

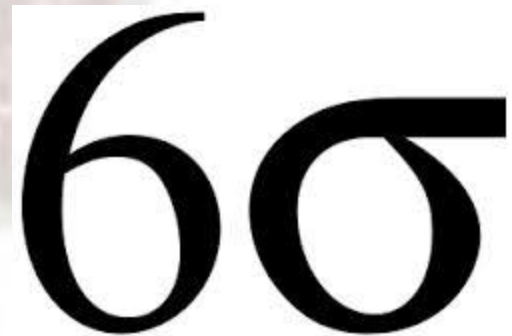
Welcome to the FDP



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SIX SIGMA—an Overview

"Delivering Tomorrow's
Performance Today"





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BEFORE WE START !!!

- Your participation is key to success...
- If any doubts you can ask question at the end
- Share your thoughts...
- Get involved...
- Switch off / Silent your mobile phones...
- Participate, contribute and make this program successful



Six Sigma – an Overview



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You might be familiar with some of the following terms ...

Quality Control

Quality Management

Statistical Quality Control

ISO 9001: 2008

Kaizen

Just -In-Time

Total Quality Management Six Sigma





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6σ

- Your first question is likely....
What is Six Sigma?
- Your second question is likely...
Why Six Sigma?



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WHAT IS SIX SIGMA ?



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- A performance goal, representing
- 3.4 defects for every million opportunities .
- 3.4 DPMO

Create S.M.A.R.T. Goals



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WHAT IS SIX SIGMA ?



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A series of tools and methods used to improve or design products, processes, and/or services.



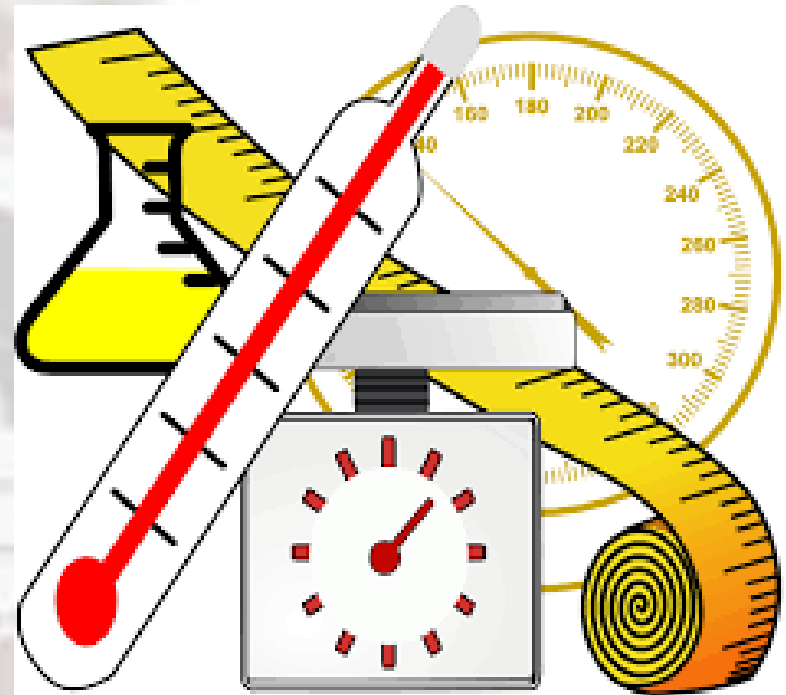
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WHAT IS SIX SIGMA ?



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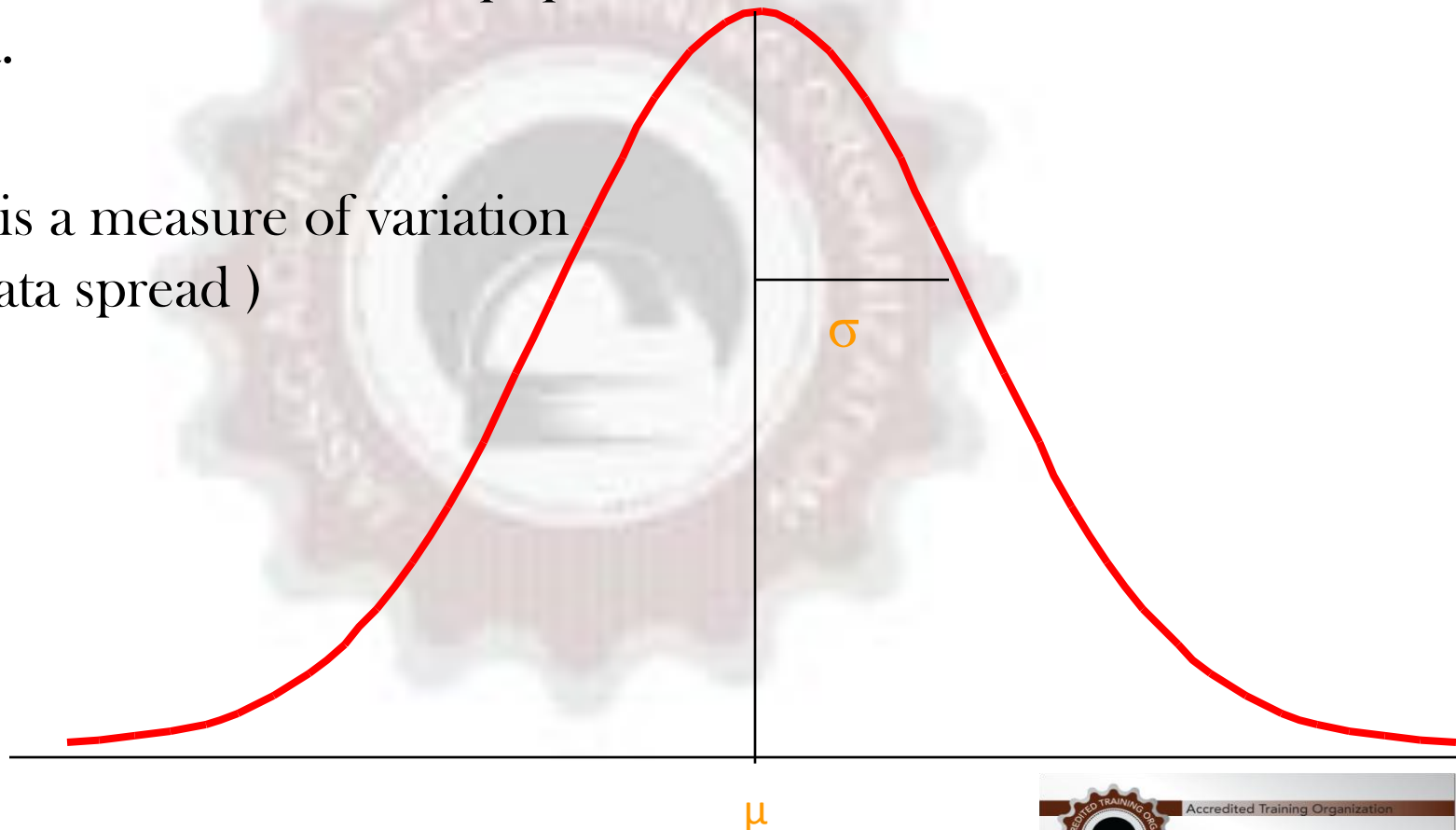
- A statistical measure indicating the number of standard deviations within customer expectations.
- A disciplined, fact-based approach to managing a business and its processes



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σ

- Sigma is the Greek letter representing the standard deviation of a population of data.
- Sigma is a measure of variation (the data spread)
-

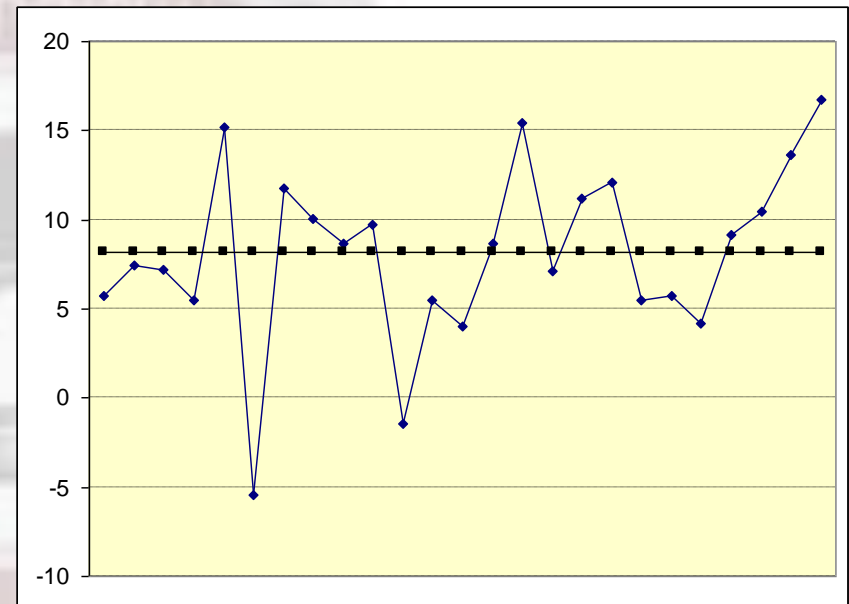


What does variation mean?



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- Variation means that a process does not produce the same result (the “Y”) every time.
- Some variation will exist in all processes.
- Variation directly affects customer experiences.



WHY USE SIX SIGMA ?



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Customer Satisfaction

Shareholder Value

Increasing Business Revenues

Reduced Variation .

Processes can be made more streamlined with the help of a more structured approach.



The Six Sigma Evolutionary Timeline



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1818: Gauss uses the normal curve to explore the mathematics of error analysis for measurement, probability analysis, and hypothesis testing.



1896: Italian sociologist Vilfredo Alfredo Pareto introduces the 80/20 rule and the Pareto distribution in *Cours d'Economie Politique*.

1924: Walter A. Shewhart introduces the control chart and the distinction of special vs. common cause variation as contributors to process problems.

1736: French mathematician Abraham de Moivre publishes an article introducing the normal curve.



1949: U. S. DOD issues Military Procedure MIL-P-1629, *Procedures for Performing a Failure Mode Effects and Criticality Analysis*.

1960: Kaoru Ishikawa introduces his now famous cause-and-effect diagram.



1941: Alex Osborn, head of BBDO Advertising, fathers a widely-adopted set of rules for "brainstorming".



1970s: Dr. Noriaki Kano introduces his two-dimensional quality model and the three types of quality.

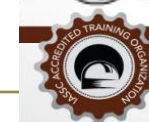
1986: Bill Smith, a senior engineer and scientist introduces the concept of Six Sigma at Motorola



1995: Jack Welch launches Six Sigma at GE.



1994: Larry Bossidy launches Six Sigma at Allied Signal.



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Six Sigma Companies



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Honeywell



Johnson & Johnson

Kodak

LOCKHEED MARTIN
We never forget who we're working for™

ServiceMASTER.

Raytheon

DUPONT *The miracles of science™*

BLACK & DECKER

SONY

MOTOROLA
intelligence everywhere™



Living.
Improved daily.

CATERPILLAR®

GM

AlliedSignal



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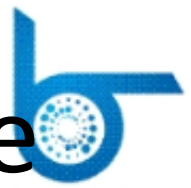
Six Sigma and Financial Services



Deutsche Bank



Measuring Process Performance




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The pizza delivery example. . .

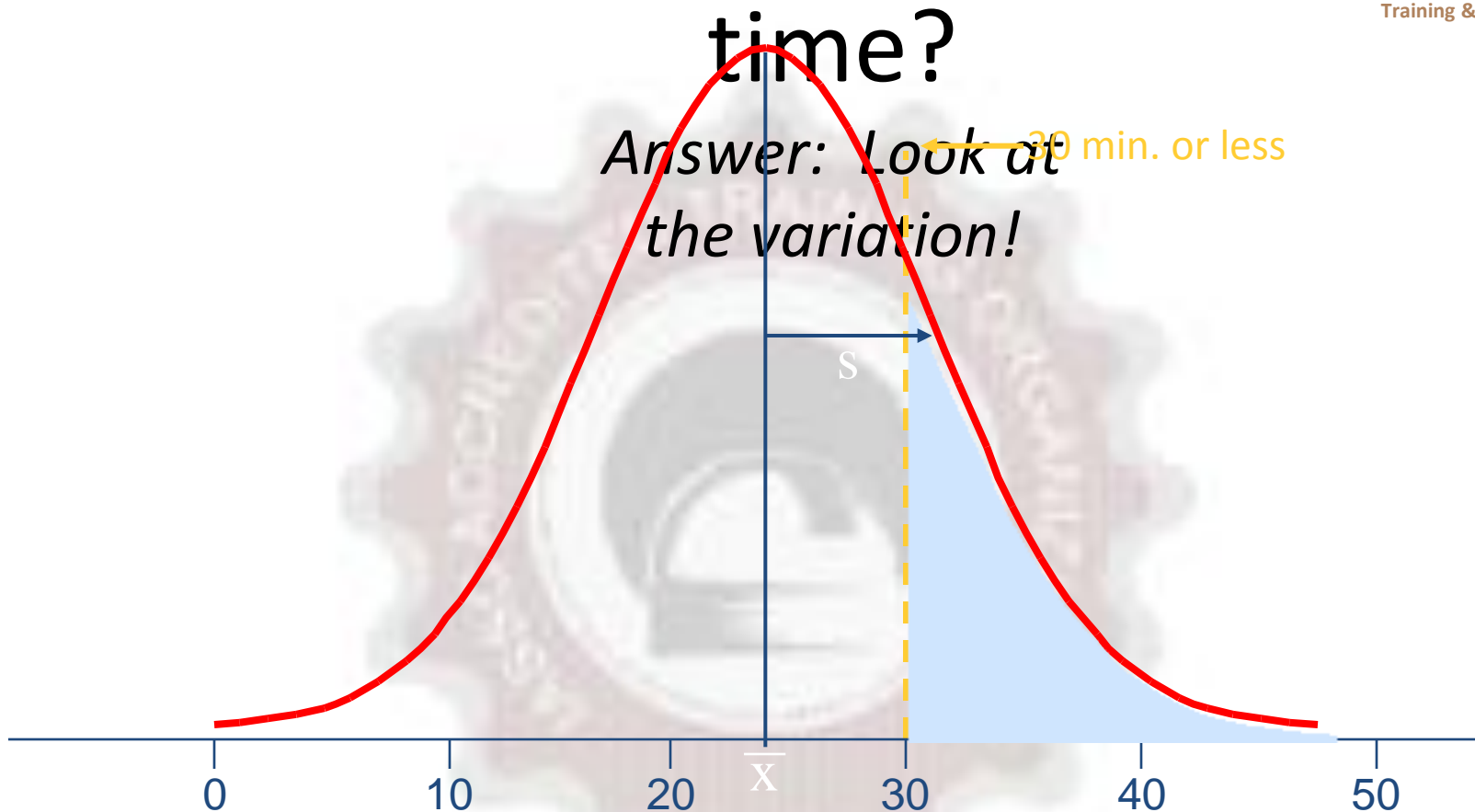
- Customers want their pizza delivered fast!



-  Guarantee = “30 minutes or less”
- What if we measured performance and found an average delivery time of 23.5 minutes?
 - On-time performance is great, right?
 - Our customers must be happy with us, right?

How often are we delivering on time?

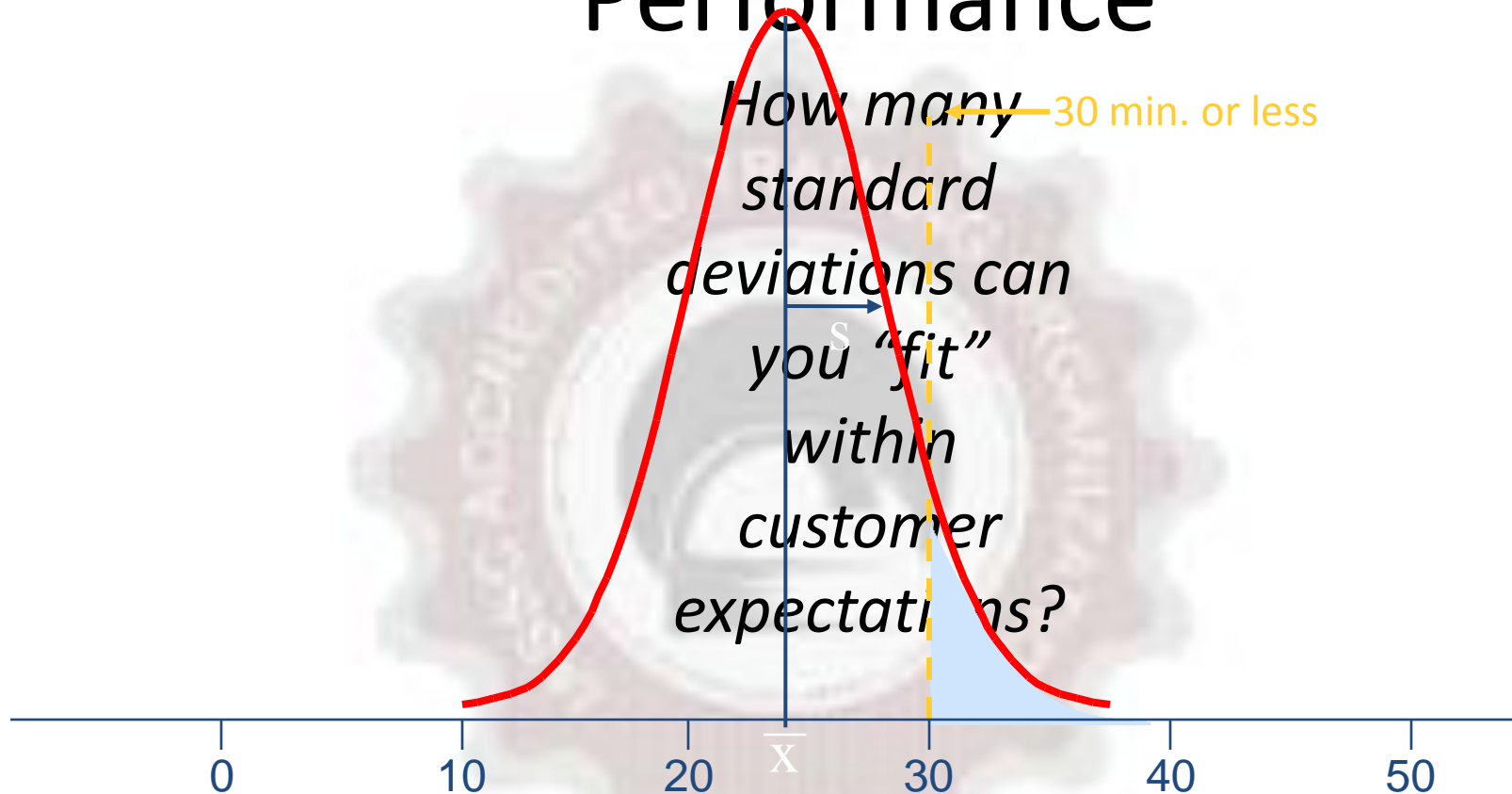
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- Managing by the average doesn't tell the whole story. The average *and* the variation *together* show what's happening.

Reduce Variation to Improve Performance

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Sigma level measures how often we meet (or fail to meet) the requirement(s) of our customer(s).

WHAT IS A METRIC ?



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Length Conversion

kilometer (km) → meter (m)
meter (m) → centimeter (cm)
centimeter (cm) → millimeter (mm)

Mass Conversion

kilogram (kg) → gram (g)
gram (g) → milligram (mg)

Volume Conversion

kiloliter (kl) → liter (l)
liter (l) → milliliter (ml)



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Six Sigma As a Metric.



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- It is a common saying “ what you cannot measure you cannot improve”.
- Six Sigma tools of Z value and DPMO act as metric and help us understand the measurement of various business processes done.
- Example would be : TAT for a recruitment drive done in a company and count of attrition.



Defining Defects



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Two measures are used to derive the sigma value for quality for any given process or product



the number of defects
In that product
or within an execution
of that process

the number of opportunities
for defects within
that product or within an
execution of that process

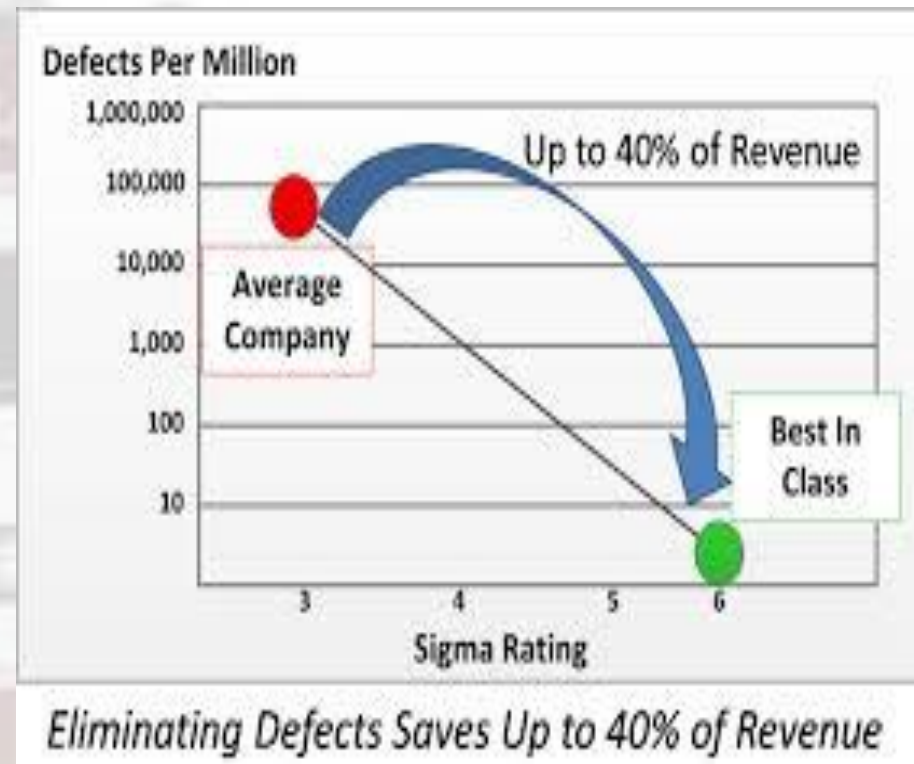


Six Sigma Defects.



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- Defect – any mistake or error that is passed on to a customer.
- Defects per unit (DPU) = $\text{number of defects discovered} \div \text{number of units produced}$.
- Defects per million opportunities (dpmo) = $\text{DPU} \times 1,000,000 \div \text{opportunities for error}$.



WHAT IS DMAIC ?

(Define, Measure, Analyse, Improve, Control)

- A logical and structured approach to problem solving and process improvement.
- An iterative process (continuous improvement)
- A quality tool which focus on change management style.



DMAIC – The Improvement Methodology



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Define

Measure

Analyze

Improve

Control

<u>Objective:</u> DEFINE the opportunity	<u>Objective:</u> MEASURE current performance	<u>Objective:</u> ANALYZE the root causes of problems	<u>Objective:</u> IMPROVE the process to eliminate root causes	<u>Objective:</u> CONTROL the process to sustain the gains.
<u>Key Define Tools:</u> <ul style="list-style-type: none"> • Cost of Poor Quality (COPQ) • Voice of the Stakeholder (VOS) • Project Charter • As-Is Process Map(s) • Primary Metric (Y) 	<u>Key Measure Tools:</u> <ul style="list-style-type: none"> • Critical to Quality Requirements (CTQs) • Sample Plan • Capability Analysis • Failure Modes and Effect Analysis (FMEA) 	<u>Key Analyze Tools:</u> <ul style="list-style-type: none"> • Histograms, Boxplots, Multi-Vari Charts, etc. • Hypothesis Tests • Regression Analysis 	<u>Key Improve Tools:</u> <ul style="list-style-type: none"> • Solution Selection Matrix • To-Be Process Map(s) 	<u>Key Control Tools:</u> <ul style="list-style-type: none"> • Control Charts • Contingency and/or Action Plan(s)



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Define – DMAIC Project

What is the project?



- What is the problem? The “problem” is the Output (a “Y” in a math equation $Y=f(x_1,x_2,x_3)$ etc).
- What is the cost of this problem
- Who are the stake holders / decision makers
- Align resources and expectations

DEFINE Phase



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- Define the Project
- Define the Process
- Define the Customer Requirements
- Define the CTQ (Critical to Quality)



Measure Phase



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- Measure the Baseline Capabilities
- Measure the Risk of Failure



Analyze Phase



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- In terms of X's and Y's, the Analyze phase is quite simple: All graphical tools (e.g., stratified frequency plots, pie charts, scatter plots, etc.) and statistical tools (hypothesis tests, regression analysis, design of experiments) that Green Belts and Black Belts learn during training have just one goal:
- Verifying and quantifying X- Yrelationships.

Improve Phase



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- Various frameworks are used to generate list of robust actionable solution, two of the commonly used framework to develop list of robust actionable solution is QFD (Quality Function Deployment) and FMEA (Failure Mode and Effect Analysis).



Control Phase



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- Control – Sustainable Benefits

How do we "hold the gains" of our new process?



CLOSE -UP



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- It is a performance goal representing 3.4 Defects per million opportunities
- It is A series of tools and methods used to improve or design products, processes, and/or services.
- A statistical measure indicating the number of standard deviations within customer expectations.
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Thank You



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