SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

An Autonomous Institution

Accredited by NAAC – UGC with 'A' Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF COMPUTER SCIENCE AND TECHNOLOGY

COURSE NAME : 19OE114 –TOTAL QUALITY MANAGEMENT

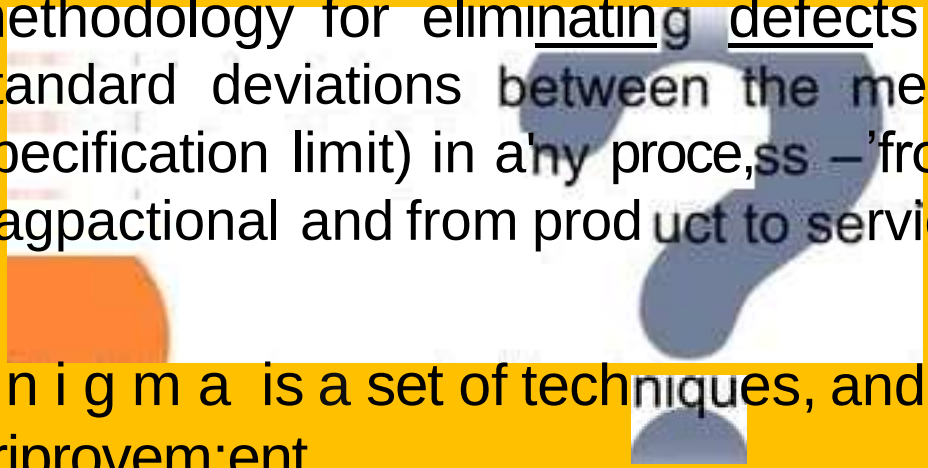
III YEAR / VI SEMESTER

Unit 3 - TQM TOOLS & TECHNIQUES

SIX SIGMA CONCEPTS

WHAT IS SIX SIGMA?

Six Sigma is a disciplined, data-driven approach and methodology for eliminating defects {driving toward six standard deviations between the mean and the nearest specification limit) in a'ny proce,ss –’from manufacturing to tragpactional and from prod uct to service.



e n i g m a is a set of techniques, and tools for process irriprovem;ent.

The ”word Sigma is a statistical term that measures how far a glven process deviates from perfection.


ADD VALUE TO ORGANIZATION & STAKEHOLDER
ORGANIZATIONAL DIRECTION
• Identify opportunities
• Voice of Stakeholder & Organization
• Sponsors & Champions
• Team Guidelines
Six Sigma
TECHNICAL SOLUTIONS
• Reduce variation
• Analyze data
• Activity, Program & Process Design
• Statistical Tools
PERFORMANCE & RELIABILITY
OWNERSHIP
• Involved Employees
• Green/Black Belt
• Training/Mentoring
PROJECT DELIVERY & EVALUATION

HISTORY

Since the 1920's the word “sigma”(s) has been used by mathematicians and engineers as a symbol for achievement of Measurement in product quality variation.

in the mid-1980's engineers in MotDrola in the USA used ”Six Sigma”(S) an informal name for an in-house initiative for reducing defects in production processes, because it represented a suitably high level of quality.

In the late-1980's Motorola extended the Six Sigma methods to its critical business processes, became a formalized 'branded' name for a performance improvement methodology, i.e, beyond purely 'defect reduction .

In 1991 Motorola certified its first 'Black Belt' Six Sigma experts, which indicates the beginnings of the formalization of the accredited training of Six Sigma methods.

By the vear 2000, Six Sigma was effectively established as an industry in its own right, involving the training, consultancy and implementation of Six Sigma methodology.

FEATURES OF SIX SIGMA

A six sigma process is one in which 99.9999966% of the products manufactured are statistically expected to be free of defects (3.4 defects per million).

Six Sigma's aim is to eliminate waste and inefficiency, thereby Increasing customer satisfaction by delivering what the customer is expecting.

Six Sigma is a data driven methodology, and requires accurate data collection for the processes being analyzed.

Six Sigma is about putting results on Financial Statements.

Six Sigma follows a structured methodology, and has defined roles for the panicipants.

Six Sigma is a business-driven, multi-dimensional structured approach for:

-Improving Processes

- Lowering Defects
- Reducing process variability
- Reducing costs
- Increasing customer satisfaction
- Increased profits

FATHER OF SIX SIGMA

Sir Bill Smith

" *the Father of six sigma*"

KEY CONCEPTS OF SIX SIGMA

CRITICAL TO QUALITY: Attributes most important to the customer.

DEFECT: Failing to deliver what tha customer wants,

STABLE Ofi ELATIONS. Ensuring consistent, predictable processes to improve what the customer sel2s and feeis.

PROCESS CAPABILITY: What your process can deliver.

VARIATION: What the customer sees and feels.

DESIGN FOR SIX SIGMA: Designing to meet customer needs and process capability.

KEY ELEMENTSOF CIX SIGMA

CUSTOMERS	PROCESSES	EMPLOYEES
Cusomersdefne Quail.Theyexpec| performance. reliability, competitive prices, Dn-time delivery. service. clear and correct transaction processing and more.	By understanding the transaction lifecycle from the customer's needs and processes. we can discover what they are seeing and feeling.	Company must provide opportunities and incentives for employees to focus their talents and ability to satisfy customers.

ORGANIZATION OF SIX SIGMA

Leadership

Sponsor

Implementation Leader

Coach

Team Leader

Team member

Procees Owner

EXTENDED DEFINITIONS OF ROLES IN SIX SIGMA(BELT COLORS)

Black Belt	Master Black Belt	Green Belt
The individual designated as a Black Belt has completed a thorough internal training program and has the experience of working on several projects.	The Master Black Belt is available to answer procedural questions and to resolve the technical issues that come up.	A Green Belt is less experienced than a Black Belt but is cast in a key role within the team.

IS SU SIGMA RIGHT FOR AN ORGANIZATION

Is the strategic course clear for the company?

Is there a strang theme or vision for the future of the organizatiDn that Is well understood and consistently communicated?

How effective are your current improvement and change management systems?

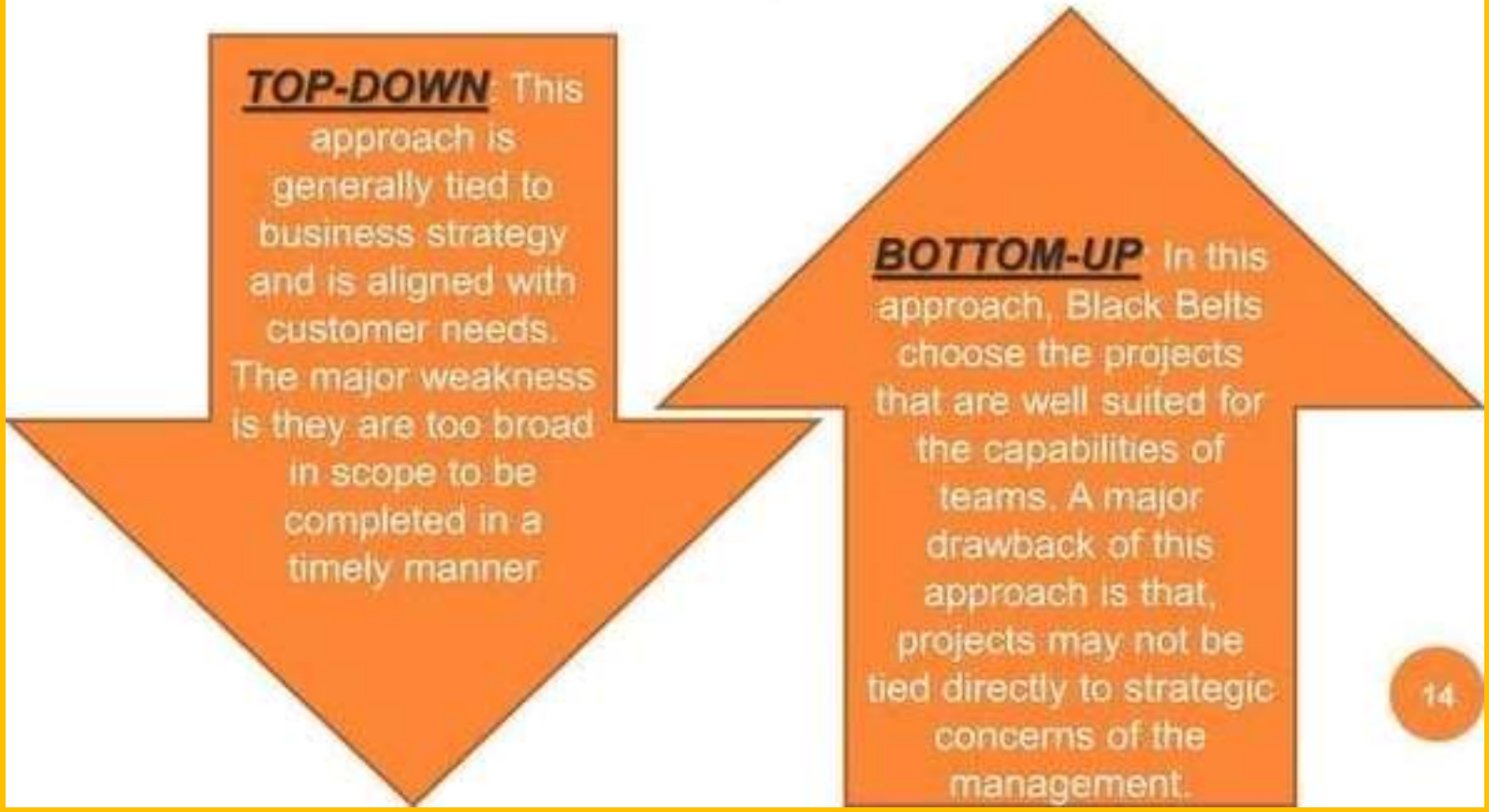
Is the business healthy enough to meet the expectations of analgStD and investors?

Is the organization good at *responding effectively and* efficiently to new circumsta nces?

What other change efforts or activities might conflict with Dr support Six Sigma initiative?

PROJECT GENE T ON FOR SIX SIGMA

Tåerv arc generally Łnb \ra}s lo genci ale projccls:



METHODOLOGY OF IX SIGMA

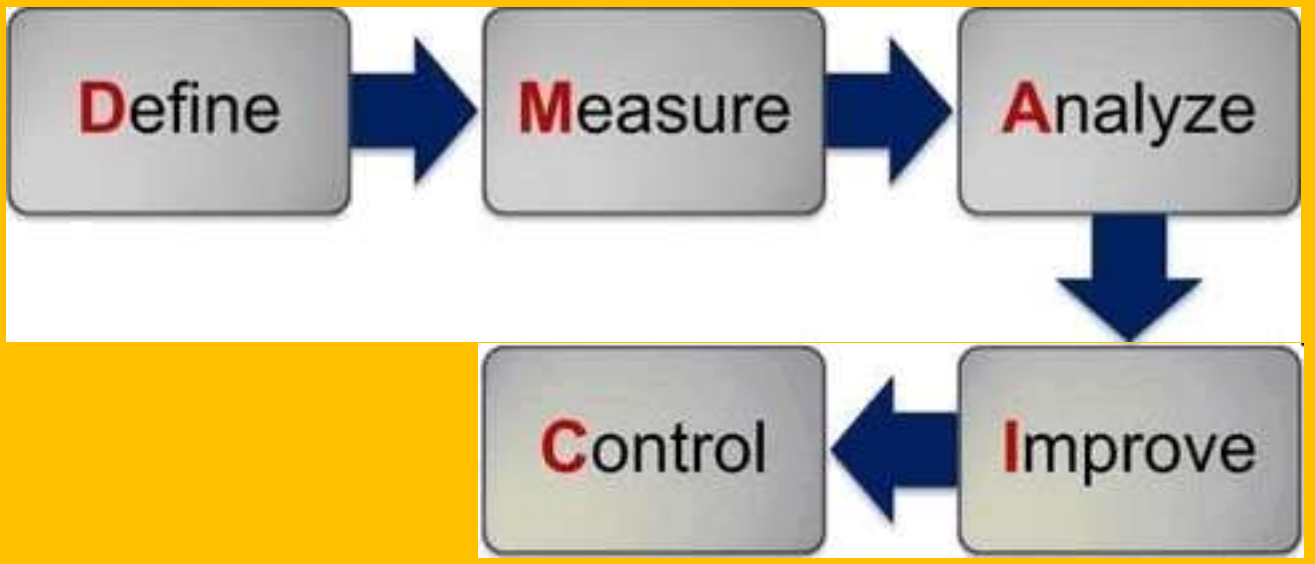
Six Sigma has two key methodologies:

I› xi t Ir : \t refers to a data-driven quality strategy for improving processes. This methodology is used to improve an existing business process.

IJ\i I iJ\ : It refers to a data-driven quality strat€•gy for designing products and processes. This methodology is used lo create new product designs or process designs in such a way that it results in a more predictabl , Nature and defect free performance.

DMAIC METHODOLOGY

This methodology consists of the following five steps.



DEFINE: Define the problem or project goal that needs to be addressed.

MEASURE: Measure the problem and process from which it was produced.

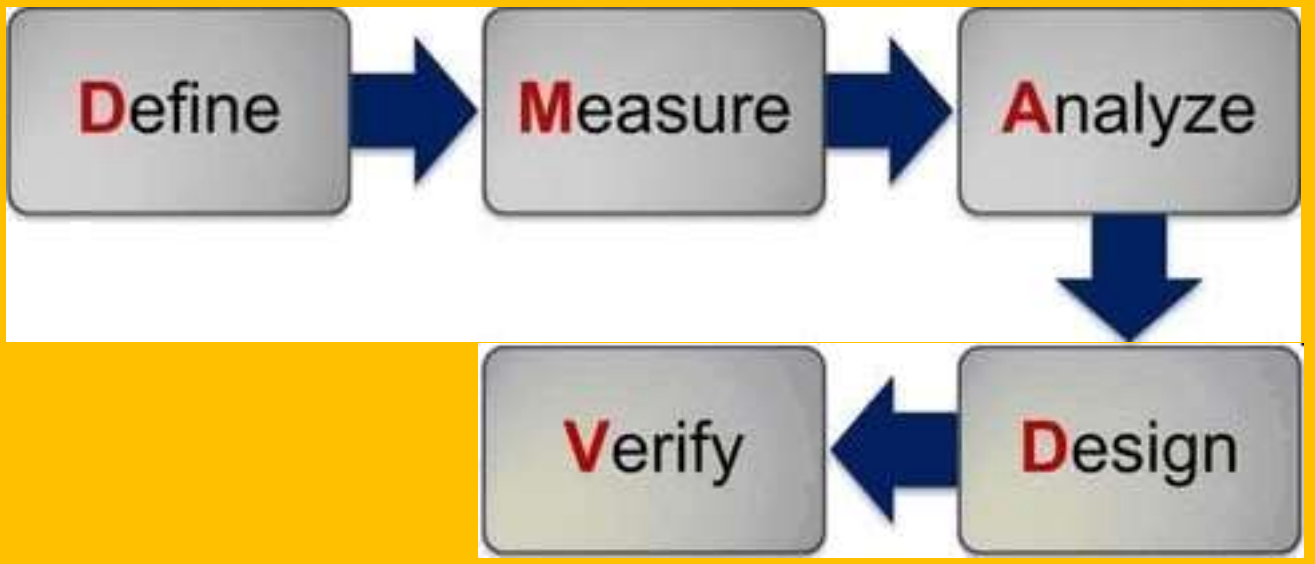
ANALYZE: Analyze data and process to determine root cause of defects and opportunities.

IMPROVE: Improve the process by finding solutions to fix, diminish, and prevent future problems.

CONTROL: Implement, control, and sustain the improvement solutions to keep the process on the new course.

DMADV METHODOLOGY

This methodology consists of the following five steps.



DEFINE : Define the Problem or Project Goal that needs to be addressed.

MEASURE: Measure and determine customers' needs and specifications.

ANALYZE: Analyze the process to meet the customer needs.

DESIGN: Design a process that will meet customers' needs.

VERIFY: Verify the design performance and ability to meet customer needs.

DEFINE PHASE

The first step is Define. During the Define phase four major tasks are undertaken.

I- Project Team Formation

2- Decument Customers Core Business Processes

3- fievelop n Project Charter

4- Develop The SI f•OC Process Map

MEASURE PHASE

During the Measure Phase, the overall performance of the Core Business Process is measurRd. There are three important parts of Measure Phase

Data Collection Plan And Data Collection

Data Evaluation

FMEA

Data Collection Plan And Data Collection

A data collection plan is prepared to CDllect the required data. This plan includes what type of data needs to be collected, what are the sources of data, etc.

You collect data from three primary sources:

Data Evaluation

At this stage, the collected data is evaluated and sigma is calculated. It gives an approximate number of defects.

-A Six Sigma defect is defined as anything outside of customer specifications

-A Six Sigma opportunity is the total quantity of chances for a defect.

First we calculate Defects Per Million Opportunities (DPMO), and based on that a is decided from a predefined table:

$$DPMO = \frac{Numher\ of\ defects}{Number\ of\ Unifs\ X\ Num6er\ of\ opportunities} X 1\,000{,}0$$

The food ordering delivery project team examines 50 deliveries and tinds out the following:

-Delivery is not on time (13)

-Ordered food is not according to the order (3)

-Food is not fresh (0)

So now, DPMO will be as follows:

$$DPMO = \frac{13 + 3}{50 \times 3} \times 1,\ 00,\ 00 = 1O\ \ 6\ \ .7$$

According to the Yield to Sigma Conversion Table 106,666.7 defects per million opportunities is equivalent to a sigma performance of between 2,7 and 2,8.

This is the method used for measuring results as we proceed through a project. This beginning point enables us to locate the cause and effect of those processes.

Yield %	DPMO	Sigma	Yield %	DPMO	Sigma
&8Ł	933200	0	91.79	$21€	9.IN
13.03	869700	0.375	97.73	22700	3.0
19.08	809200	0.625	9&38	12200	3.7S
21€	773400	ß7S	m.u	8800	3J75
45.025	S487Sß	tJ75	99.87	1300	4.5
SO	500000	Ł.S	99.91	900	4.625
59.87	401300	1.7S	99.96	400	4.875
77.34	226600	2Z	99.992	80	5.375
80.92	190800	2J7S	99997	30	5.5
84.I3	158700	US’	99.99767	23.35	5d2S
				16.7	
91.545	84550	2J3S	99.99966	3.4	6