

The logo of Galgotias University is a circular emblem with a stylized 'G' shape in the center. The 'G' is composed of several curved segments in shades of yellow, orange, and blue. The background of the emblem is a light, textured grey.

**Unit 6:  
L-2  
Six Sigma**

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# Objectives

Sigma ( $\sigma$ ) stands for the *standard deviation*, which is a measure of variation in the process. Assuming that the process output is represented by a normal distribution, about 99.73% of the output is contained within bounds that are three standard deviations ( $3\sigma$ ) from the mean.

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## What is six sigma..????

- Six sigma is a business statistical Strategy.
- Is to identifying defects and removing them from the process of products to improve quality.
- A defect is defined as any process output that does not meet customer specifications.
- Statistical measure to objectively evaluate processes.

## History of six sigma

- The Six sigma was founded by Motorola in the 1970s.
- Out of senior executive Art Sundry's criticism of Motorola's bad quality.
- They founded a connection between increases in quality and decreases in costs of production.
- **Bill Smith**, "Father of six sigma" introduce this quality improvement Methodology to Motorola.

## Six Sigma Definition

- Quality management program developed by Motorola in the 1980s.
- Management philosophy focused on business process improvements to:
  - ✓ Eliminate waste, rework, and mistakes
  - ✓ Increase customer satisfaction
  - ✓ Increase profitability and competitiveness

## Six Sigma Methods



DMAIC

A red starburst shape with a thick red outline and a light red fill, containing the text 'DMAIC'. A red arrow points from the top of the starburst towards the 'Six Sigma Methods' title.

- **D**efine
- **M**easure
- **A**nalyze
- **I**mprove
- **C**ontrol

Name of the Faculty: Mr. Anurag Shanu



DMADV

A red starburst shape with a thick red outline and a light red fill, containing the text 'DMADV'. A red arrow points from the top of the starburst towards the 'Six Sigma Methods' title.

- **D**efine
- **M**easure
- **A**nalyze
- **D**esign
- **V**erify

Program Name: B.Tech (ME)

## DMAIV Explanation

**Define** : company must identify the customer and which type of a product and hope from it. These are analyze by using flow cause/effect diagrams, check sheets, pareto analysis.

**Measure** : company will collect the baseline data to determine where the process stands as compare to where it needs to be. And also see the critical to quality characteristics an estimate current process capability. Then find out the current sigma level according to those identified characteristic that are mostly important to the customer

## DMAIV cont....

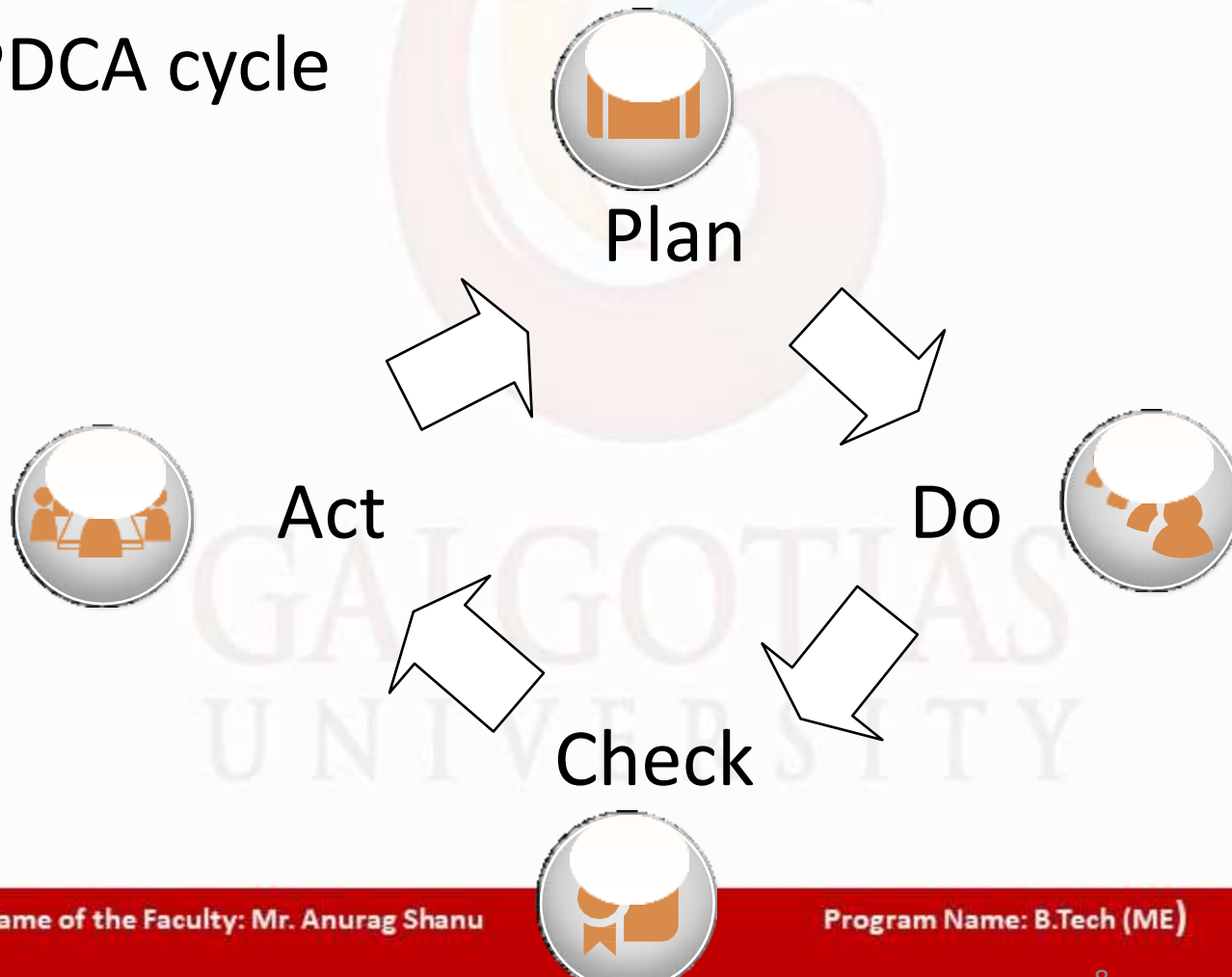
**Analyze** : this shows the amount of improvement necessary to make the Critical to quality characteristics the best in the industry. For this phase company use some descriptive statistical methods like mean, mode, median...etc.

**Improve** : Implement the suggested improvements in this phase And also test possible solutions to the process problem. Collect data from the all possible solutions and test them on a small scale and run a cost/benefit analysis of implementing the solution. Then choose the best solution and create a plan for implement the solution.



## Improvement cycle

- PDCA cycle



## DMAIV cont....

- **Control** : measures are implemented to ensure improvements are maintained. To monitor the process improvements, basically use tools like statistically process control charts. These charts have three limits, the center line for the average. Monitor the process to ensure that the process is in the control limits.

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## DMADV Explanation

**This method is also called DFSS (Design For Six Sigma)  
And have five phases,**

*Define* design goals that are consistent with customer demands and the enterprise strategy.

*Measure* and identify CTQs (characteristics that are **Critical To Quality**), product capabilities, production process capability, and risks.

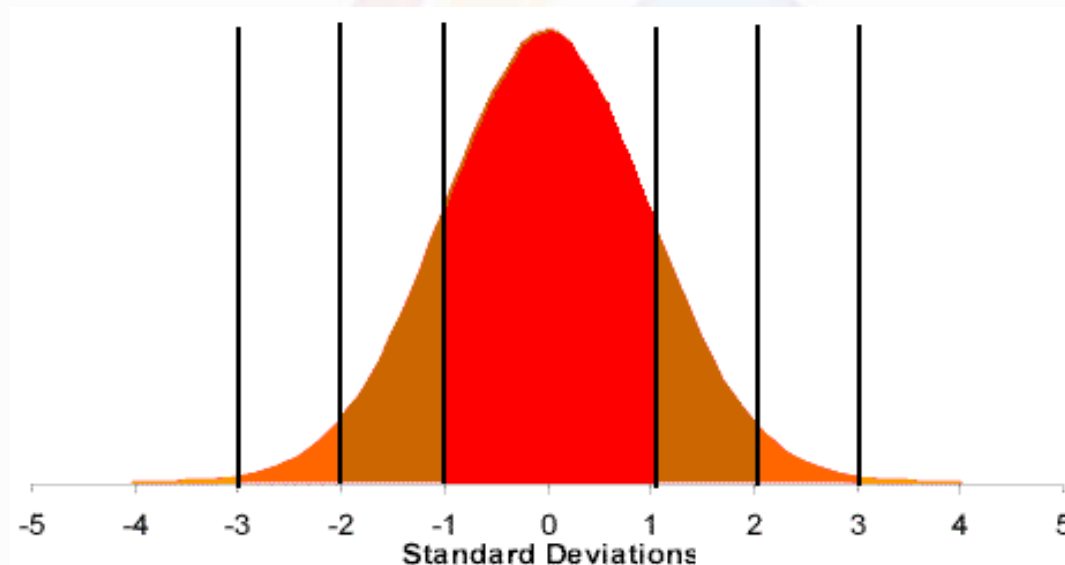
*Analyze* to develop and design alternatives, create a high-level design and evaluate design capability to select the best design.

## DMADV cont....

- ***Design*** details, optimize the design, and plan for design verification. This phase may require simulations.
- ***Verify*** the design, set up pilot runs, implement the production process and hand it over to the process owner(s).

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## Statistical view of Six Sigma



Between -1 and +1  
Standard Deviation  
Between -2 and +2  
Standard Deviation  
Between -3 and +3  
Standard Deviation

68.3% (about two  
thirds)

95.5% (about 95%)

99.7%

## Implementing Roles

- Executive Leadership (CEO and other top level managers)
- Champions (act as the leaders of black belts. And also )
- Master Black Belts (chosen by champions, give their full effort to six sigma. Help to champions and guide the Black belts and green belts).
- Black belts (working under Master Black Belts, they are applying six sigma to specific projects).
- Green Belts (Working under the black belts).



Implement

Zero defects

Quality Control

Total Quality Management

Six Sigma



# Six Sigma Companies



**SONY**



## Focus of Six Sigma

- Accelerating fast breakthrough performance
- Significant financial results in 4-8 months
- Ensuring Six Sigma is an extension of the Corporate culture, not the program of the month
- Results first, then culture change!

## Criticisms

- There is nothing new. It only proves defects and defectives counts offer tangible, measurable results.
- It is corrective action system rather than taking a preventive and proactive approach to problems.
- It is merely about appraisal system and that appraisal programs aren't useful. In reality, appraisals are great tools for identifying and tracking improvements, which is critical to any project.
- Critics have suggested that Six Sigma did not bring quality improvement in all the organizations where it was implemented. It depends on the tools and authorizations.

Management philosophy of quality

- Statistical target of six sigma or 3.4 defects in one million opportunities

Components of Six Sigma are people power and process power

- Executive Leader, Champion, Master Black Belt, Black Belt, and Green Belt

Define, Measure, Analyze, Improve, Control

- Criticisms

Summary

## Summary

1. It's more product oriented than any other model of development
2. Six Sigma is a great way to improve your production in any area of business
3. It's techniques reduce errors which cost more in production than in design

## References

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