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

FMEA STAGES AND TYPES

Failure Mode And Effects Analysis (FMEA)

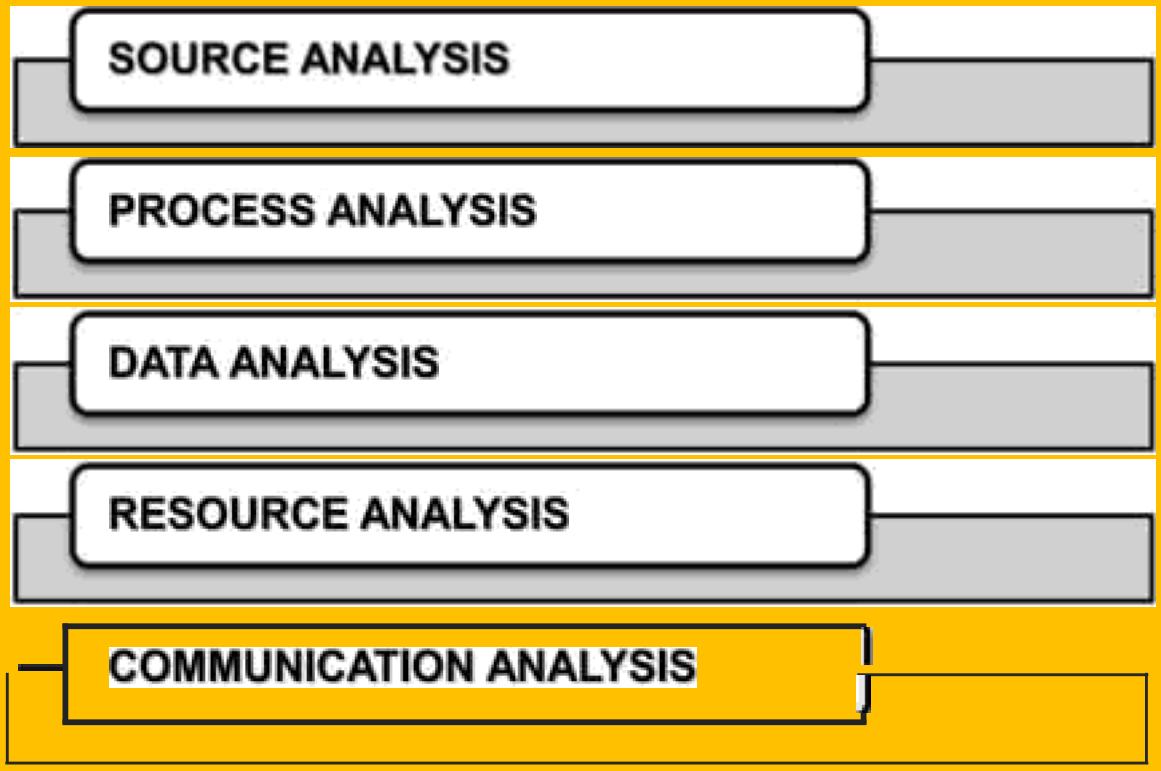
It refers to preventing defects before they occur. The *FMEA* process usually includes rating possible defects, or failures, in three ways:

- The likelihood that something might go wrong.
- The ability to detect a defect.
- The level of severity of the defect

Rate each of these three areas from 1 to10, with 1 being the lowest FMEA level and 10 being the *highest.* The higher the level ,the more severe the rating. Hence, a high FMEA indicates the need to devise and implement improved measuring steps within the overall process. This would have the effect of preventing defects.

ANALYZE PHASE

There are five specific types of analyses that help to promote the goals of the project.



SOURCE ANALYSIS

This is also called root cause analysis. It attempts to find defects that are derived from the sources of information or work generation. After finding the root cause of the problem, attempts are made to resolve the problem before we expect to eliminate defects from the product.

PROCESS ANALYSIS

-Analyzing the numbers to find out how well or poorly the processes are working, compared to what's possible and what the competition is doing.

-PrDcess analysis includes creating a more detailed prDcess map, and analyzing the more detailed map, where the greatest inefficiencies exist.

-The process refers to the precise movement of materials, information, or requests from one place to anDther.

DATA ANALYSIS

-Many a times the data itself may have defect

-There may be a case when products or delivery do not provide all the needed information.

-Data is analyzed to find out defects and attempts are made to resolve the problem before it is expected to eliminate defects from the product.

RESOURCE ANALYSIS

-It is also needed to ensure that employees are prDperly trained in all departments that affect the process.

-Resources include raw materials needed to manufacture, process, and deliver the goods.

For example,

If the Accounting Department is not paying vendor bills on time and, consequently, the vendor holds up a shipment of shipping supplies, it becomes a resource problem.

COMMUN CATION ANALYSIS

-One problemcommon to most processes high in defects is poor communication.

-The classic interaction between a customer and a retail store is worth studying because many of the common communication problems are apparent.

For example.

A vendor wants payment according to agreed-upon terms, but the Accounting Department wants to make its batch processing uniform and efficient. Between these types of groups, such disconnects demonstrate the importance of communication analysis.

IMPROVE PHASE

The objective of Improve phase is to identify:

- Improvement breakthroughs,
- Identify high gain alternatives,
- Select preferred approach,
- Design the future state,
- Determine the new sigma level,
- Perform cosVbenefit analysis,
- Design dashboards/scorecards, and
- Create a preliminary implementation plan.

CONTROL PHASE

-This is the phase where one ensures that the processes continues to work well, produce desired output results, and maintain quality levels.

-This phase is concerned with four specific aspects of control, which are as follows.

Quality control

Standardization

Control methods and alternatives

Responding when defects occur

TECHNICAL TOOLS

The technical tools are those tools which a Six Sigma team member needs to master as they progress through any one of the methodology.

Tool #1 —The Critical to Quality (CTQ) Tree

The steps in creating a CTO tree are as follows'

- Identify the customer of the process targeted for improvement.

- Identify lhe need of the customer.

identify trie first level of requirements of the need.

- Drill down to more detailed level(s) of the requirement if necessary.

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CTQ TREE

Tool #2 —The Process Map

-A process map is a picture of the current steps in the process targeted for improvement.

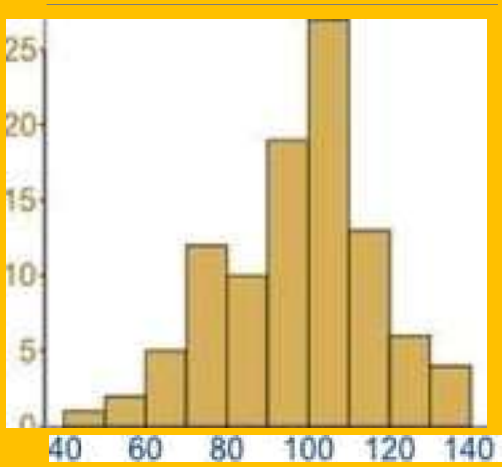
A process map has five major categories of work:

- The identification of the suppliers of the process,
- The inputs the suppliers provide,
- **The name of the process,**
- The output of the process,
- **The customers of the process.**

Tool #3 —Histogram

0 Data is of two types - Discrete data (go/no go, fail or pass) and Continuous data(time, height etc.).

OThe data should be organized into graphs or charts, which makes it easier to understand, what the data is saying about the process.

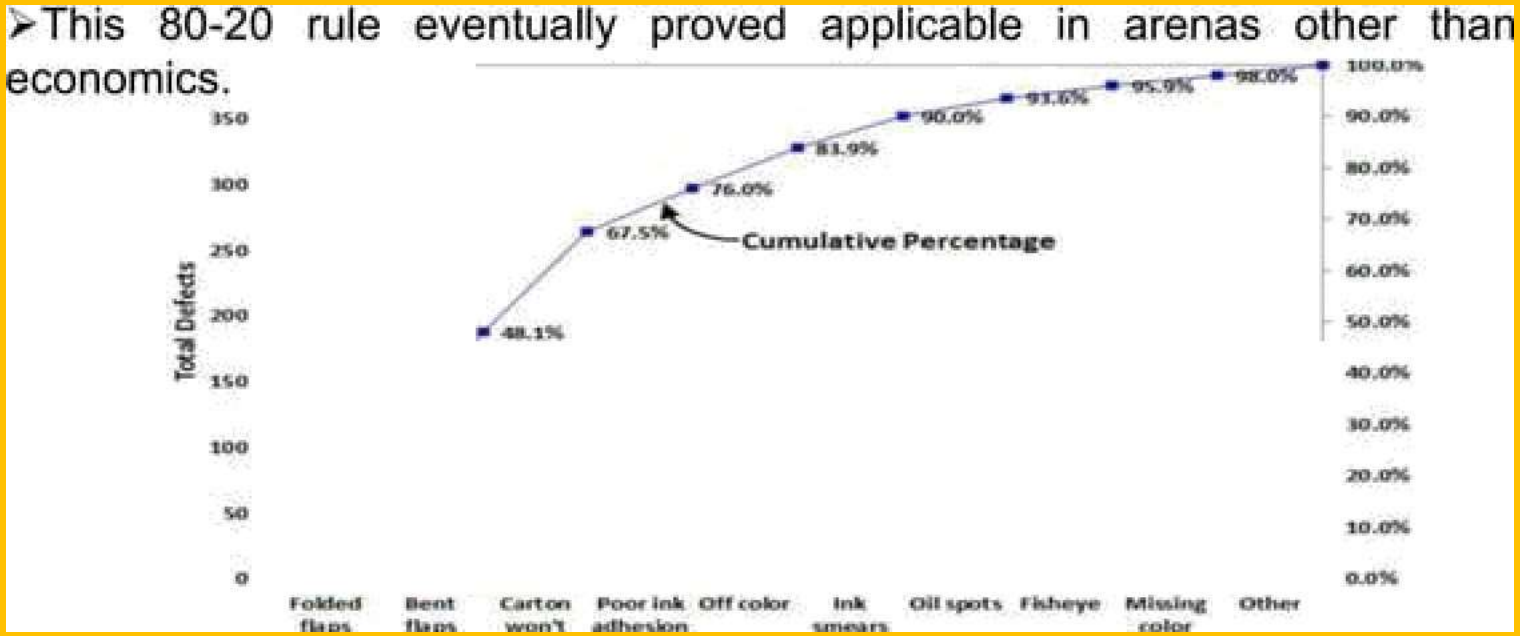


Tool #4 —The Pareto Chart

?When the data Is discrete, Pareto chart is used.

PARETG PRINCIPLE: An Italian economist Vilfredo Pareto, in the sixteenlh century proved mathematically that 80 percent of the world's wealth was controlled by 20 percent of the population.

➢This 80-20 rule eventually proved applicable in arenas other than economics.



Tool #5 —The Process Summary Worksheet

OThe process summary worksheet is a “roll-up" of the sub process map indicating which steps add value in the process and which steps don't add value.

Process Summary Worksheet

Process Step	1	2	3	4	5	6	s	Percent
Time (in minutes)	1	20	15	45	10	15	106	100.0
Value added	x					x	16	15.1
Non-value added		x	x	x	x		90	84.9
Moves							0	0
Delays				x			45	42.5
Set-up							0	0
Internal failures			x		x		2S	33.5
External failures		x						18.9
Control / Inspection							0	0
Value-enabling							0	0

Tool #6 - The Cause-Effect Diagram

Tool #7 —The Scatter Diagram

OOnce ideas have been prioritized after use of the cause-ePect diagram, the most important thing the project team does is to validate the remaining ideas with fact and data.

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Tool #8— The Affinity Diagram

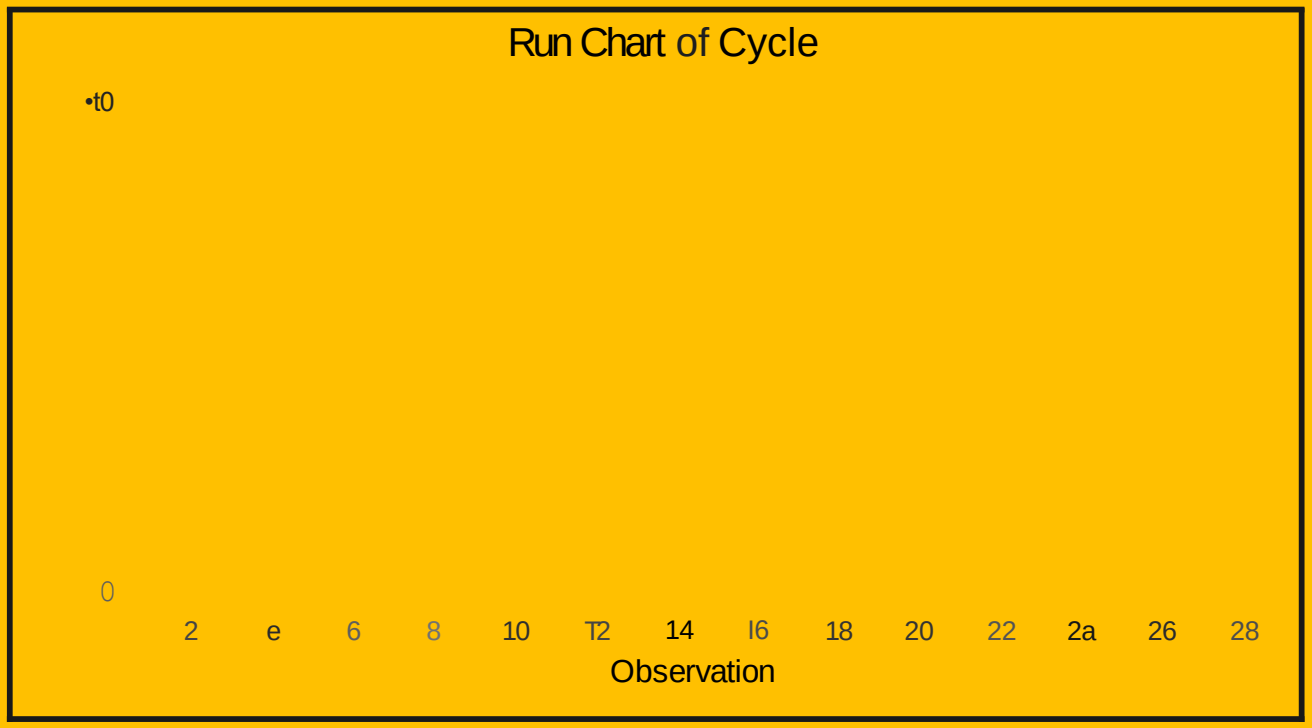
OAn affinity diagram is used to help son and categorize a large number of ideas into major themes or categories.

0 It is especially useful when the team is ready to brainstorm solutions.

Start-up Problems -Affinity Diagram

Tool #9— The Run Chart

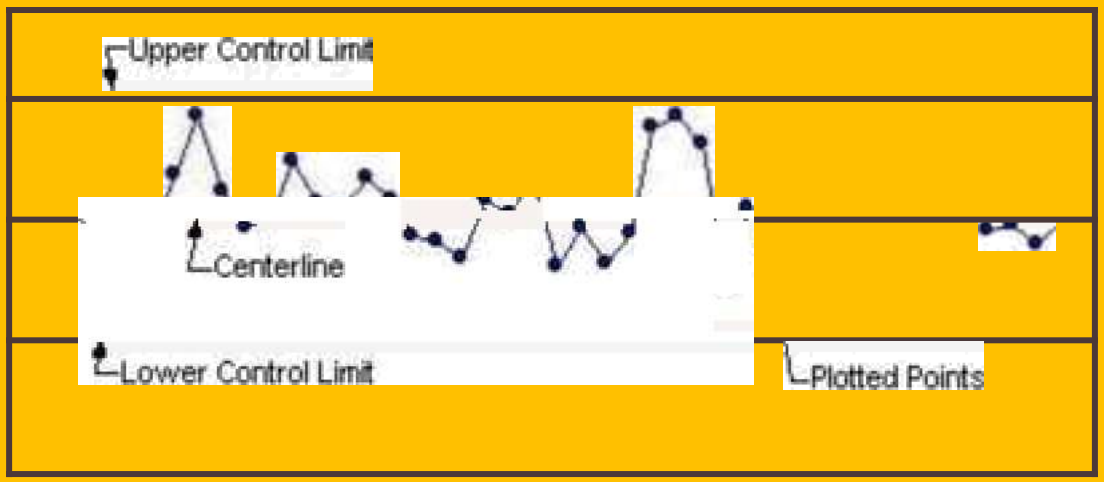
OThe run chart is similar to a camcorder, recording some process element over time.



Tool #10— The Control Chart

OSimilar to a run chart, a control chart uses the data from a run chart to determine the upper and lower control limits.

OThese limits are mathematically calculated and indicated by dotted lines.



Labs

BENEFITS OF SIX SIGMA( )

.Generates sustained success

· Sets a performance goal for everyone

· Enhances value to customers

· Accelerates the rate of improvement

· Promotes learning and cross-pollination

· Executes strategic change

MYTHS ABOUT SIX SIGMA( )

Six Sigma is only concerned with reducing defects.

Six Sigma is a process for production or engineering.

Six Sigma cannot be applied to engineering activities.

Six Sigma uses difficult-to-understand statistics.

Six Sigma is just training.