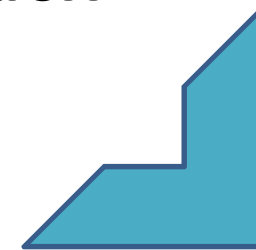


# **“Mystery Calling: A Qualitative Application of the Lean Six Sigma Approach”**



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January 2010

# Outline

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Introduction

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Define (Literature Review)

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Measure (Research Methodology)

4

Analyze (Data Analysis and Findings)

5

Improve and Control (Discussion and Conclusion)

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# Introduction

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“Defect, Failure, Mistake, Default”

- Who is paying your salary?
- Its neither your boss, our organization nor compliance with any ISO 9000 ...
- It's the customer and those who guarantee customer relation management (CRM)!
- So is it you, too...? **By reducing DFMD!**

 => All of the **above** are defined by external and internal customers!

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# Six Sigma vs. Lean Sigma

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: Six Sigma seeks to improve the quality of process outputs by identifying and removing the causes of defects (errors) and minimizing variability in manufacturing and business processes.

- **Lean Sigma: *more value with less work***

**Lean manufacturing** or **lean production**, which is often known simply as "**Lean**" focuses on activities that create value for the end customer and then eliminate those activities that are not value creating. Good example is Toyota ,JIT.

# Six Sigma

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**Like its predecessors, Six Sigma doctrine asserts that:**

- Continuous efforts to achieve stable and predictable process results (i.e. reduce process variation) are of vital importance to business success.
- Manufacturing and business processes have characteristics that can be measured, analyzed, improved and controlled.
- Achieving sustained quality improvement requires commitment from the entire organization, particularly from top-level management.

**Features that set Six Sigma apart from previous quality improvement initiatives include:**

- A clear focus on achieving measurable and quantifiable financial returns from any Six Sigma project.
- An increased emphasis on strong and passionate management leadership and support.
- A special infrastructure of "Champions," "Master Black Belts," "Black Belts," etc. to lead and implement the Six Sigma approach.
- A clear commitment to making decisions on the basis of verifiable data, rather than assumptions and guesswork.

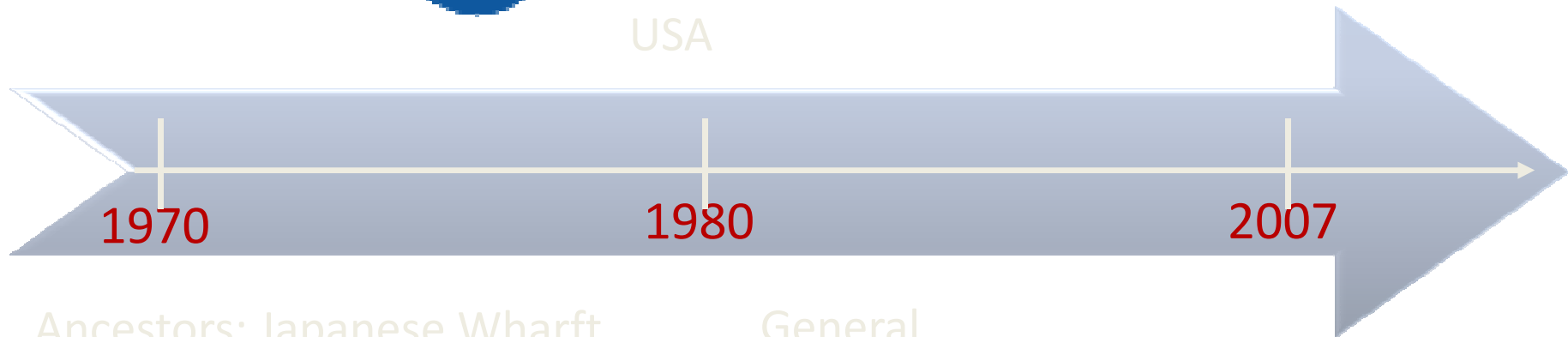


# Development of Six Sigma



## MOTOROLA

USA



1970

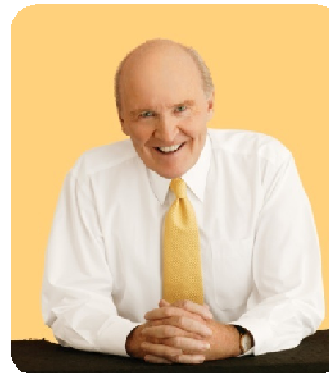
1980

2007

Ancestors: Japanese Wharft



General Electric



Jack Welch

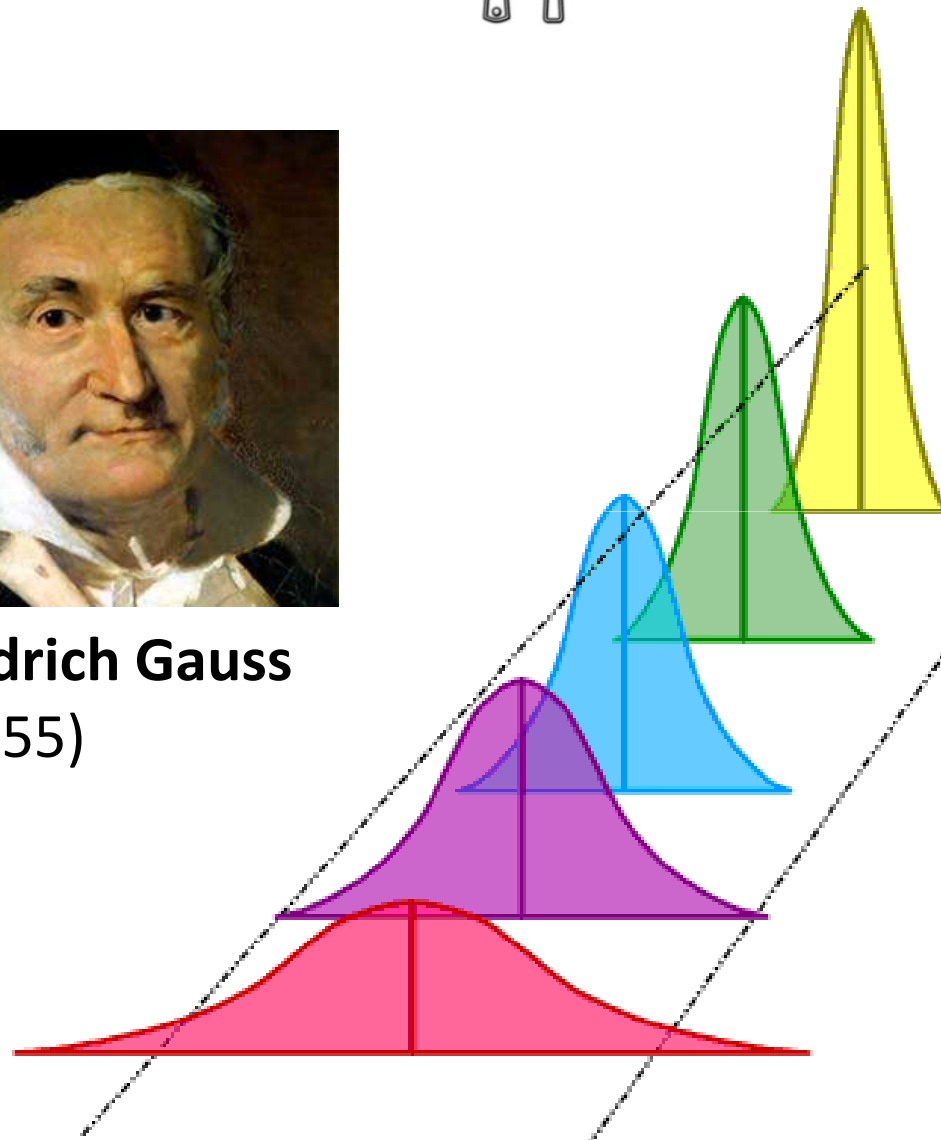
**HUMAN SIGMA:**  
Foundation for  
Service Organisations



## From 2σ – 6 σ: Statistics



**Carl Friedrich Gauss**  
(1777-1855)



Process  
Capability

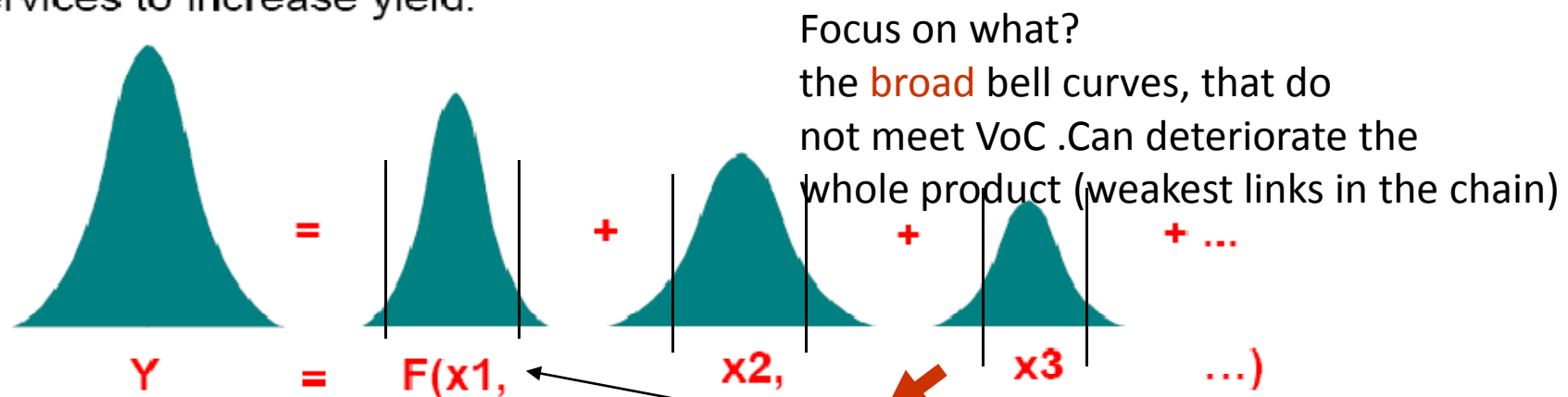
Failure-Parts  
Incidents  
per Million

$C_p$	$\sigma$	ppm
2.00	6.0	3.4
1.67	5.0	233
1.33	4.0	6,210
1.00	3.0	66,800
0.67	2.0	308,540

# What Is Six Sigma?

## Six Sigma, a Strategy and a Measurement of Strategies

- ◆ Six Sigma is an overall strategy to accelerate improvements in processes, products and services (create breakthrough).
- ◆ Six Sigma is a measurement of how effective strategies are in eliminating defects and variations from processes, products and services to increase yield.



**Understand and control the x's, and you'll never have to ask "Y".**

Steep curves ok

e.g. JAN+FEB+...  
e.g. Branch 1+2+3..

Goes out to the customer = output

X are all the triggers to control variation

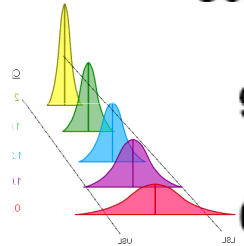


# Difference Between Average and Best-in-Class

Cost of Poor Quality in Terms of Sales

## Customer Focus

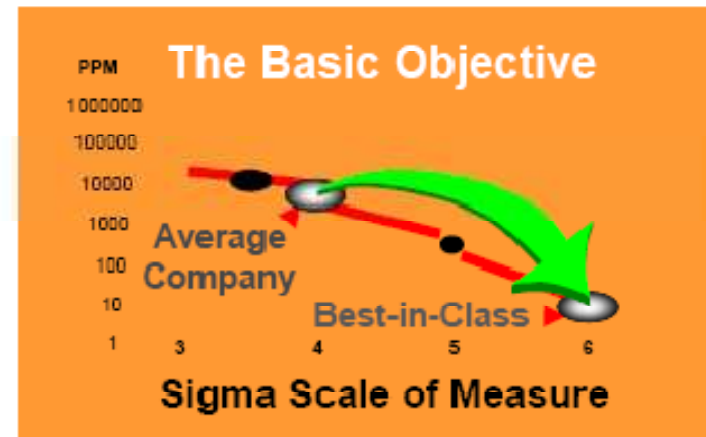
	<u>Yield</u>	<u>PPMO</u>	<u>COPQ</u>	<u>Sigma</u>	
	99.9997%	3.4	<10%	6	<b>World Class Benchmarks</b>
	99.976%	233	10-15%	5	
	99.4%	6,210	15-20%	4	<b>Industry Average</b>
	93%	66,807	20-30%	3	
	65%	308,537	30-40%	2	<b>Non Competitive</b>
	50%	500,000	>40%	1	



Source: Journal for Quality and Participation, Strategy and Planning Analysis

What are Quality Costs under Observation?

**A focus on TDPU reduces cycle time/unit, WIP, inventory carrying costs, delivered defects, early life failure rate and defect analysis and repair costs/unit**



# Introduction

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## Background

- Many researches are conducted to attain the real picture of the services.
- One of the major ways to get a real picture is mystery shopping or mystery calling.
- Mystery calling in educational institutions is not much utilized.



# Introduction

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In a previous study done by (*Latifah L. A. et al. 2009*) in Learners rated two items :“*university staff is easily contacted by telephone*” and “*toll free number for learner services center is easily reachable*” as least satisfactory.



## **Therefore, Problem to be Investigated:**

(DMAIC) is used to rectify the problems encountered in telephone calling at OUM.

# Measure

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## Instrument Design

- A questionnaire was taken from a German study and then translated into English.
- After doing a focused group study the Questionnaire was customized.
- Mystery caller used real cases when calling the service centers.



# Measure

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## Sample



- 40 calls were made by a mystery caller to OUM staff.
- Real case questions were asked from the staff.
- According to the telephone call experience mystery caller has answered the questions of the mystery calling questionnaire.

# Data Analysis Method

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## Soft-wares:

- SPSS 15

## Type Data Analysis Method:

- Descriptive
- Inferential

## Measurement Instrument

- Questionnaire

# Data Analysis

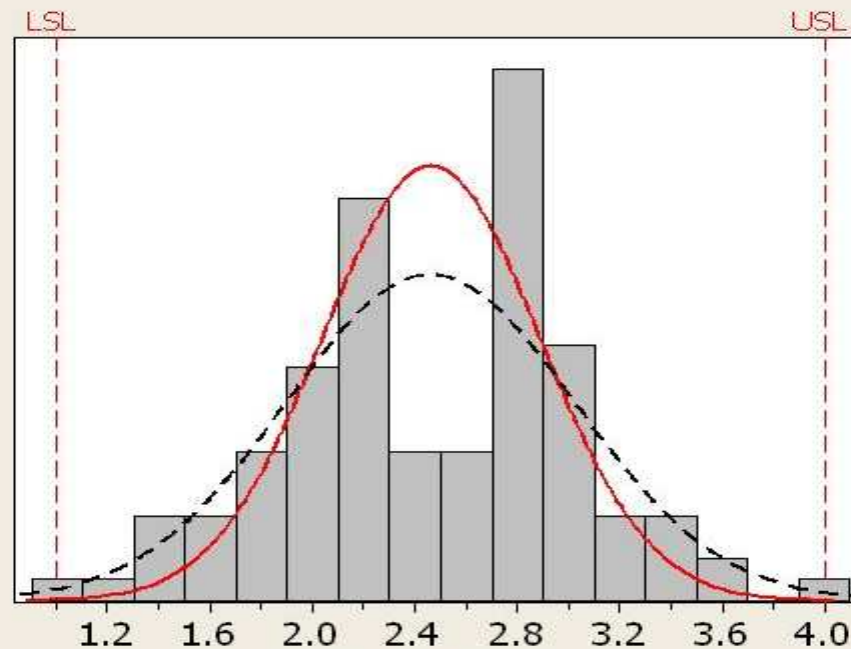
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## Frequency test result

# Data Analysis

## Process Capability of A Average

Process Data	
LSL	1
Target	*
USL	4
Sample Mean	2.46134
Sample N	109
StDev(Within)	0.4245
StDev(Overall)	0.566695



—	Within
- - -	Overall

Potential (Within) Capability	
Z.Bench	3.33
Z.LSL	3.44
Z.USL	3.62
Cpk	1.15

Overall Capability	
Z.Bench	2.40
Z.LSL	2.58
Z.USL	2.72
Ppk	0.86
Cpm	*

Observed Performance	
PPM < LSL	0.00
PPM > USL	0.00
PPM Total	0.00

Exp. Within Performance	
PPM < LSL	288.19
PPM > USL	144.68
PPM Total	432.87

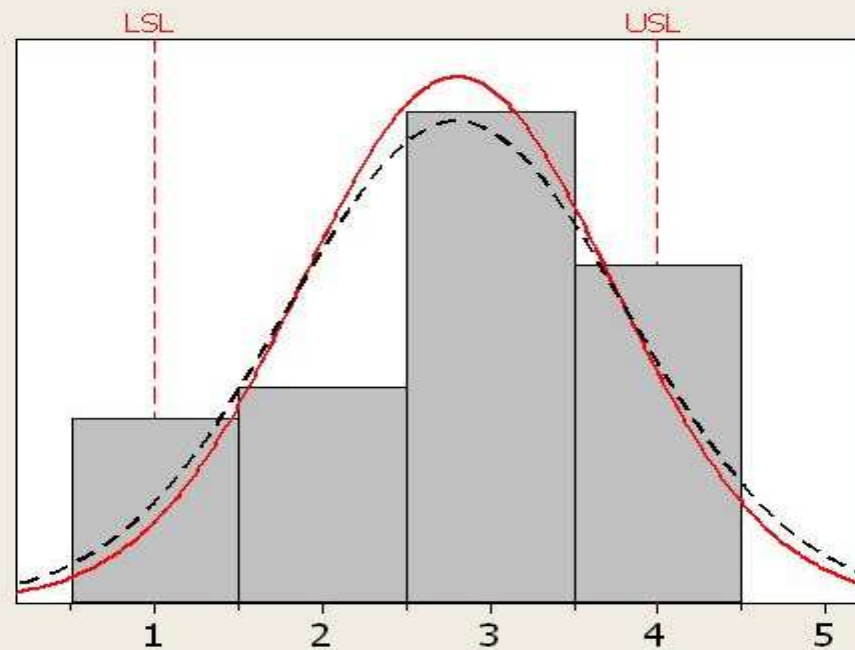
Exp. Overall Performance	
PPM < LSL	4958.61
PPM > USL	3312.25
PPM Total	8270.87



# Data Analysis

## Process Capability of Appropriate Speed?

Process Data	
LSL	1
Target	*
USL	4
Sample Mean	2.8
Sample N	40
StDev(Within)	0.931988
StDev(Overall)	1.01779



—	Within
- - -	Overall

Potential (Within) Capability	
Z.Bench	1.15
Z.LSL	1.93
Z.USL	1.29
Cpk	0.43
Overall Capability	
Z.Bench	1.00
Z.LSL	1.77
Z.USL	1.18
Ppk	0.39
Cpm	*

Observed Performance	
PPM < LSL	0.00
PPM > USL	0.00
PPM Total	0.00

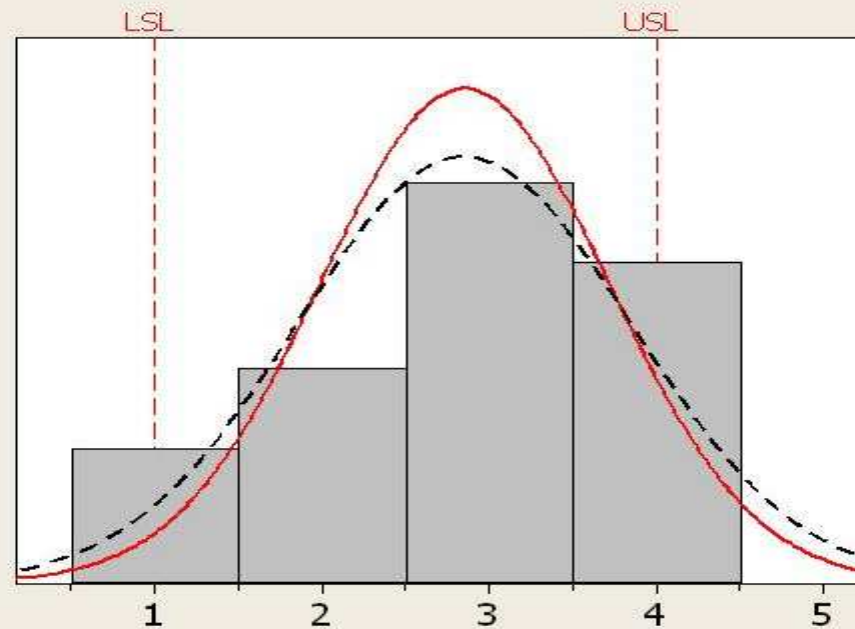
Exp. Within Performance	
PPM < LSL	26719.52
PPM > USL	98947.72
PPM Total	125667.23

Exp. Overall Performance	
PPM < LSL	38485.59
PPM > USL	119194.19
PPM Total	157679.78

# Data Analysis

## Process Capability of Appropriate Loudness?

Process Data	
LSL	1
Target	*
USL	4
Sample Mean	2.85
Sample N	40
StDev(Within)	0.863793
StDev(Overall)	1.00128



—	Within
- - -	Overall

Potential (Within) Capability	
Z.Bench	1.24
Z.LSL	2.14
Z.USL	1.33
Cpk	0.44

Overall Capability	
Z.Bench	1.00
Z.LSL	1.85
Z.USL	1.15
Ppk	0.38
Cpm	*

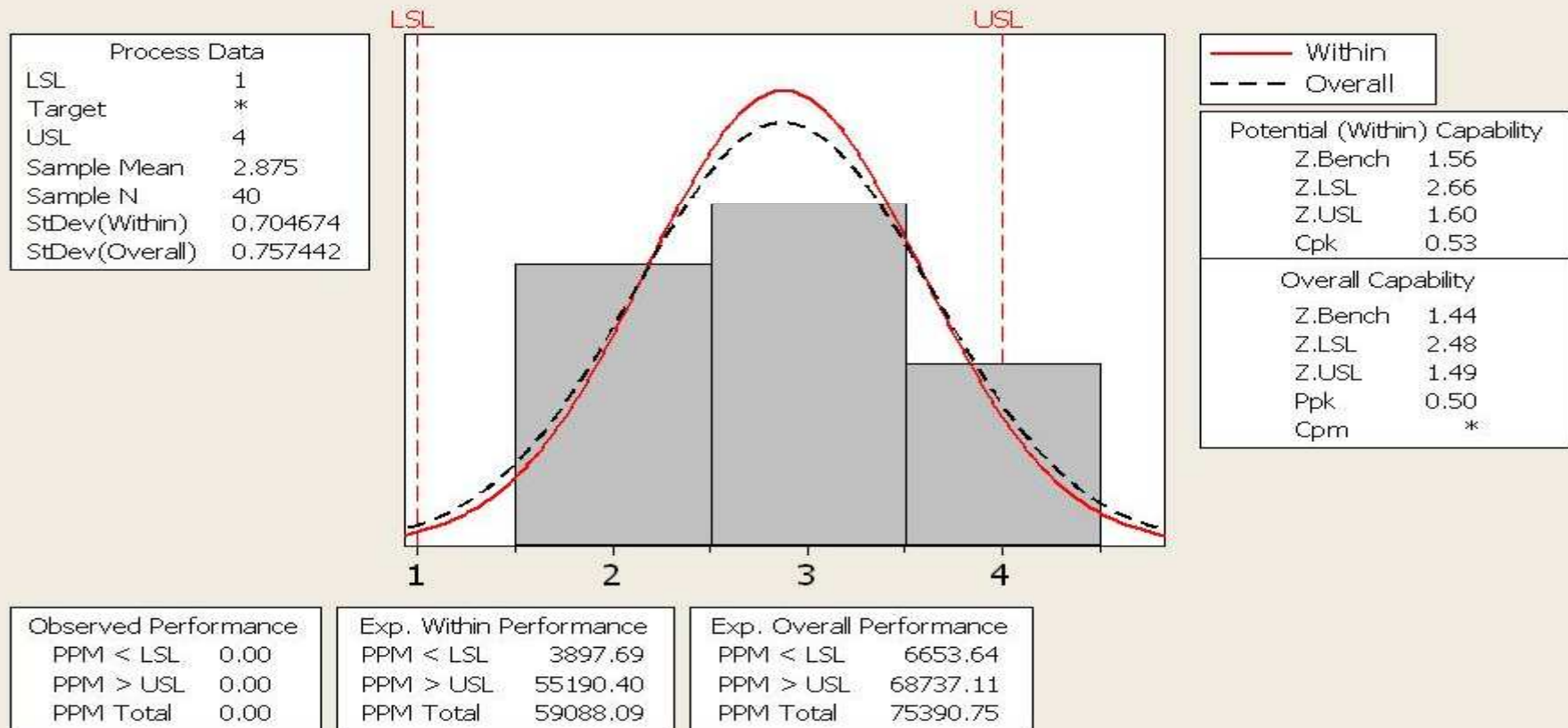
Observed Performance	
PPM < LSL	0.00
PPM > USL	0.00
PPM Total	0.00

Exp. Within Performance	
PPM < LSL	16108.18
PPM > USL	91539.10
PPM Total	107647.28

Exp. Overall Performance	
PPM < LSL	32327.74
PPM > USL	125375.23
PPM Total	157702.98

# Data Analysis

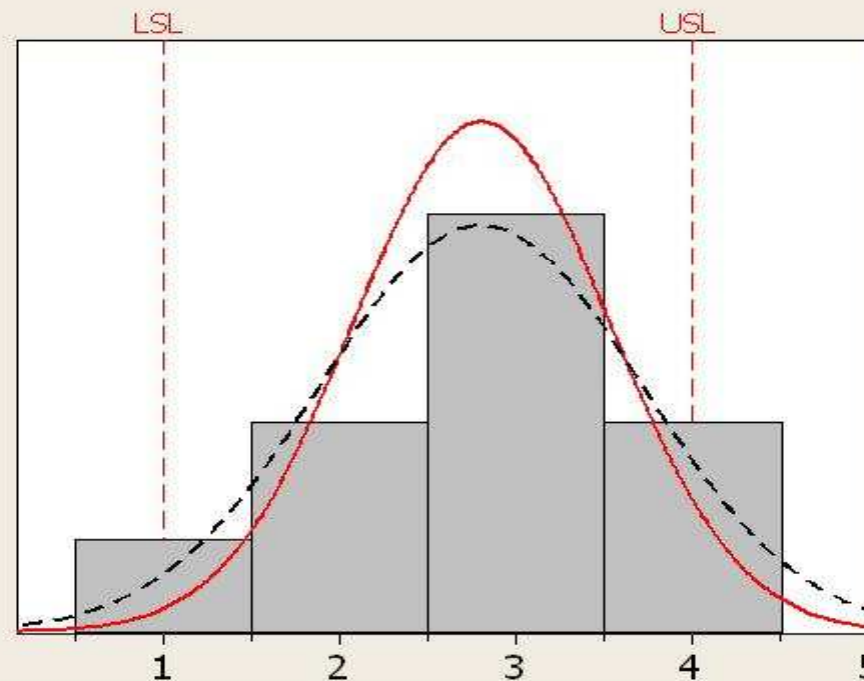
## Process Capability of Caller was given attention?



# Data Analysis

## Process Capability of Expresses Himself Clearly?

Process Data	
LSL	1
Target	*
USL	4
Sample Mean	2.8
Sample N	40
StDev(Within)	0.727405
StDev(Overall)	0.911465



—	Within
- - -	Overall

Potential (Within) Capability	
Z.Bench	1.59
Z.LSL	2.47
Z.USL	1.65
Cpk	0.55

Overall Capability	
Z.Bench	1.18
Z.LSL	1.97
Z.USL	1.32
Ppk	0.44
Cpm	*

Observed Performance	
PPM < LSL	0.00
PPM > USL	0.00
PPM Total	0.00

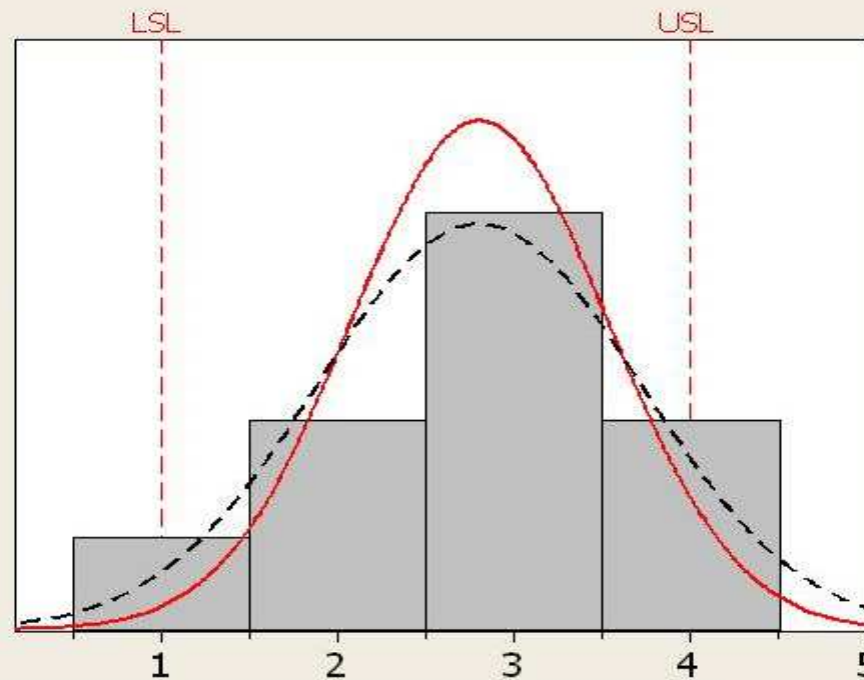
Exp. Within Performance	
PPM < LSL	6670.21
PPM > USL	49502.16
PPM Total	56172.36

Exp. Overall Performance	
PPM < LSL	24143.05
PPM > USL	93992.88
PPM Total	118135.93

# Data Analysis

## Process Capability of Expresses Himself Clearly?

Process Data	
LSL	1
Target	*
USL	4
Sample Mean	2.8
Sample N	40
StDev(Within)	0.727105
StDev(Overall)	0.911465



—	Within
- - -	Overall

Potential (Within) Capability	
Z.Bench	1.59
Z.LSL	2.47
Z.USL	1.65
Cpk	0.55

Overall Capability	
Z.Bench	1.18
Z.LSL	1.97
Z.USL	1.32
Ppk	0.44
Cpm	*

Observed Performance	
PPM < LSL	0.00
PPM > USL	0.00
PPM Total	0.00

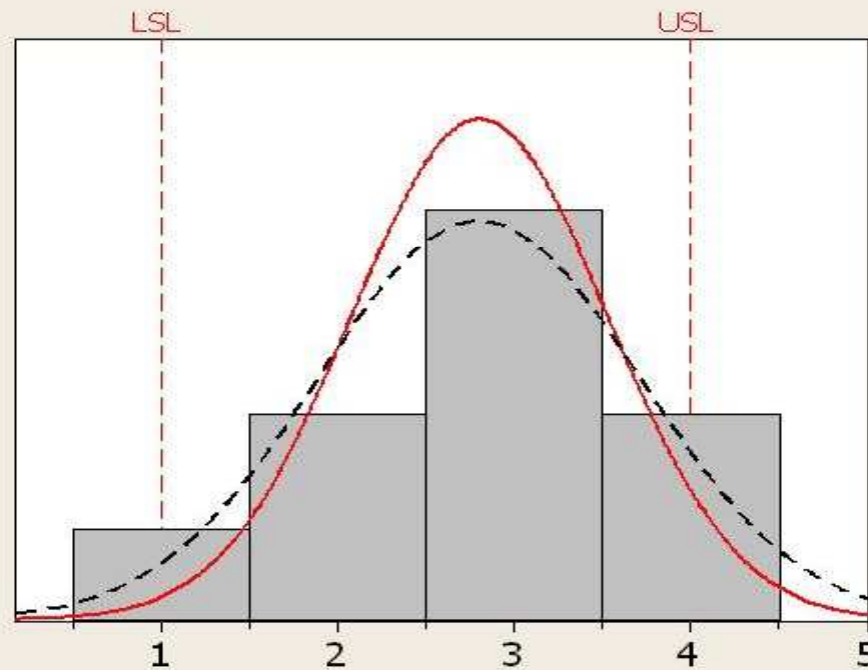
Exp. Within Performance	
PPM < LSL	6670.21
PPM > USL	49502.16
PPM Total	56172.36

Exp. Overall Performance	
PPM < LSL	24143.05
PPM > USL	93992.88
PPM Total	118135.93

# Data Analysis

## Process Capability of Expresses Himself Clearly?

Process Data	
LSL	1
Target	*
USL	4
Sample Mean	2.8
Sample N	40
StDev(Within)	0.727405
StDev(Overall)	0.911465



—	Within
- - -	Overall

Potential (Within) Capability	
Z.Bench	1.59
Z.LSL	2.47
Z.USL	1.65
Cpk	0.55

Overall Capability	
Z.Bench	1.18
Z.LSL	1.97
Z.USL	1.32
Ppk	0.44
Cpm	*

Observed Performance	
PPM < LSL	0.00
PPM > USL	0.00
PPM Total	0.00

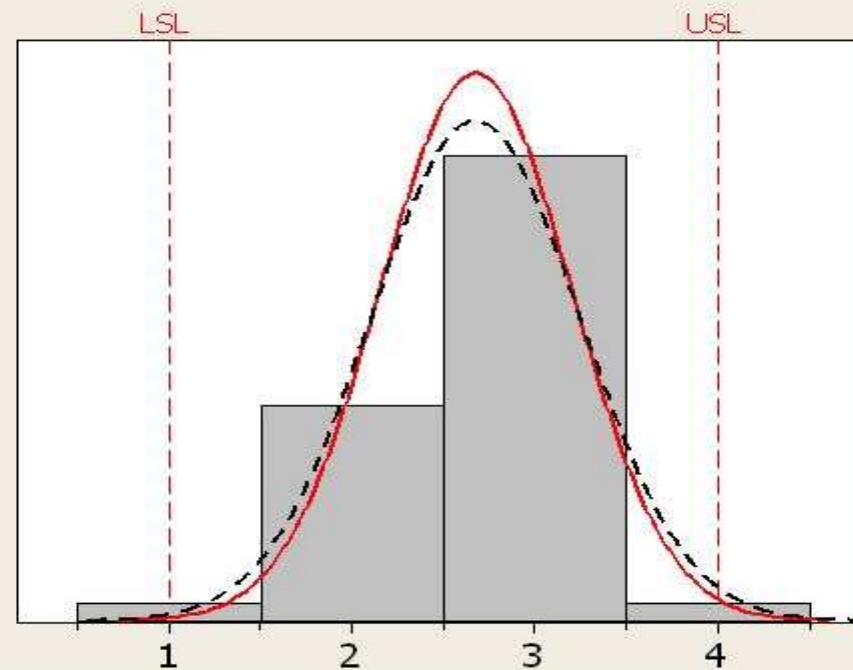
Exp. Within Performance	
PPM < LSL	6670.21
PPM > USL	49502.16
PPM Total	56172.36

Exp. Overall Performance	
PPM < LSL	24143.05
PPM > USL	93992.88
PPM Total	118135.93

# Data Analysis

## Process Capability of Fr. at endng the conv.

Process Data	
LSL	1
Target	*
USL	4
Sample Mean	2.675
Sample N	40
StDev(Within)	0.522822
StDev(Overall)	0.572332



—	Within
- - -	Overall

Potential (Within) Capability	
Z.Bench	2.49
Z.LSL	3.20
Z.USL	2.53
Cpk	0.84

Overall Capability	
Z.Bench	2.26
Z.LSL	2.93
Z.USL	2.32
Ppk	0.77
Cpm	*

Observed Performance	
PPM < LSL	0.00
PPM > USL	0.00
PPM Total	0.00

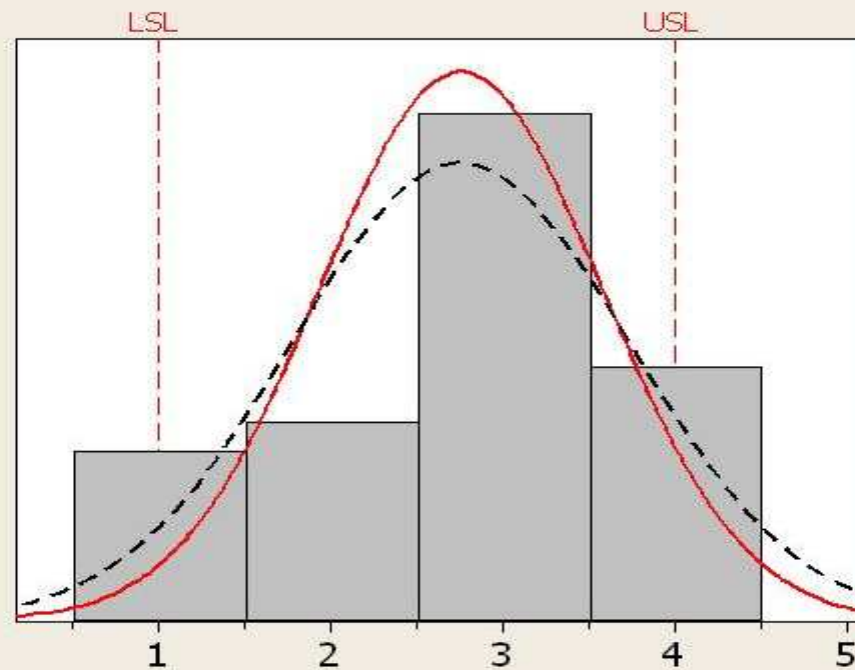
Exp. Within Performance	
PPM < LSL	678.22
PPM > USL	5633.26
PPM Total	6311.48

Exp. Overall Performance	
PPM < LSL	1713.32
PPM > USL	10304.03
PPM Total	12017.35

# Data Analysis

## Process Capability of Pleasant Voice?

Process Data	
LSL	1
Target	*
USL	4
Sample Mean	2.75
Sample N	40
StDev(Within)	0.818331
StDev(Overall)	0.980581



—	Within
- - -	Overall

Potential (Within) Capability	
Z.Bench	1.41
Z.LSL	2.14
Z.USL	1.53
Cpk	0.51

Overall Capability	
Z.Bench	1.09
Z.LSL	1.78
Z.USL	1.27
Ppk	0.42
Cpm	*

Observed Performance	
PPM < LSL	0.00
PPM > USL	0.00
PPM Total	0.00

Exp. Within Performance	
PPM < LSL	16238.09
PPM > USL	63318.36
PPM Total	79556.46

Exp. Overall Performance	
PPM < LSL	37158.50
PPM > USL	101198.01
PPM Total	138356.51



# Conclusion



**Although the approach is simple, it is by no means easy. But the results justify the effort expended. Research has shown that OUM by successfully implementing Six Sigma may perform better in return on sales, customer satisfaction, reduction of complaints and so on.**

# Limitations of the Study

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- Mystery calling is a new approach for which there is not much literature available particularly in academic studies.
- Other types of methods may be used for comparison.





