The Five S's (5S)

Purpose: To remove waste, we turn to the five S's. The principles of reorganizing work so that it's simpler, more straightforward, and visually manageable are:

1. **Sort** — keep only what is needed. Pitch everything else. The workplace often becomes cluttered with products, tools, and waste materials that don't really belong there. Get rid of them.
2. **Straighten** — A place for everything and everything in its place. Establish standardized places for incoming raw materials, tools, etc.
3. **Shine** — clean machines and work area to expose problems.
4. **Standardize** — develop systems and procedures to monitor conformance to the first three rules. (This includes the define and measure aspects of Six Sigma's DMAIC.)
5. **Sustain** — maintain a stable workflow. (This includes the Analyze, Improve, and Control phases of Six Sigma.)

Design for One-Piece Flow

Purpose: Stop producing big batches of product. Start producing one piece at a time.

1. Focus on the part, product or service itself. Follow the product through its entire production cycle looking for opportunities to reduce delay, inventory, waste and rework.
2. Realign the work flow into production "cells" to eliminate delay, rework, and scrap.
3. "Right size" the machines and technology to support smaller batches, quick changeover, and one-piece flow.

   Focus on mission-critical and profit-critical processes and issues first!

The Speed Bumps of Lean

Purpose: To accelerate flow, you will want to eliminate the seven speed bumps which are considered "Muda"—non-value added waste. Muda is any activity which absorbs money, time, and people but creates no value. Acronym: DOWNTIME.

1. **Delay**—Don't you hate standing in line? So do your products or services. So do employees. Are they always waiting for something?
2. **Overproduction** (the most common type of waste) which creates inventories that take up space and capital.
3. **Waste and rework** caused by defects and deviation.
4. **Non-value added processing.** Why have people watch a machine that can be taught to monitor itself? Why do unnecessary actions?
5. **Transportation.** Unnecessary movement of materials and work products. When you break the silos into cells, the products don't have to travel so far between processes.
6. **Inventory.** Excess caused by overproduction.
7. **Movement**. Unnecessary movement of employees. Are parts and tools too far from where they're needed? Walking is waste.
8. **Employee creativity.** Unused wisdom

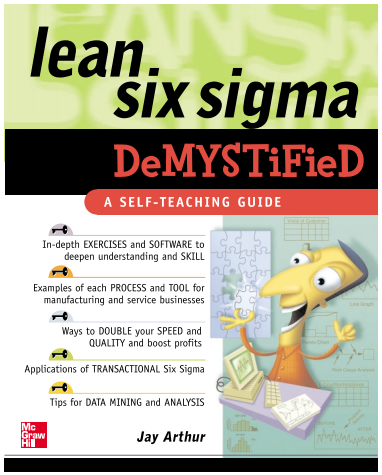
When you rearrange your production or service floor into production cells with right-sized machines and quick change-over, you can quickly reduce most of these common kinds of waste by 50-90 percent.

Common measures of flow:

- **Lead (or cycle) time:** time from order to delivery
- **Value-added ratio:** (Value-added)/(lead time)
- **Travel distance** of the product or people doing the work. (Hint: use pedometers.)
- **Productivity**: (people hours)/unit
- **Number of handoffs**
- **Quality rate or first pass yield**

Lean Six Sigma

Fire Up Your Profits!



Quick Reference Card

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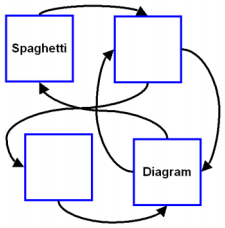
Lean - Reduce Delay

Value Stream Map: Map the value stream or process at a high level to identify delays between steps and time for each step.



Spaghetti Diagram: To show the flow of people and products around a work area as a way of redesigning a work cell for one-piece flow.

Purpose: Eliminate the Speed Bumps of Lean

1. **D**elay (unnecessary waiting)
2. **O**verproduction (leads to excess inventory)
3. **W**aste and rework due to defects or deviation
4. **N**on-value added processing
5. **T**ransportation - Unnecessary movement
6. **I**nventory (excess incoming or outgoing)
7. **M**ovement of people (walking is waste)
8. **E**mployee creativity (unused)

Process

FISH	Step	Activity
Focus	**1**	**Use Value Stream Mapping to...**
Improve		Identify and eliminate unnecessary **delays** between steps.
	2	**Use 5S** to simplify the work area.
	3	**Use Spaghetti Diagrams** to identify and eliminate unnecessary movement of people and materials.

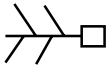
To jump start your improvement efforts consider our One Day Lean Six Sigma Workshop
qimacros.com/training/lean-six-sigma-workshop

Six Sigma - Reduce Defects

Control Chart: Show data trends over time. The Y-axis (left) shows the defects, time, cost and the X-axis (bottom) shows time (minute, hour, day, week, etc.).

Pareto Chart: Focus the improvement effort by identifying the 4% (vital few) of the contributors that create 50% of the time defects or costs in any process.

4-50 Rule: 4% of any business process produces over 50% of defects.



Cause-Effect: Systematically analyze the root causes of problems. It begins with major causes and works backward to root causes.

Verify Results: Show improvement (before and after using control charts and paretos).

Sustain the Improvement: Use control charts to monitor and correct performance.

Purpose: Reduce or eliminate **defects** to cut costs and boost profits.

Process

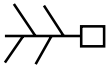
FISH	Step	Activity
Focus	**1**	**Control chart** of defect rates over time
	2	**Pareto chart** of defect types
	3	**Analyze root causes** of defects
Improve	**4**	**Implement countermeasures**
	5	**Verify results** meet target

To automate these charts, get the QI Macros for Excel. Download a FREE 30 day trial at
www.qimacros.com

6σ - Reduce Deviation

Control Chart: Show data trends over time. The Y-axis (left) shows the defects, time, cost and the X-axis (bottom) shows time (minute, hour, day, week, etc.).

Histogram: Determine the capability (i.e., the level of performance the customers can consistently expect) of the process and the distribution of measurable data.



Cause-Effect: Systematically analyze the root causes of problems. It begins with major causes and works backward to root causes.

Verify Results: Show improvement using control charts and histograms.

Sustain the Improvement: Use control charts and histograms to monitor and correct performance.

Purpose: Reduce or eliminate **deviation** (a.k.a., variation) in products or services.

Process

FISH	Step	Activity
Focus	**1**	**Control chart** of deviation over time
	2	**Histogram** of deviation
	3	**Analyze root causes** of deviation
Improve	**4**	**Implement countermeasures**
	5	**Verify results** meet target

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