



# Introduction to Lean and Six Sigma

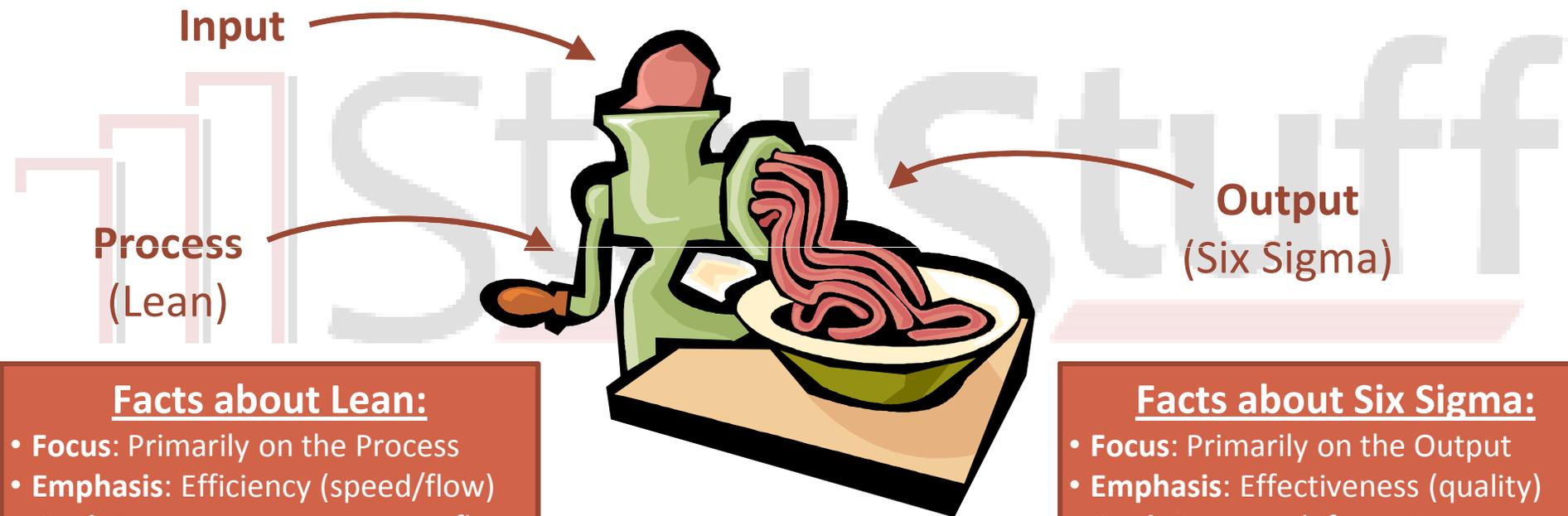
*An introduction to the fundamental concepts of the Lean and Six Sigma methodologies using the IPO model.*

**Section & Lesson #:** Introduction – Lesson 2

**Pre-Requisite Lessons:** None

# What are Lean and Six Sigma?

- **Lean and Six Sigma are methods that help improve business processes & performance.**
  - Despite many similarities, they have different tools that focus on different areas of the IPO flow.
- **Input > Process > Output (IPO) flow model.**
  - Below is a brief example of IPO and how Lean and Six Sigma are applied:



## Facts about Lean:

- **Focus:** Primarily on the Process
- **Emphasis:** Efficiency (speed/flow)
- **Goal:** Remove waste; improve flow
- **History:**
  - 1913 – Ford Motor Company
  - 1930s – Toyota Production Sys
  - 1990s – “Lean Thinking”

## Facts about Six Sigma:

- **Focus:** Primarily on the Output
- **Emphasis:** Effectiveness (quality)
- **Goal:** Remove defects; improve perf.
- **History:**
  - 1800s – Statistical Analysis begins
  - 1980s – Motorola formalizes it
  - 1990s – GE popularizes it

# Efficiency vs. Effectiveness

- Improvement projects primarily focus on improving Efficiency and/or Effectiveness.

			
	<b><u>Time or Effort</u></b>	+	<b><u>Quality or Accuracy</u></b>
<b>Efficiency =</b>	↓ Decrease ↓	+	Same
<b>Effectiveness =</b>	Same	+	↑ Increase ↑

- **What is Efficiency?**
  - Achieve same level of effectiveness (quality/accuracy) in less time or with less effort.
- **What is Effectiveness?**
  - Achieve same level of efficiency (time/effort) with less error or higher quality/accuracy.
- **Despite this difference, they are not mutually exclusive.**
  - Though a project may target efficiency or effectiveness, they generally end up improving both.

# Balancing Efficiency and Effectiveness

## ○ Which is more important between efficiency & effectiveness?

- Neither! It depends on your goal.
- For example, suppose you had a car and a truck. Which vehicle is “better”? It depends on your purpose for each.

- **Purpose A:** Transport a couple people across town.
  - Both vehicles are equally effective, but the car is more efficient (consumes less fuel to achieve same purpose).
- **Purpose B:** Haul a large quantity of furniture and appliances across town.
  - Only the truck would be effective.



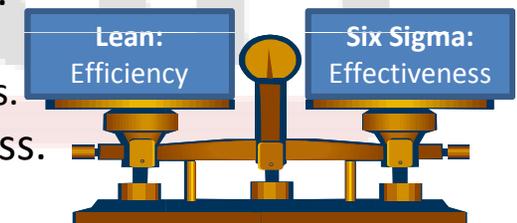
Car: 30 MPG



Truck: 15 MPG

## ○ How does this compare to Lean and Six Sigma?

- Effectiveness (i.e., quality or accuracy) should always be considered first.
  - For example, who cares how efficient the car is if it’s incapable of achieving Purpose B? Most of the Six Sigma tools are designed to improve effectiveness.
- Efficiency can improve time/cost, but shouldn’t compromise effectiveness.
  - When targeting efficiency, the output should always be measured to ensure quality isn’t compromised. Lean tools are designed to improve process efficiency.



## ○ Can Lean and Six Sigma apply to non-manufacturing environments?

- Absolutely! Intangibles (like transactions) can be more challenging to measure and improve.
- Regardless, the Lean and Six Sigma tools can apply to any process fitting the IPO model.

# Practical Application

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- **Identify at least 3 different functions in your work that fit the IPO model.**
  - What are the inputs going into each?
  - What are some of the general processes being performed in each?
  - What are the outputs coming out from each?
- **Identify the efficiency and effectiveness metrics for each function.**
  - How is effectiveness (e.g., quality or accuracy) being measured in each?
  - How is efficiency (e.g., timeliness) being measured in each?

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