

Lean and Six Sigma

6σ

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# Overview

- Waste reduction and variation reduction – early roots in manufacturing sector – Toyota Production System, GE, Motorola
- Continuous elimination of waste driven by customer satisfaction
- Six Sigma in statistics – almost all values lie within 3 sigma of both sides of the mean
- Six Sigma in process – of 1 million opportunities there are only 3.4 defective points (**99.99966%** effective).
- Most business runs at a 2-4 sigma range (69%-**99.38%** effective – still 6,210 babies dropped during delivery).
- Order of magnitude
  - **Henry Ford** – Father of Lean; used time and motion studies to develop assembly line – moving line reduces operator motion and reduces lead time.
  - **Dr. William Edwards Deming** – PDSA development for defect reduction

# Overview



- Waste reduction and variation reduction – early roots in manufacturing sector – Toyota Production System, GE, Motorola
- Continuous elimination of waste is driven by customer satisfaction
  - **Jack Welch, Chairman and CEO, General Electric, 1981-2001** – Don't Manage change –Lead change before you have to. 4000% rise in value of GE over 20 years.
  - **Motorola** – Founder of 'six sigma' and from 1986 – 2006 reported over \$17 billion USD in savings

# Key Elements: Strategy, Tactics, Culture

Management strategy/philosophy – all work is a process with inputs and outputs.  
Control the inputs and you will control the outputs.

Tactics - use qualitative and quantitative techniques to drive process improvement, waste removal

Pervasive empowered culture based on a bias towards the systemic and it's elimination of waste, driven by customer expectations.

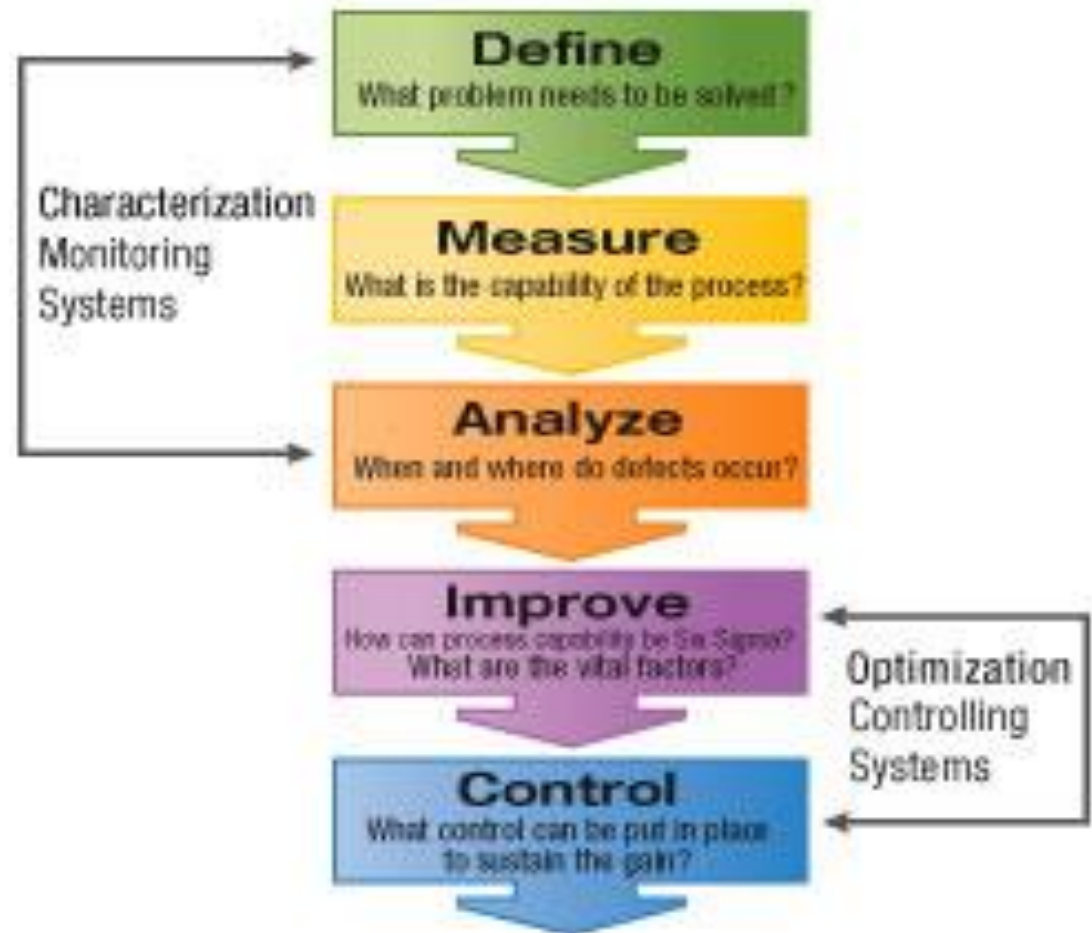


# Six Sigma Methodology

DMAIC – define, measure, analyze, improve, control

We tend to define an issue and want to implement improvements immediately

Think prevention and detection





# Define/Measure

Need to take time to measure 'current state'  
-gather metrics – value stream mapping  
done by whole team

Need to analyze for root cause of variation  
-not usually solely a person issue –  
machine, method, material, measurement,  
people, environment also play role

Need to review for process improvement  
alternatives with different types of waste –  
Waiting for decision or authorization,  
looking for information, time to implement new  
service





# Waste Elimination (Define)

## Manufacturing

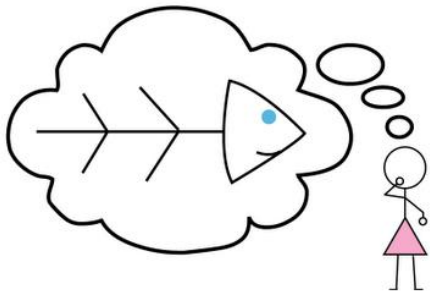
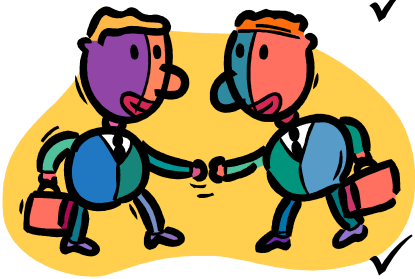
- Defects
- Overproduction
- Waiting
- Non-utilized talent
- Transportation
- Inventory
- Motion
- Extra processing

## Service

Product/Service Dev. and Eng  
Order processing time  
Looking for information  
Indecision and waiting  
Traditional cost accounting  
Inspection, approval, authorization  
Conflicting functional goals  
Sales and business transactions

# Analyze

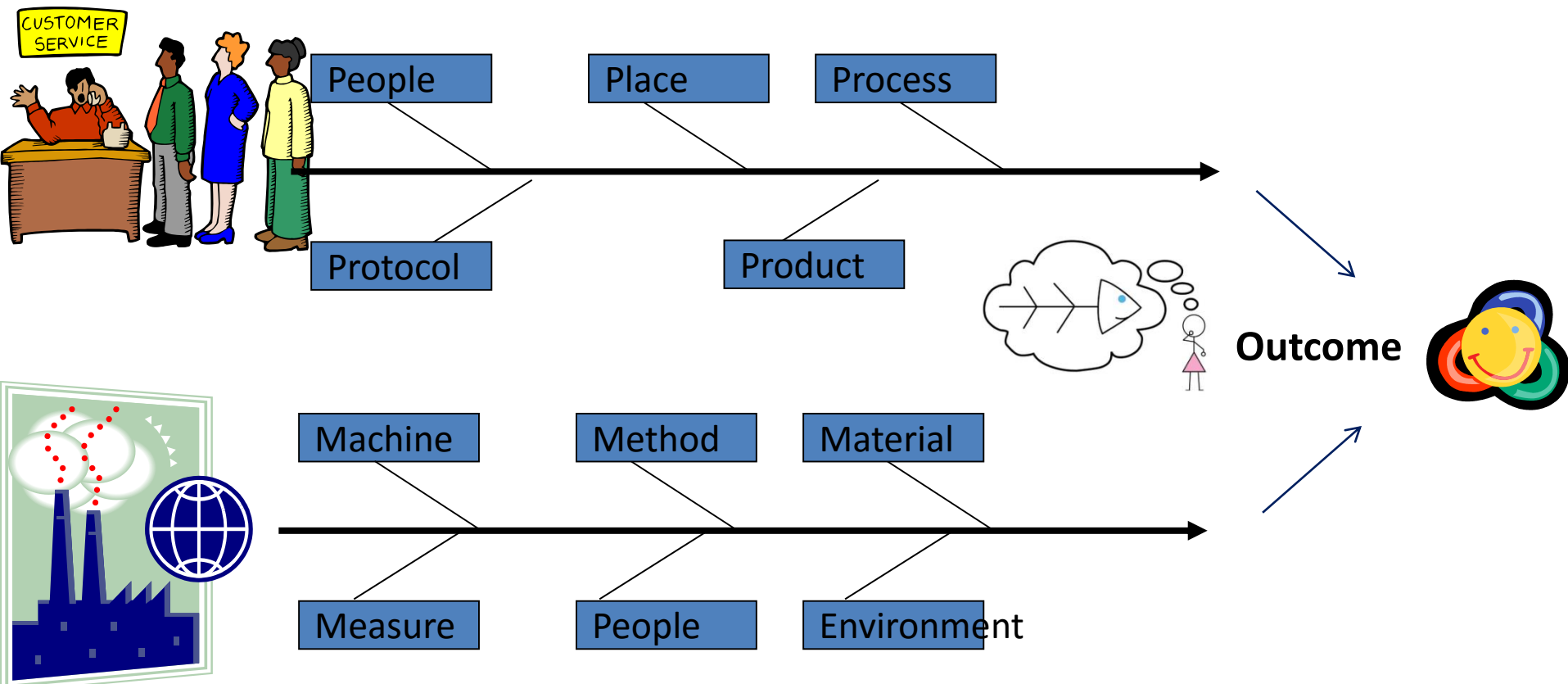
- Process can take as little as 3 months to implement changes
  - ✓ Need to ensure management support
  - ✓ Need to ensure buy in from all stakeholders – cross functional team
    - ✓ Involve those in the process with the review and suggestions for improvement
  - ✓ Choose correct issue to work on – success breeds success – does not have to be major change
    - Define needs and requirements
    - Current state Care Map will show where small changes may reap noticeable improvements (Eg. marking correct arm for surgery)
    - Analyse for: Moments of truth (contact, first impression or ah ha); Nature of work (value add or non value add); Flow of work (actual time)





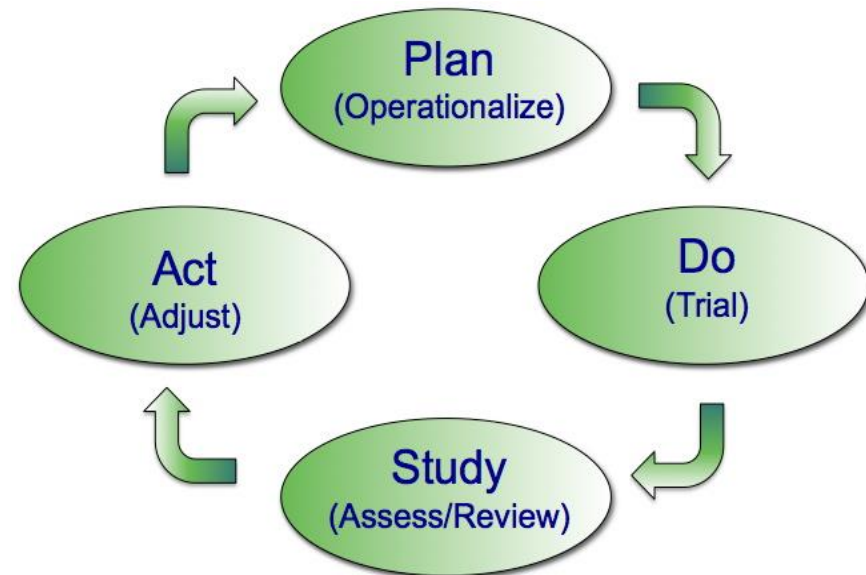
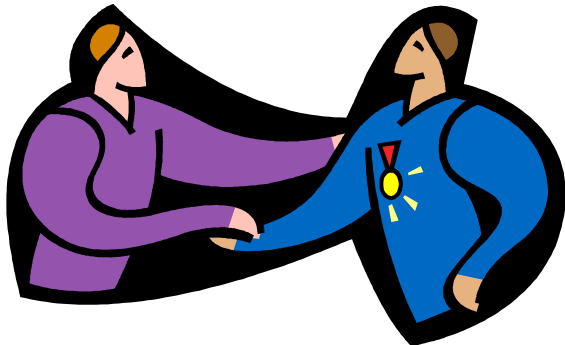
# Analyze

- Root Cause Analysis – Cause and Effect Diagram - machine, method, material, measurement, people, environment are all causes to any effect or outcome – Brainstorm any and all ideas (People, Place, Process, Protocol, Product)



# Improve/Control

- Plan, Do, Study, Act cycle – improve and control portions of DMAIC
  - Plan improvement
  - Implement improvement
  - Study new result
  - Put into action
  - **Dr. William Deming** – PDSA developer for defect reduction



In Summary Lean Six Sigma is:

- Methodology for improvement
- Management philosophy
- Strategy for running a business
- Method to transform a culture



An example of performance indicator



Figure 1

# Visualizing and Improving the Process

- Kaizen Events - **5S** is the name of a workplace organization method that uses a list of five words describing how to organize a work space for efficiency and effectiveness by identifying and storing the items used, maintaining the area and items, and sustaining the new order.
- **Sort** – clearly distinguish between what is need and what is not; red tag process – tag, review, remove; make list of tools – what we have and what we need and don't have
- **Store** – organize with visual controls – a place for everything and everything in it's place
- **Shine** – Daily, Inspections and Maintenance at regular time on regular basis
- **Standardize** – checklist of what to be done, who will do it and when; visual workplace and visual standards – easy for everyone to identify
- **Sustain** – continuity, a habit, company wide support
- Benefits – eliminate excess inventory, fewer equipment breakdowns, efficient and effective, defects made obvious, higher quality, motion and waste reduction