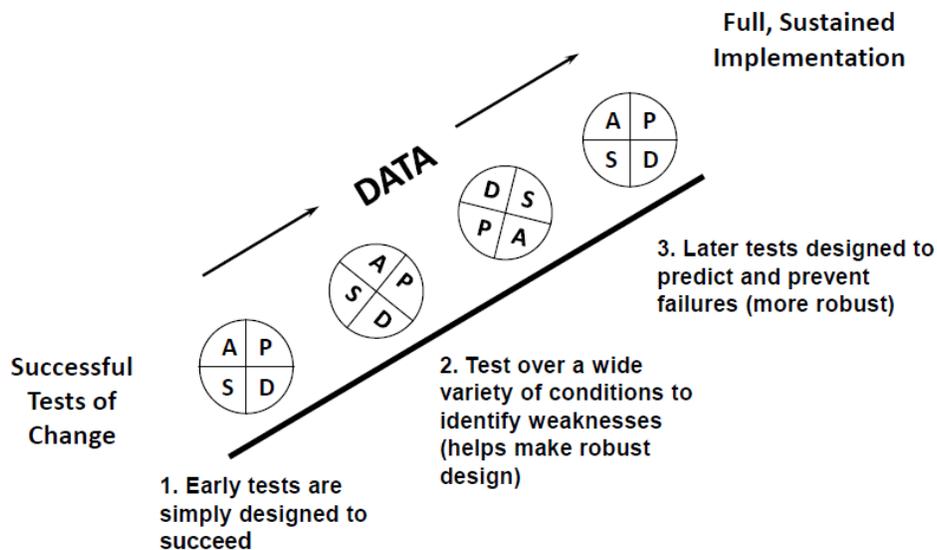
Methodologies and Related Concepts

Lean – Process improvement methodology focused on reducing waste in a system. It is based heavily on the teachings of W. Edwards Deming and the Toyota Production System. The term Lean is derived from the idea that the approach reduces “wastes” that contribute to inefficient processes and poor outcomes. It does NOT refer to the idea that it is a way to cut staff as in the management adage: “lean and mean.”

- **Mura** – Japanese term that means “waste.” Key concept in Lean, which focuses on the reduction of “waste.”
- **Muda** – Japanese term that means “unevenness.”

Workaround – Temporary fix to a system or process breakdown – a reaction to an immediate problem. In some cases, may not work well. Equivalent to “Duct tape on a split on a car radiator hose.” Not a permanent solution. Sometimes the result of procedures created without input from those involved in the process. A workaround does nothing to improve the situation in the future.

PDCA/PDSA – Plan, Do, Check or Study, Act – A change process originally developed by Walter Shewhart (PDCA) and later revised by W. Edwards Deming (PDSA). It is sometimes referred to as the Deming wheel. It is intended to be used in multiple, successive cycles.



Process Improvement Terminology (Jargon) Handout

Error-proofing (“poka yoke” Japanese term) – the practice of making a process error proof, or make errors more apparent. Example: Unique plugs for specific electrical equipment and special connectors designed for certain types of gases mounted on hospital bed head boards. Additionally, safe failures modes on infusion pumps are designed to prevent medication errors.

Toyota Production System (TPS) – Process improvement methodology based heavily on teachings of W. Edwards Deming. Used by Toyota and other manufacturers internationally. Used by leading health care organizations in the U.S. Another name for “Lean.”

A-3 Thinking – Refers to the method within Lean to communicate and project manage the improvement process. Actually, A-3 refers to the size of paper used in Japan to report on – equivalent to 11”X13.” Communicate: Background, Current State, Goal, Improvement Ideas/Countermeasures, Future State (Improved process), Plan (Gantt chart), and Follow up (Who is responsible to sustain/control) Equivalent to Six Sigma DMAIC (see below.)

Waste(s) – Reducing waste is the central concept in Lean. Depending on the process improvement practitioner or school of thought, there are 7-8 generally accepted “wastes.” (See non-value added.) Waste does not provide value to the customer – the patient in health care.

The following mnemonics are used to help remember the different forms of waste.

COMMWIP – Traditional

- Corrections
- Overproduction
- Motion
- Material Movement
- Waiting
- Inventory
- Processing

DOWNTIME (S. Davidow’s personal favorite)

- Defects
- Overproduction
- Waiting
- Non- or underutilization of staff
- Transport
- Inventory
- Material
- Excess processing

Process Improvement Terminology (Jargon) Handout

TIM P WOOD - Alternative

- Transportation
- Inventory
- Motion/movement
- People
- Waiting
- Over production
- Over processing
- Defects

Pareto Principle – General principle: 80% of the problem is caused by 20% of the causes. – “The vital few and trivial many”. Named after the Italian engineer and economist, Vilfredo Pareto.

Six Sigma – Process improvement methodology focused on reducing variability. It refers to the idea that the measurement focuses on the mean or average – a measure of central tendency. Sigma is the statistical term for mean. Six Sigma refers to six standard deviations from the mean and equals 3.4 defects per million outputs – widgets, encounters, etc. Six sigma’s theoretical goal is 99.9996% accuracy.

DPM – Defects Per Million – Key metric in Six Sigma. Theoretical goal of 3.4 Defects Per Million

DPMO – Defects Per Million Opportunities – Key metric in Six Sigma

DMAIC – Primary approach in Six Sigma moving from understanding the nature of a problem/defect, improving it, and then reviewing and controlling it to sustain improvement.

- Define
- Measure
- Analyze
- Improve
- Control

(Similar to Lean A-3 form)

Institute for Healthcare Improvement (IHI) Model for Improvement – A methodology that uses Plan, Do, Study, Act (PDSA) to make and test small changes that can lead to wide spread change. Asks three basic questions: What are we trying to accomplish? (Aim) How will we know that a change is an improvement? (Measure) What change can we make that will result in improvement (Idea)? Once one cycle is complete, another can occur, and so on. (See Plan, Do, Study Act – PDSA.)

Process Improvement Terminology (Jargon) Handout

Tools

Root-cause analysis – Process improvement step that helps teams understand why there was a breakdown before developing improvement ideas and countermeasures to prevent future occurrences. Used in developing the Future State (see below).

5 Whys – Method to identify the root-cause of a problem by asking “Why” five successive times. Sometimes the root cause is identified on the fourth or, possibly the sixth “Why?”

Ishikawa – Method of root-cause analysis that explores: Man, Machine, Method, Material contributors to a failure or defect. Diagram is also referred to as a fishbone diagram because it resembles a fish skeleton. Named after Dr. Kaoru Ishikawa who invented the diagram in the Kobe Shipyards in Japan during the 1960s.

Fishbone diagram – Another name for an Ishikawa diagram because the causes and sub causes as diagram resemble a fish skeleton.

4M/7M – Man, Machine, Method, Material, Measurement, Mother Nature, and Money – The components of an Ishikawa or fish bone analysis. Originally, started with four, and now some practitioners use up to 7 branches or modes.

FMEA (Failure Modes and Effects Analysis) – Form of root-cause analysis that tries to predict all the potential ways a process may fail in advance so that the team may develop countermeasures to prevent failure, including error-proofing, or “poke-a-yoke.”

Kaizen – Japanese term meaning “continuous improvement” but is often used to describe a three- to five-day event involving a team and a facilitator to focus on understanding and addressing a problem using a variety of tools.

Gemba – Japanese term that means “the place” and in Lean practice means “go to the place” where the work is done to understand the environment and any contributing factors to the waste or process breakdown. Also known as a “Gemba Walk.”

5S – A Lean approach to improvement/waste reduction. Often the first step in Lean practice to reduce waste.

- Shine – Clean the equipment or work space
- Sort – Review materials, equipment and other supplies; remove broken or expired products
- Set in place – Place materials where people need them most with good access
- Standardize – Develop routines/procedures, checklists, maintenance routines
- Sustain – Review processes to ensure working and meeting requirements/performance parameters; provide training to new personnel to “maintain the gains”

Process Improvement Terminology (Jargon) Handout

Countermeasure – Term used to describe an improvement idea. Preferred word because in process improvement, there is always room for additional improvement – one idea is rarely, truly a “solution,” which has a sense of finality to it. It may take several improvement cycles to reach a stable situation.

Checklist – Simple way to product standard work to insure the work is done the same way each time, by all people involved. It is used to reduce waste and variability. Universal protocol is one example. It is one form of a Countermeasure.

Spaghetti diagram – Diagram that depicts the physical steps personnel take from one work station to others within a given work space. Used to determine excessive movement of personnel, which can use excessive time and fatigue. Used to redesign work areas or design new ones.

Value stream map – Diagram that shows the value stream as it relates to the customer (i.e., patient) and identifies the key process steps and the flow of communication to provide value. It notes wait times, process time, lead time, as well as value added and non-value added activities.

- **Current state** – How the process currently works. Reflects reality and serves as the starting point for improvement.
- **Future state** (Also known as Ideal State) – After reviewing the current state, identifying root causes of problems, and developing countermeasures, a future state process map reflects the preferred process incorporating improvement ideas.

Value-added process step – Process step that is valuable to meeting needs of the customer.

Non-value added process step – Process step that is NOT valuable to meeting needs of the customer, and therefore, should be removed, if possible, from a future state value stream.

Business-value added step – Process step that may not directly benefit the customer but is necessary to the smooth operation of the business, possibly because of regulatory and contract requirements, or management issues, which do not allow an improvement at the present time.

SIPOC (Suppliers, Inputs, Processes, outputs, Customers) – Used to identify the key components of a process. Often, completing a SIPOC is an activity that is conducted prior to the development of a value-stream map. It is valuable when there is limited time with key professionals. A process improvement professional can draft a value-stream map for others to review and respond to in a subsequent meeting based on a completed SIPOC grid.

Opportunity for improvement – Places in the process where special attention is needed to reduce waste or variability, such as excessive waiting, bottlenecks, and workarounds.

Kaizen burst – Starburst placed on a value-stream map to signify an opportunity for improvement.

Process Improvement Terminology (Jargon) Handout

Swim-lane diagram – A type of value stream map that identifies the department responsible for a specific process step. It resembles a swimming pool with lane dividers installed. It is particularly helpful in clarifying roles, as well as identifying where bottlenecks occur.

Primary Statistical Tools

Descriptive statistics – A basic statistical tool that identifies mean, mode, median, standard deviation, standard error, range, skew, kurtosis, variance, and confidence level – very useful in the Measure and Analysis phases of Six Sigma DMAIC. (I do not define the individual statistical analysis tools included in Descriptive Statistics)

- **Histogram** – A bar chart that illustrates frequency.
- **Pareto chart** – A histogram that rank orders the items based on frequency.
- **t-Test** – Comparative test of means from two samples.
- **p-Test** – test of probability.
- **ANOVA** – Analysis of variance.
- **Run chart** – Analysis looking at trends over time. Used to identify potential problems.
- **Control chart** – Run chart with upper and lower specification limits. It is used to monitor the consistency of a process.
- **Box plots** -- Display variation in samples of a statistical population. The spacing between the different parts of the box indicate the degree of spread and skewness in the data, and show outliers.
- **Scatter diagrams** – Show dispersion of variables for set of data involving two values

Professional Quality Certification

Six Sigma Practitioner Certification Levels:

- **Master Black Belt** – Senior Six Sigma practitioner, often responsible for large team of Black Belts and Green Belts. Generally, sets improvement priorities for the organization.
- **Black Belt** – Experienced Six Sigma with advanced training and work on larger projects
- **Green Belt** – Six Sigma practitioner who manages a number of projects, sometimes with advice from a Black Belt.
- **Yellow Belt** – Designation for someone who has received basic Six Sigma training.
- **White Belt** – Someone who may have received an overview of the tools and concepts.

Lean Certification Levels – Not common to see stratification of levels in Lean, especially in healthcare. Occasionally, there is Lean Sensei, Lean Champion, or Lean Shingo Prize Certification – mostly in manufacturing or among consultants.

CPHQ – Certified Professional in Healthcare Quality. Associated with the National Association of Healthcare Quality's (NAHQ) Healthcare Quality Certification Commission.

CPPS – Certified Professional in Patient Safety. Associated with the National Patient Safety Foundation's (NPSF) Certifying Board of Professionals in Patient Safety.

Process Improvement Terminology (Jargon) Handout

ASQ – American Society of Quality: Quality certifying organization. Offers Six Sigma certification and other manufacturing and industrial certifications.

Key Process Improvement Leaders, Etc.

W. Edwards Deming, PhD – American Engineer and a leading purveyor of quality improvement methodology focused on statistical process control. A key figure in rebuilding Japanese industry following WWII. From his work, Lean and the Toyota Production System sprang. Deming focused on four ideas: 1) Better design of products to improve service, 2) Higher level of uniform product quality, 3) Improvement of product testing in the workplace and in research centers, and 4) Greater sales through global markets.

Deming Prize – Prize in the name of W. Edwards Deming, recognizing excellence in process improvement in the Japanese manufacturing sector.

Joseph Juran – American engineer and contemporary of Deming. Active proponent and purveyor of quality improvement, especially in Japan following WWII. Best known for the Juran Trilogy, 1) quality planning, 2) quality control, and 3) quality improvement. Although he focused greatly on the Pareto principle – the “trivial many and the vital few,” he turned the saying around saying the many should not be ignored -- “the vital few and the useful many.”

Walter Shewhart – Best known for the Shewhart Cycle (Plan, Do, Check, Act - PDCA), which Deming later revised as Plan, Do, Study, Act-PDSA).

Donald M. Berwick, MD – A leading proponent of health care quality improvement in the U.S., Harvard professor, and founder of the Cambridge, Mass.-based Institute for Healthcare Improvement (IHI). He also served as the administrator of the U.S. Centers for Medicare and Medicaid Services during President Barack Obama’s first term. The IHI developed the Triple Aim – Better Care, Better Health, Lower Cost – which has been widely incorporated in government and other programs.

Triple Aim – Better care, better health, lower cost

Baldrige Performance Excellence Award – U.S. award for excellence in process/performance improvement in a number of industries. Awarded by the National Institute for Standards and Technology (NIST). Named after Malcolm Baldrige, former U. S. Secretary of Commerce. According to the NIST website, “The goal of the Malcolm Baldrige National Quality Improvement Act of 1987 was to enhance the competitiveness of U.S. businesses. Its scope has since been expanded to health care and education organizations (in 1999) and to nonprofit/government organizations (in 2005).”

Process Improvement Terminology (Jargon) Handout

Additional Resources

Website/Education

- Google.com (Search on Lean, Lean health care, Six Sigma, etc.)
- https://en.wikipedia.org/wiki/Lean_manufacturing
- https://en.wikipedia.org/wiki/Lean_Thinking
- https://en.wikipedia.org/wiki/Lean_Six_Sigma
- <https://en.wikipedia.org/wiki/PDCA>
- Lean Enterprise Institute. <http://www.lean.org>
- Denver Health Lean Academy. <http://www.denverhealth.org/lean-academy>
- Pittsburgh Regional Health Initiative. <http://www.prhi.org/>
- Intermountain Healthcare. <https://intermountainhealthcare.org/about/transforming-healthcare/quality-improvement/>
- University of Michigan College of Engineering training programs: <http://isd.engin.umich.edu/professional-programs/index.htm>
- Virginia Mason Institute: <http://www.virginiamasoninstitute.org/>
- ThedaCare Center for Healthcare Value. www.createvalue.org
- Institute for Healthcare Improvement Open School web site: Tools, online courses and other materials. <http://www.ihl.org/education/hiopenschool/Pages/default.aspx>

Books

- Lean Hospitals: Improving Quality, Patient Safety, and Employee Satisfaction, Second Edition, Mark Graban, CRC Press, 2012.
- The Checklist Manifesto: How to Get Things Right, Atul Gawande, MD, 2009.
- The Improvement Guide: A Practical Approach to Enhancing Organizational Performance, Gerald J. Langley (co-author), 2009.
- Managing to Learn: Using the A3 management process, John Shook, Lean Enterprise Institute, Inc., 2008.
- Measuring Quality Improvement in Healthcare: A Guide to Statistical Process Control Applications, Raymond G. Carey, 2001.
- On the Mend: Revolutionizing Healthcare to Save Lives and Transform the Industry John Toussaint, 2010.
- The Pittsburgh Way to Efficient Healthcare: Improving Patient Care Using Toyota Based Methods, Naida Grunden, 2008.
- Preventing Medication Errors, Institute of Medicine. 2007.
- The Six Sigma Way Team Fieldbook, Peter Pande, Robert Neuman, & Roland Cavanagh, 2002.
- Understanding Patient Safety, Robert Wachter, 2008.
- Improving Healthcare Using Toyota Lean Production Methods. Robert Challice, 2007.
- Lean Six Sigma Pocket Toolbook, Michael George, David Rowlans, Mark Price, & John Maxey. 2005).
- The Lean Enterprises Memory Jogger, Richard L. Macinnes, 2003.
- The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer, Jeffrey Liker, 2004.