UNIT- III

TQM TOOLS
&
TECHNIQUES - 1

The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking– Reason to bench mark, Bench marking process – FMEA – Stages, Types

NEW SEVEN MANAGEMENT TOOLS

- Affinity (KJ) diagram
- Relationship diagram
- Tree diagram
- Matrix diagram
- Decision tree (PDPC)
- Arrow diagram (PERT)
- Matrix data analysis

Tool 1: AFFINITY DIAGRAM

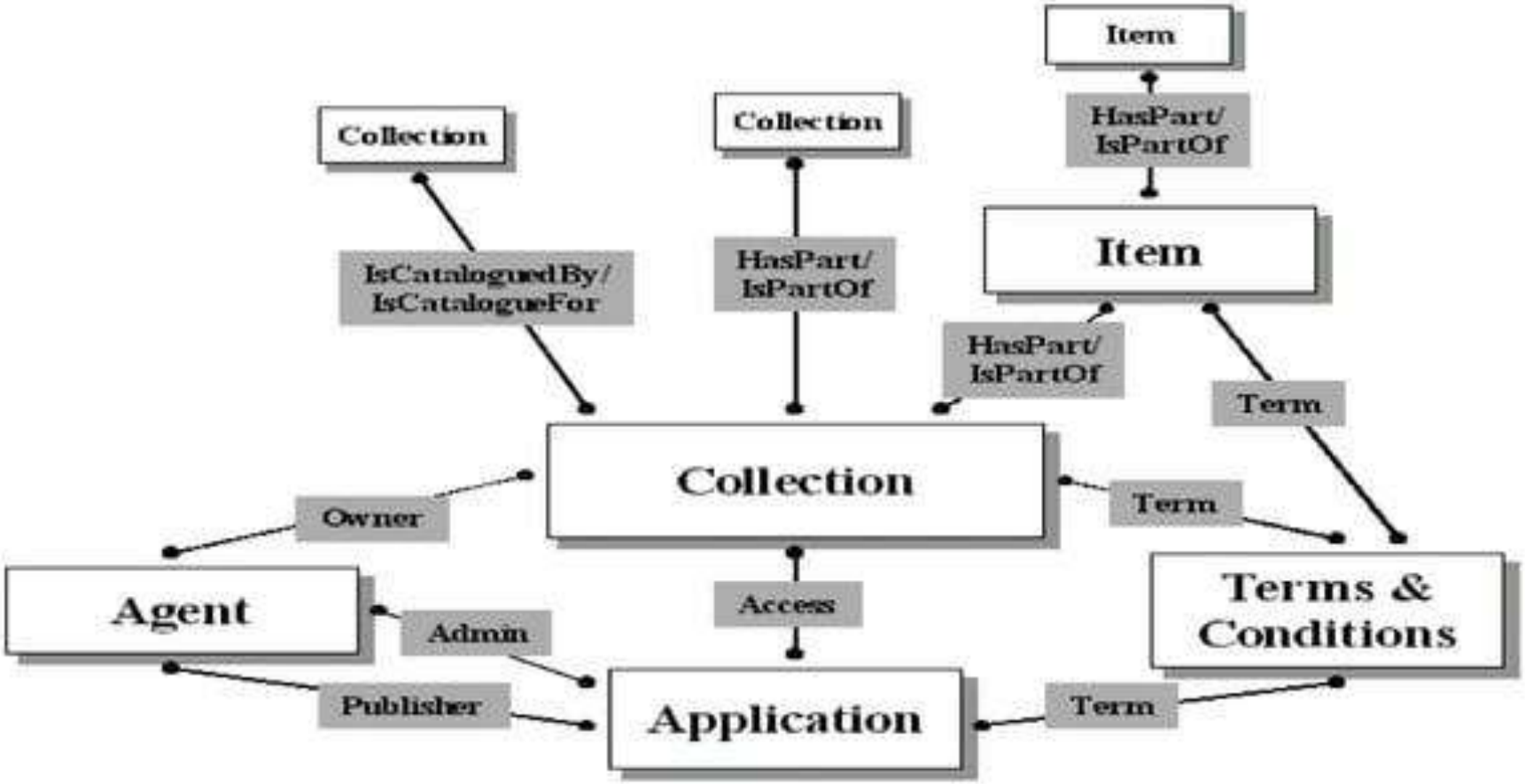
- A tool to collect a large amount of verbal expressions and organize them in groups according to natural relationship between individual items
- Also known as KJ diagram
- Special type of brainstorming tool
- Provide a visual representation of large amount of ideas
- Used to extract large amount of useful information from few or scattered data or from unrelated ideas
- Used to understand and organize problems that are not clear

AFFINITY DIAGRAM

Tool 2: RELATIONSHIP DIAGRAM

- Tool for finding causes to a problem
- Same as cause and effect diagram
- Not only clarifies the relationship between cause and effect but also between various causes
- Graphical representation of all factors in a complicated problem, system or situation
- Used to identify key problem from a list of important problems, identify the root cause of existing problems and identify key factors needed to make a decision

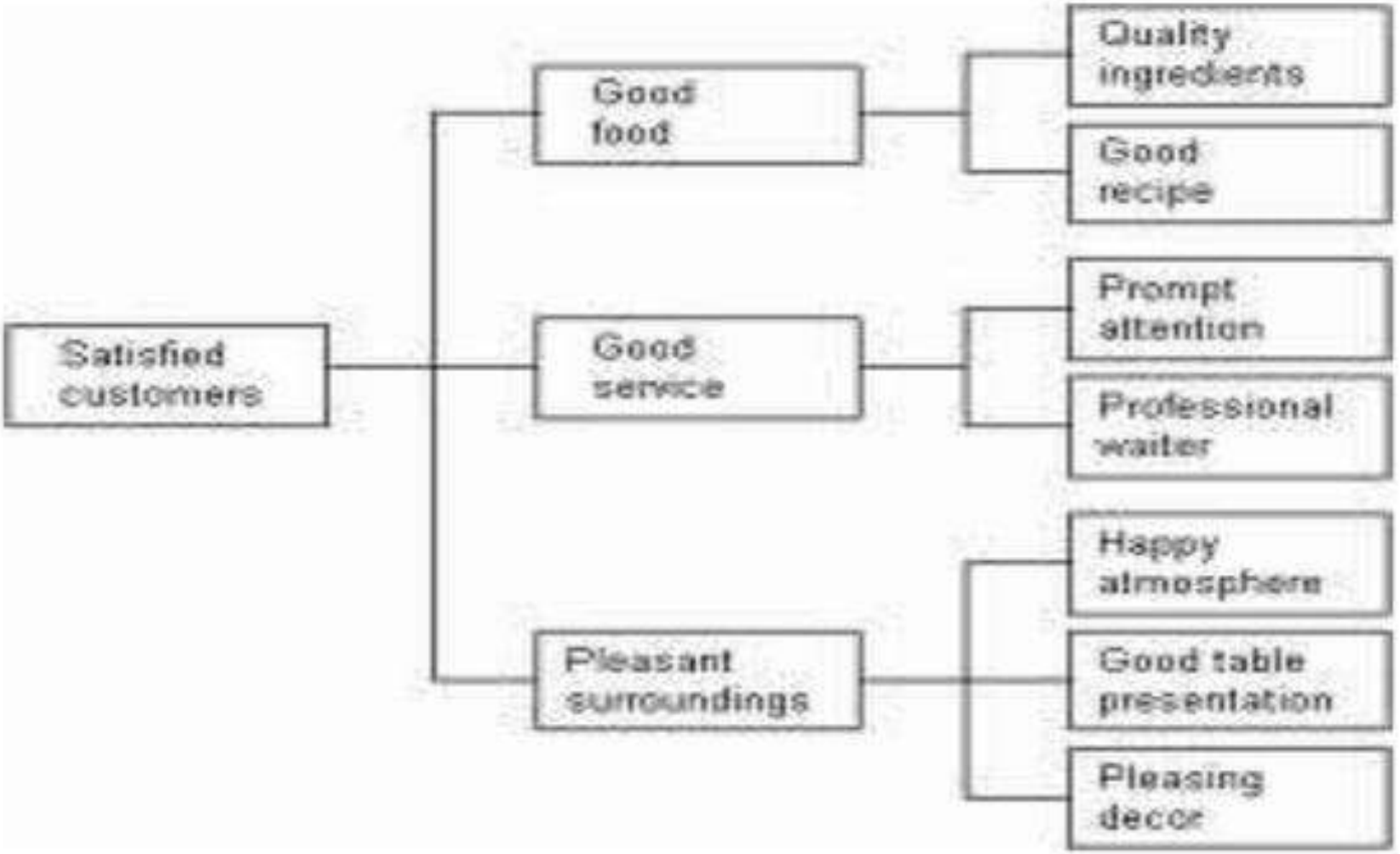
RELATIONSHIP DIAGRAM



Tool 3: TREE DIAGRAM

- Systematically breaks down a topic into its components elements and shows the logical and sequential links between these elements
- Systematically outlines the complete spectrum of paths and tasks that must be carried out to achieve a goal
- Used to develop a systematic, step by step, strategy to achieve an objective

TREE DIAGRAM



Tool 4: MATRIX DIAGRAM

- Systematically organize information that must be compared on a variety of characteristics in order to make a comparison, selection or choice
- It depicts the relationship between two sets of factors in the form of a table or a matrix
- Also known as quality table and it is the starting point in building a house of quality

MATRIX DIAGRAM

Improvement Tools Application by Function

Date: xx/xx/xx Tools / Function	QFD	SPC	JIT	CTM	BPR	CSA	Survey	Benchmarking	DOE	IPD	Metrics
Research	○	○				○	◎	◎	◎	△	
Planning	◎			○	◎			◎		◎	△
Finance											◎
Project mgmt.		△	△	◎			△	○		◎	◎
Administration				◎							◎
Engineering	○	○	△	△	◎			○	◎	○	○
Manufacturing		◎	◎	◎	△			△	○	△	○
Quality	◎	◎	○	△		◎	△	○	△	△	◎
Marketing	○		△			◎	◎	○		△	○
Sales/service	○	△	△	△		◎	◎	△		△	○

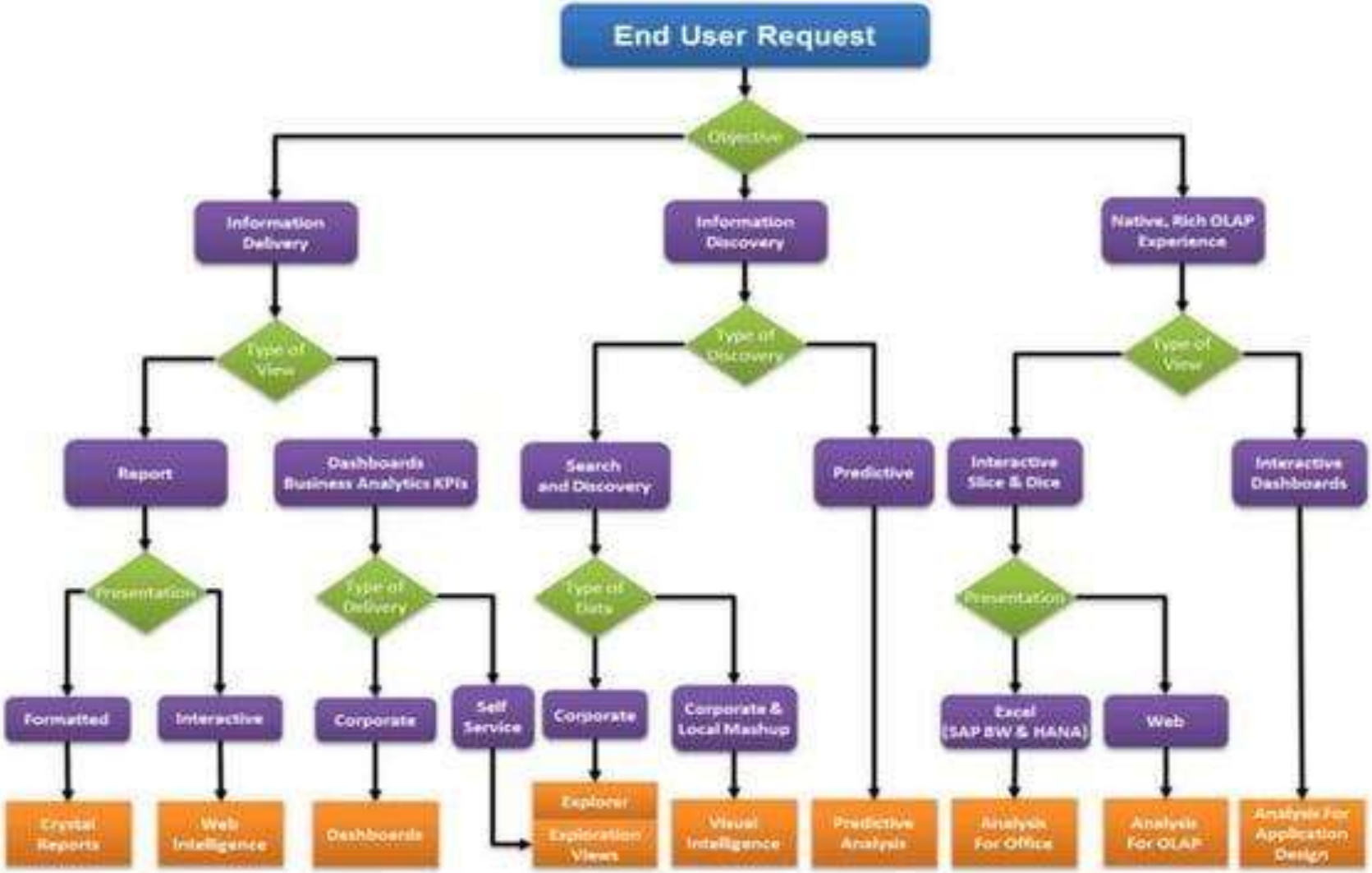
◎ = High ○ = Medium △ = Low

Note: QFD = Quality function deployment
SPC = Statistical process control
JIT = Just-in-time
CTM = Cycle time management
CSA = Customer service analysis
DOE = Design of experiments
IPD = Integrated product development

Tool 5: PROCESS DECISION PROGRAME CHART (PDPC)

- Also known as decision tree
- Planning tool to outline every conceivable and likely occurrence in any planning
- Forces proactive thinking on what can go wrong with one's plan and what would one do to overcome the effect of such adverse occurrences
- Helps to anticipate undesirable occurrences and enables one to prepare with plans to neutralize their effect
- Used in new product development, building and equipment and data processing programs
- Used in decision making when the task is new, complex and unique

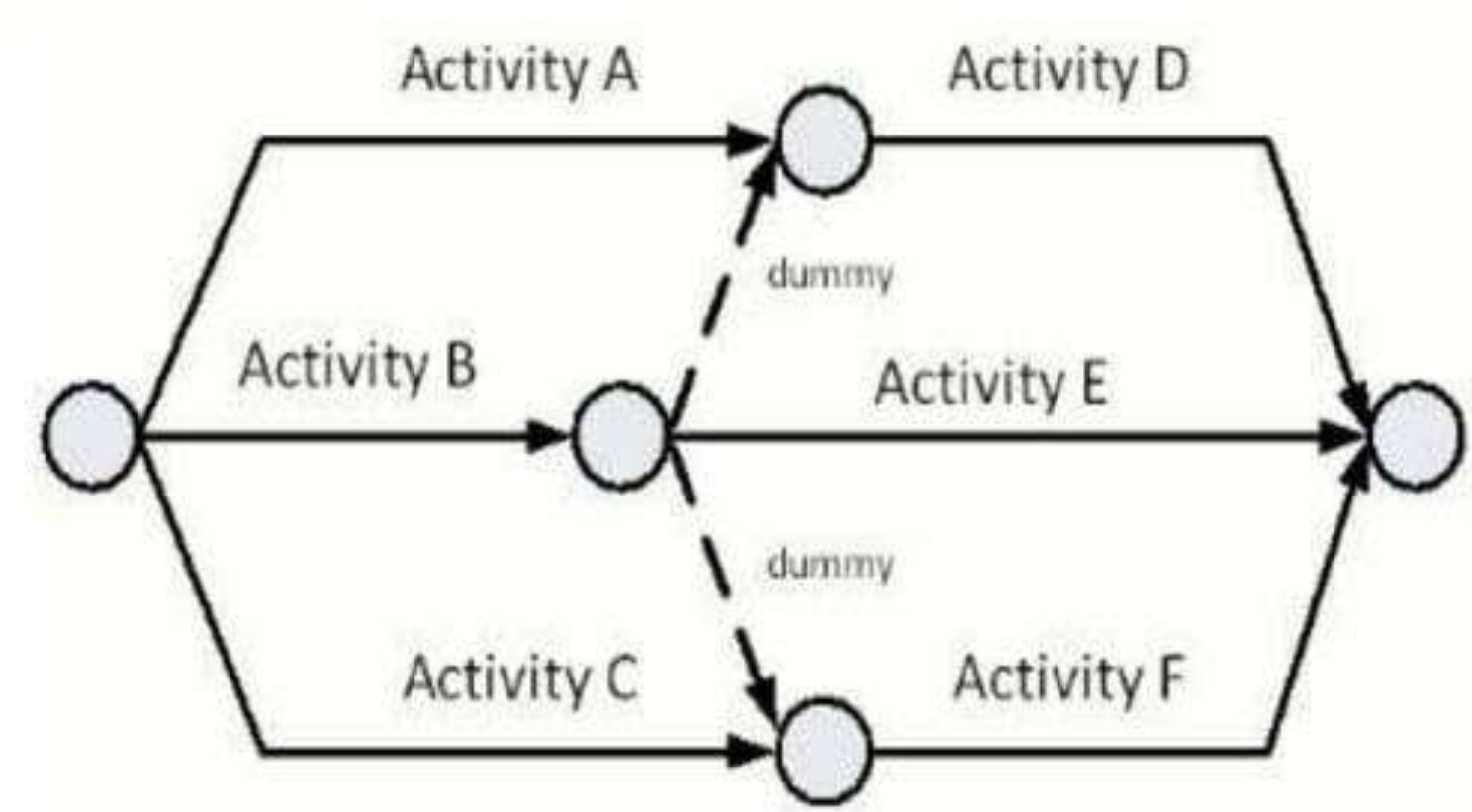
DECISION TREE



Tool 6: ARROW DIAGRAM

- It is a graphical description of the sequential steps that must be completed before a project can be completed
- PERT (Program Evaluation and Review Technique) and CPM (Critical Path Method) charts are the best known arrow diagram
- Planning tool that determines the critical path of a process or a project
- Indispensible for long term projects such as the construction of a plant or the development of new products

ARROW DIAGRAM



Tool 7: MATRIX DATA ANALYSIS DIAGRAM

- Very much similar to a matrix diagram
- A difference is that numerical data is used instead of symbols indicating the existence and strength of relationship
- Only tool among the New Seven Management Tools which uses numerical data and produces numerical results
- Used in studying the parameters of production processes, in analyzing market information, in finding links between numerical and non numerical variables

MATRIX DATA ANALYSIS DIAGRAM

Customer Requirements/ Functions	Importance	Mechanisms				
		Lead	Eraser	Body	Paint	Band
Make Marks	30	⊙ 150				
Remove Marks	20		⊙ 100			
Prevent Smudges	15	O 45		O 45		
Support Lead	5			⊙ 25		
Improve Appearance	10			O 30	O 30	Δ 10
Accomodate Grip	20			⊙ 100	Δ 20	
Column weight	555	195	100	200	50	10
Mech. weight	1.0	.351	.180	.360	.090	.018
Mech. target cost	2.80	.98	.51	1.01	.25	.05
Mech. actual cost	2.92	1.20	.43	.94	.10	.25

⊙ Strong correlation weight factor = 5

O Moderate correlation weight factor = 3

Δ Weak correlation weight factor = 1