

# Introduction



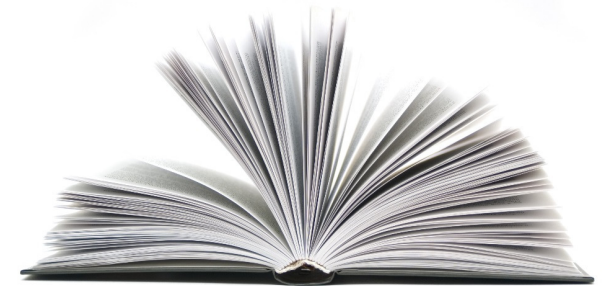
**Lean & Six Sigma**

# Introduction



## Agenda:

- Basics of Six Sigma
- What is Six Sigma?
- Six Sigma Approach
- Six Sigma As A Measure
- Why Six Sigma?

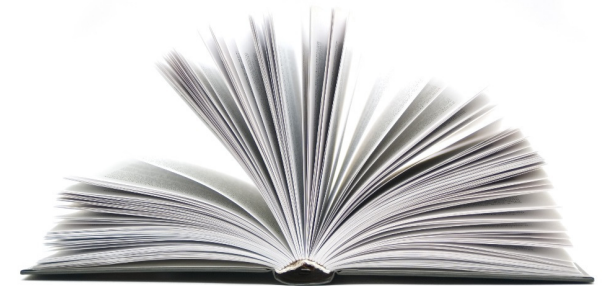


# Introduction



## Agenda:

- History of Six Sigma
- Six Sigma Projects & Organizational Goals
- Process for Six Sigma – DMAIC
- What is LEAN
- LEAN Principles & Techniques
- Structure of Six Sigma Teams

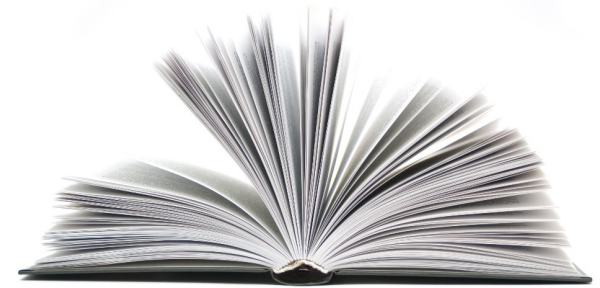


# Introduction



## Agenda:

- DMAIC and DMADV

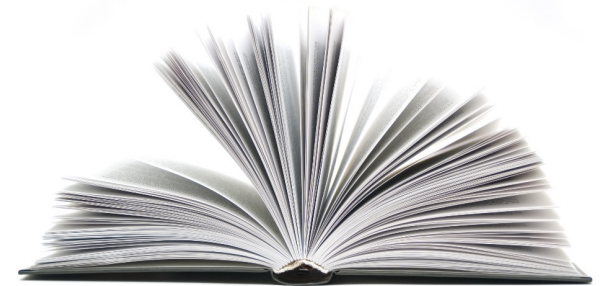


# Introduction



## Agenda:

- Normal Distribution Curve or Bell Curve
- Design For Six Sigma (DFSS)
- Summary



# Introduction



## Basics of Six Sigma:

- Highly disciplined continuous improvement process that focuses on developing and delivering near-perfect products and services consistently.
- Six Sigma is a continuous process.
- Six Sigma is process-centric.
- A **process** is a series of steps designed to produce a product or service, as specified by the customer.

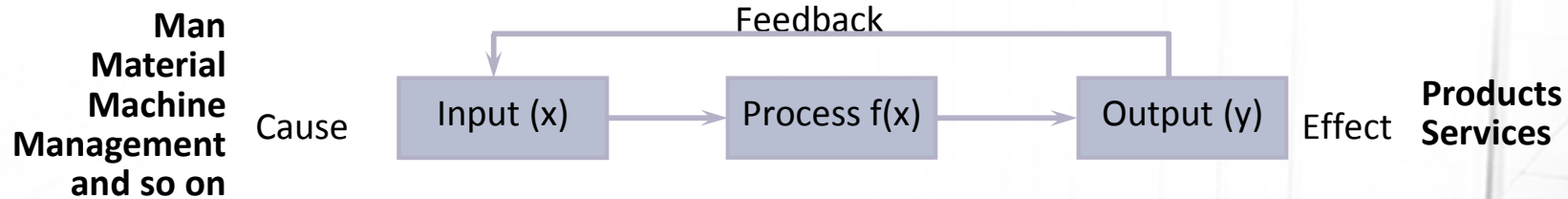




# Introduction

## Basics of Six Sigma:

### What is a Process?



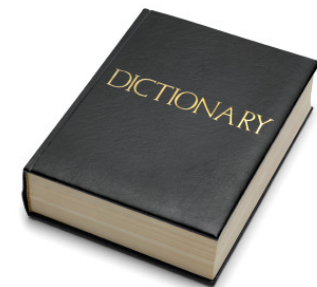
- **Input** is something put into a process or expended in its operation, to achieve an output or a result
- **Output** is the final product or service delivered to an internal / external customer
- **Output(s)** of a process can be input(s) to another process

## Introduction



### Definition of Sigma ( $\sigma$ ):

- Literally speaking, the 18th letter in the Greek alphabet, Sigma( $\sigma$ ) , is the symbol for Standard Deviation
- 6 SIGMA is a structured statistical methodology that can be used to measure the quality of your service and performance
- 6 SIGMA measure of quality is 3.4 Defects Per Million Opportunities (DPMO). The concept of DPMO will be discussed in the DEFINE phase in greater details.





## Introduction



### What is Six Sigma?:

- Six Sigma is a management methodology of which the GOAL is to improve dramatically the performance and the quality of your processes, services & products.
- A customer focused business improvement process
- Driven by teamwork, consensus & Logical reasoning
- Structured, logical methodology - D M A I C
- $Y=F(Xs)$  i.e. Y is the function of single / multiple Xs



## Introduction



### What is Six Sigma?:

- Examples of  $Y=F(Xs)$ 
  - If “X” is the cycle time, then “Y” might be On-time delivery
  - If “X” is the quality of work done, then “Y” might be the level of customer satisfaction
- Focuses on making the process robust & reducing variability
- Applies to Any Process





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### Six Sigma Approach:

$$Y=F(X)$$

Y may represent:

- Output
- Effect
- Symptom

X may represent:

- Input
- Cause
- Problem

- Controlling inputs will control the outputs.
- This is  $Y=f(X)$  thinking.



## Introduction



### Six Sigma Approach:

- Context of relating X & Y to each other would vary.





## Introduction

### Six Sigma as a Measure:

**99% Good (3.8 Sigma)**

20,000 lost articles of mail per hour

Unsafe drinking water for almost 15  
minutes each day

5,000 incorrect surgical operations per  
week

**99.9997% Good (6 Sigma)**

7 articles lost per hour

One unsafe minute every seven months

1.7 incorrect operations per week





## Introduction

### Six Sigma as a Measure:

**99% Good (3.8 Sigma)**

Two short or long landings at most major airports each day

200,000 wrong drug prescriptions each year

No electricity for almost seven hours each month

**99.9997% Good (6 Sigma)**

One short or long landing every five years

68 wrong prescriptions per year

One hour without electricity every 34 years



## Introduction



### Why Six Sigma?:

- Decisions based on facts and data rather than opinion
- Attacks the high-hanging fruit (The Hard Stuff)
- Eliminates chronic problems (Common Cause Variation)
- Improves customer satisfaction
- Provides a disciplined approach to problem solving
- Changes the company culture





# Introduction

## History of Six Sigma:

- In 1970s, Motorola started to use statistical analysis in problem solving.
- In the 1980s, Motorola started to suffer from quality problems.
- Motorola prompted Six Sigma terminology and branded Six Sigma.
- In 1987, Motorola launched it's Six Sigma program.
- **Motorola saved \$17 Billion from 1986-2004 with Six Sigma.**

Sales & Marketing

Customer Service

Transactional  
Processes

Product Design







# Introduction

## History of Six Sigma:

- General Electric had the benefit of Six Sigma as well.
- Jack Welch launched Six Sigma at GE in 1996.
- GE saved \$750 Million by 1998.
- 1998/99 – Six Sigma Green Belt exam became the criteria for management promotions
- 2002/03 – Six Sigma Green Belt certification became the criteria for management promotions



## Introduction



### Six Sigma Projects & Organizational Goals:

- Any Six Sigma project will NOT necessarily bring improvement to a Business.
- Six Sigma project should be aligned to the goals of a Business System or Organizational goals.
- Project Selection
  - ✓ Project selection group consisting of Master Black Belts, Black Belts, Champions and key executives
  - ✓ Team selection for the project may be done based on the nature of the project.





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### Six Sigma Projects & Organizational Goals:

- Project Selection
  - ✓ It helps in assigning financial metrics (ROI, increase in profit, cost reduction etc.).
  - ✓ Calculating the profit expected out of the project helps in further selection of the project.
    - Expected profit =  $\sum (\text{Profit} \times \text{Probability of success})$
- Projects for selection should also conform to the whole system.





# Introduction

## Six Sigma Projects & Organizational Goals:

- Project Responsibilities:
  1. **Leadership:** A leadership team or council defines the goals and objectives in the Six Sigma process.
    - ✓ Set out the goals.
    - ✓ Define the purpose the Six Sigma Program
    - ✓ Explain how the result is going to benefit the customer
    - ✓ Set a schedule for work and interim deadlines
    - ✓ Develop a means for review and oversight
    - ✓ Support team members and defend established positions.





# Introduction

## Six Sigma Projects & Organizational Goals:

- Project Responsibilities:
  2. **Sponsor:** Six Sigma sponsor are high-level individuals who understand Six Sigma and are committed to its success.
    - ✓ Six Sigma will be led by a full-time, high-level champion, such as an Executive Vice President.
  3. **Implementation Leader:** The person responsible for supervising the Six Sigma team effort.
    - ✓ Ensures the success of implementation plan





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### Six Sigma Projects & Organizational Goals:

- Project Responsibilities:
  4. **Coach:** The Six Sigma expert or consultant who sets a schedule, defines results of a project, and who mediates conflicts or deals with resistance to the program.
  5. **Team Leader:** The individual responsible for overseeing the work of the team and for acting as go-between with the sponsor and the team members.



## Introduction



### Six Sigma Projects & Organizational Goals:

- Project Responsibilities:
  6. **Team Member:** An employee who works on a Six Sigma project, given specific duties within a project, and deadlines to meet in reaching specific project goals.
  7. **Process Owner:** The individual who takes on responsibility for a process after a Six Sigma team has completed its work.





## Introduction

### Process for Six Sigma-DMAIC:

- **Define:** Define the problem statement and plan the improvement initiative
- **Measure:** Collect data from the process and understand current quality level
- **Analyze:** Study the business process and the data generated to understand the root causes of the problem
- **Improve:** Identify possible improvement actions, prioritize them, test the improvements, finalize the improvement action plan
- **Control:** Full scale implementation of improvement action plan, setup controls to monitor the system so that gains are sustained

