SPJIMR
Bharatiya Vidya Bhavan

Project Quality Management

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Project Quality Management

In this module, we will cover:

- Overview – Quality Management
- Quality vs Grade
- Common Industry Quality Standards
- Plan Quality Management
- Different tools used in Quality
- Quality Assurance / Manage Quality
- Quality Control
- Exercises – Balance Scorecard – Gantt Chart - Metrics
- Conclusions

Quality Vs Grade

- **Quality vs Grade**
  - Quality is the degree to which a set of inherent characteristics fulfill requirements
  - Grade is a category assigned to deliverables having the same functional use but different technical characteristics
  - Example: It may not be a problem if a suitable low-grade software product (one with a limited number of features) is of high quality (no obvious defects, readable manual). In this example, the product would be appropriate for its general purpose of use
  - It may be a problem if a high-grade product (one with numerous features) is of low quality (many defects). In essence, a high-grade feature set would prove ineffective and/or inefficient due to low quality

Common Industry Quality Standards

- **PDCA Cycle -** Dr. W. Edwards Deming – the world's leader in quality management theory. He prescribed Plan-Do-Check-Act.
- **Kaizen's Quality Management** – philosophy that proposes continuous improvements to reduce costs and ensure consistent project performance. Originated from Toyota Motor Company in Japan.
- **ISO 9000:** Standards relate to quality management. In a simple explanation it means what you do (processes) you document and what is documented you perform.
- **Lean Engineering/Manufacturing:** Eliminate waste and create value
- **Six Sigma:** Statistical sampling, that is defects per million. Originated from Motorola manufacturing in the USA.
- **Total Quality Management (TQM):** Price of conformance and non-conformance. It is a byproduct of Deming's PDCA.
- **Cost of Quality** - Refers to the total cost of the conformance work and the nonconformance work that should be done as a compensatory effort

Principles of Quality Management

- Teamwork
- Strategic Integration
- Continuous Improvement
- Respect for people
- Customer Focus
- Management by Fact
- Structured Problem Solving

Plan Quality Management

- Plan Quality Management the process of identifying quality requirements and/or standards for the project and its deliverables and documenting how the project will demonstrate compliance with quality requirements and/or standards.
- Major Activities
  - Create a Quality Management Plan
  - Cost Benefit Analysis
  - **Define a Quality Metrics – Assignment Exercise – Balance Score Card**
  - Cost of quality. The cost of quality (COQ) associated with a project consists of one or more of the following costs
    - Prevention costs. Costs related to the prevention of poor quality in the products, deliverables, or services of the specific project.
    - Appraisal costs. Costs related to evaluating, measuring, auditing, and testing the products, deliverables, or services of the specific project.
    - Failure costs (internal/external). Costs related to nonconformance of the products, deliverables, or services to the needs or expectations of the stakeholders

Cost of Conformance

Prevention Costs
(Build a quality product)
- Training
- Document processes
- Equipment
- Time to do it right

Appraisal Costs
(Assess the quality)
- Testing
- Destructive testing loss
- Inspections

Money spent during the project **to avoid failures**

Cost of Nonconformance

Internal Failure Costs
(Failures found by the project)
- Rework
- Scrap

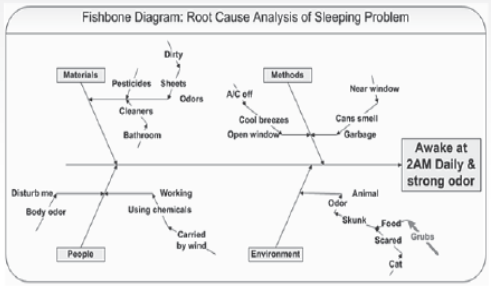
External Failure Costs
(Failures found by the customer)
- Liabilities
- Warranty work
- Lost business

Money spent during and after the project **because of failures**

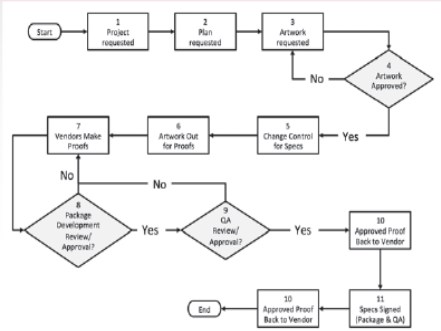
Cost-Benefit Analysis	Benchmarking	Seven Basic Quality Tools
Root Cause Analysis	Statistical Sampling	Brainstorming

Seven Basic Quality Tools

Cause & Effect Diagram



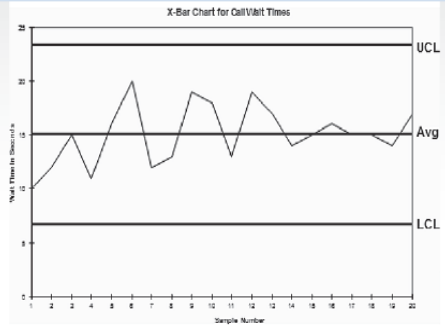
Flowcharts



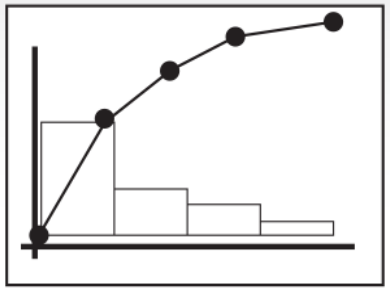
Checksheets

Category	*Strokes*	*Frequency*
Attribute 1		
Attribute 2		
Attribute ...		
Attribute n		

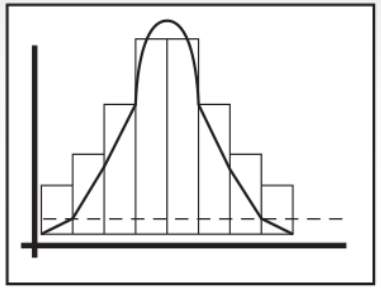
Control Charts



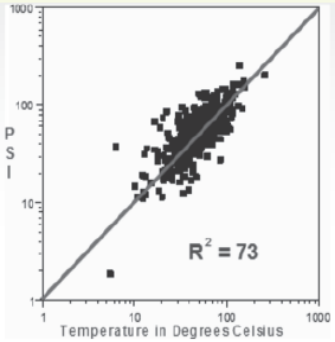
Pareto Diagrams



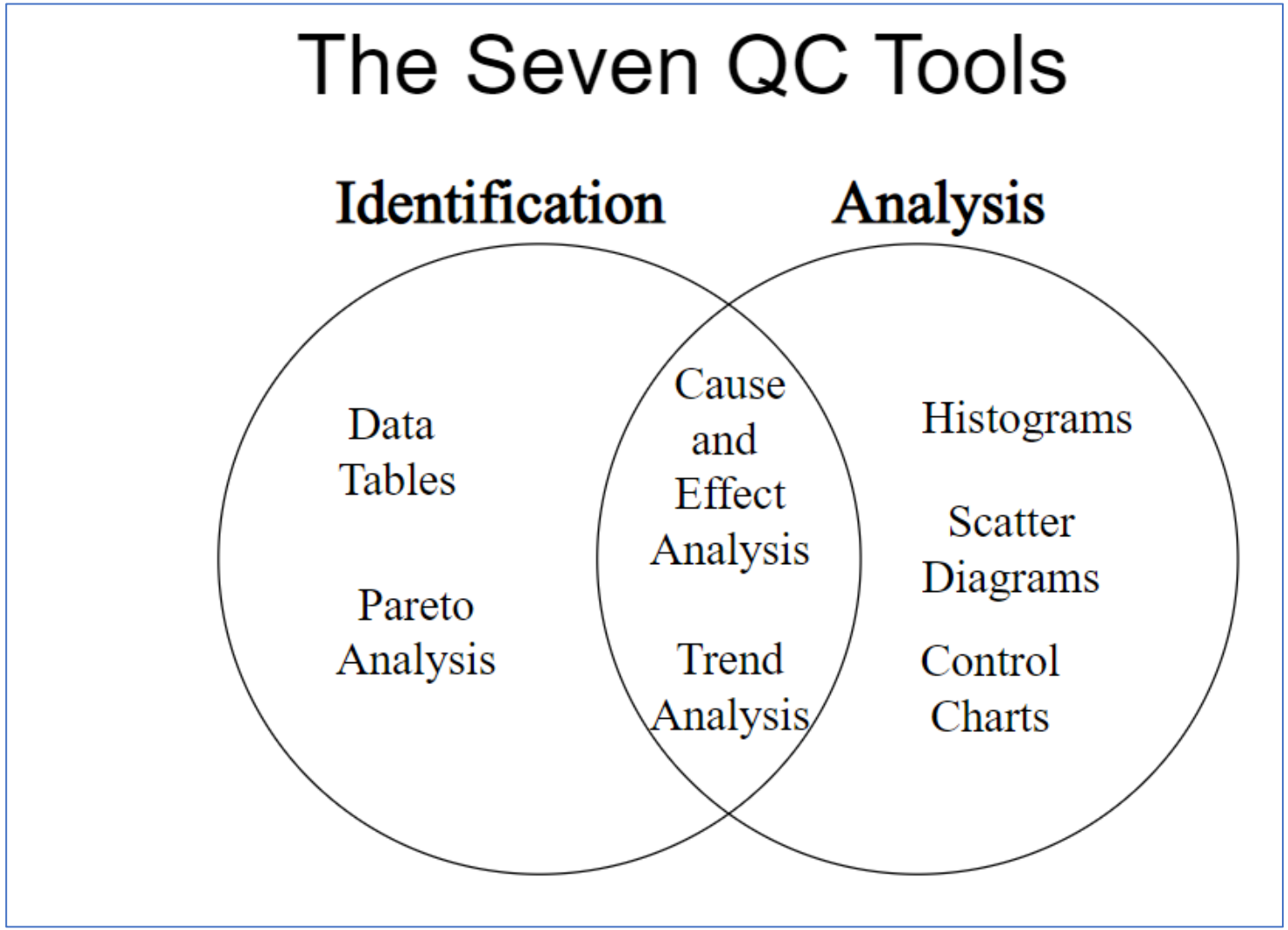
Histograms



Scatter Diagrams



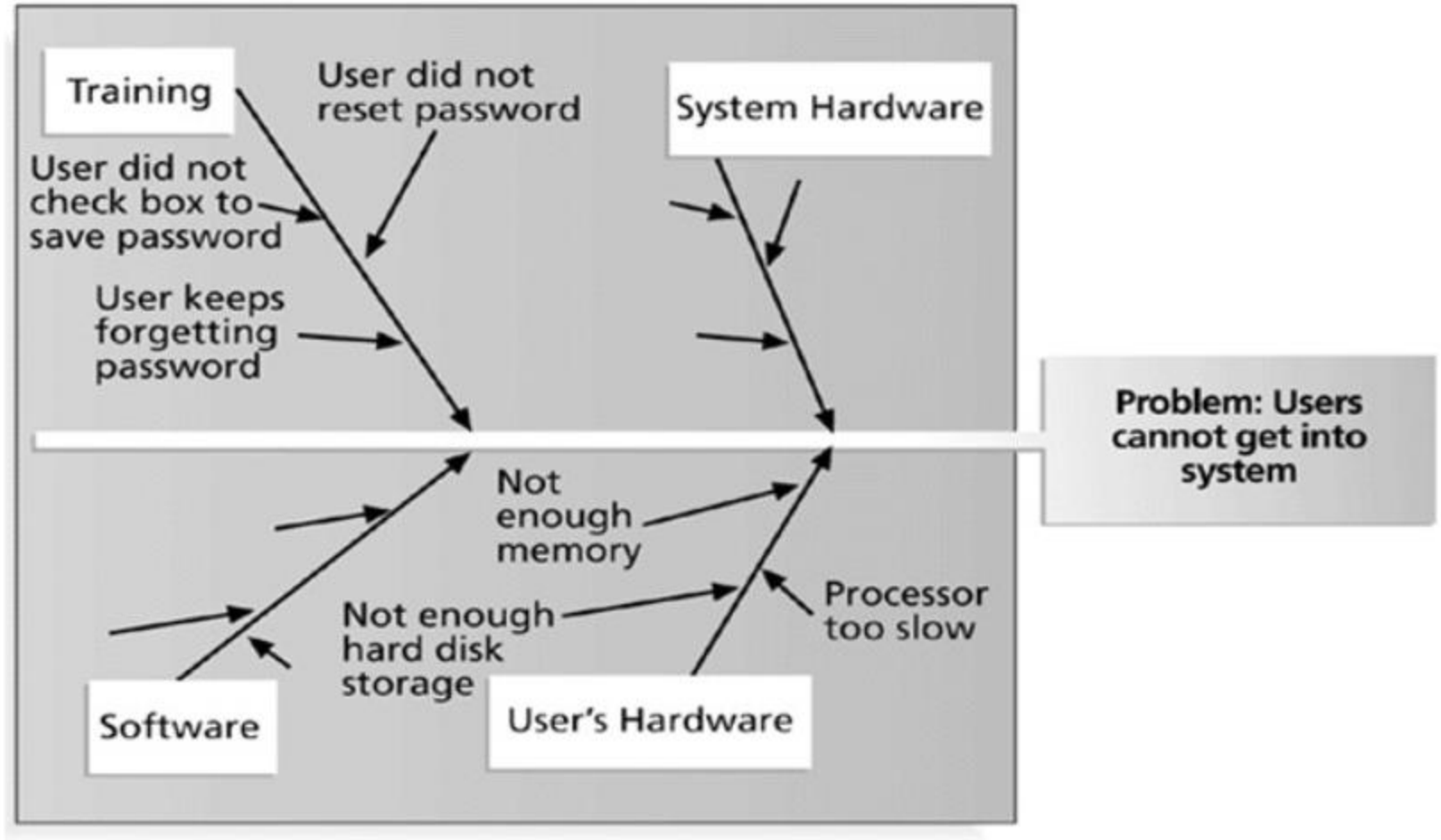
Seven Basic Quality Tools



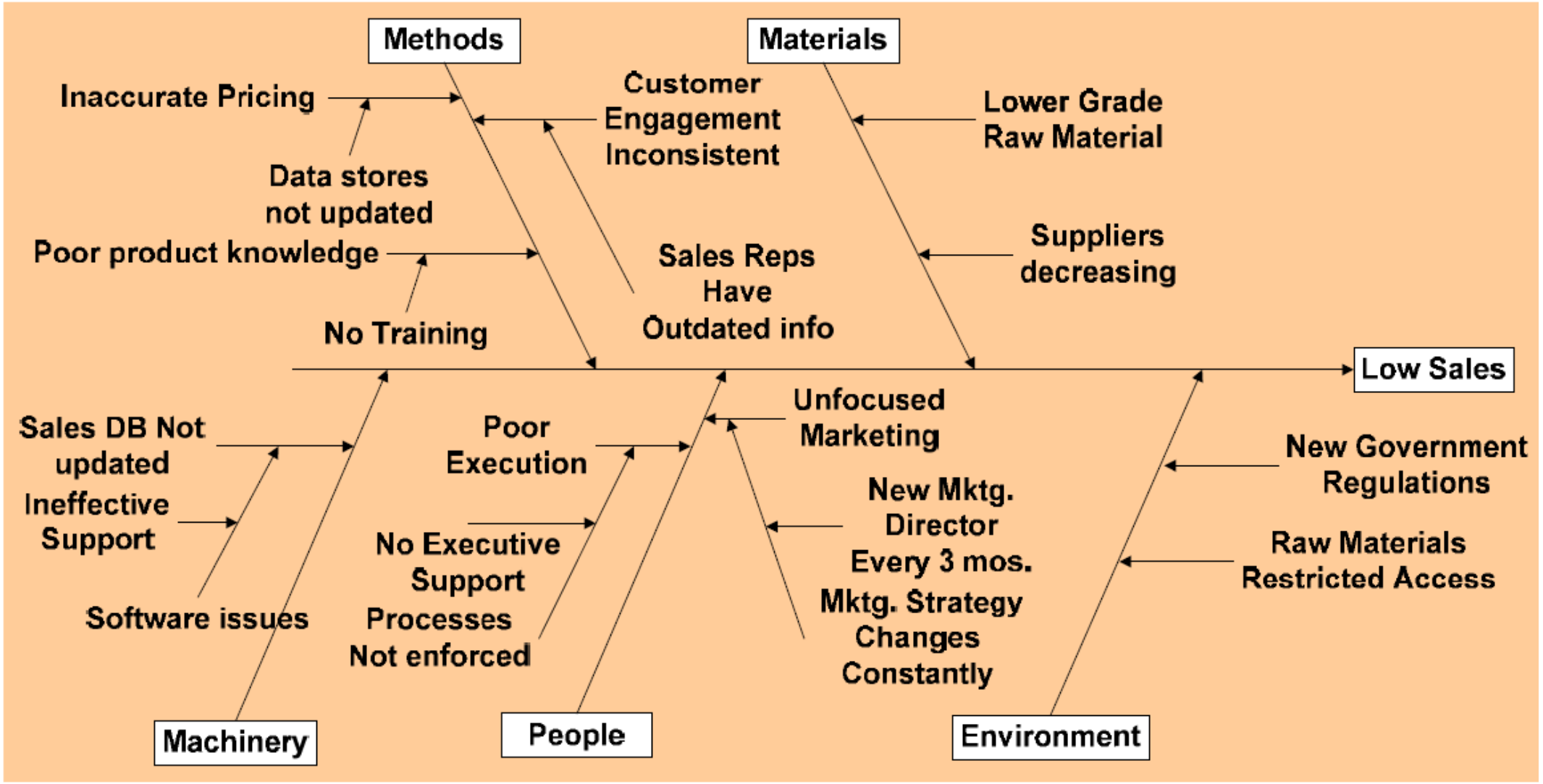
Data Table

Defects	Process A	Process B	Process C	Process D	Total
Incorrect Invoice	4	1	-	2	7
Incorrect Inventory	5	2	1	1	9
Damaged Material	3		2	3	8
Incorrect Test doc.	1	3	4	2	10
Total	**13**	**6**	**7**	**8**	**34**

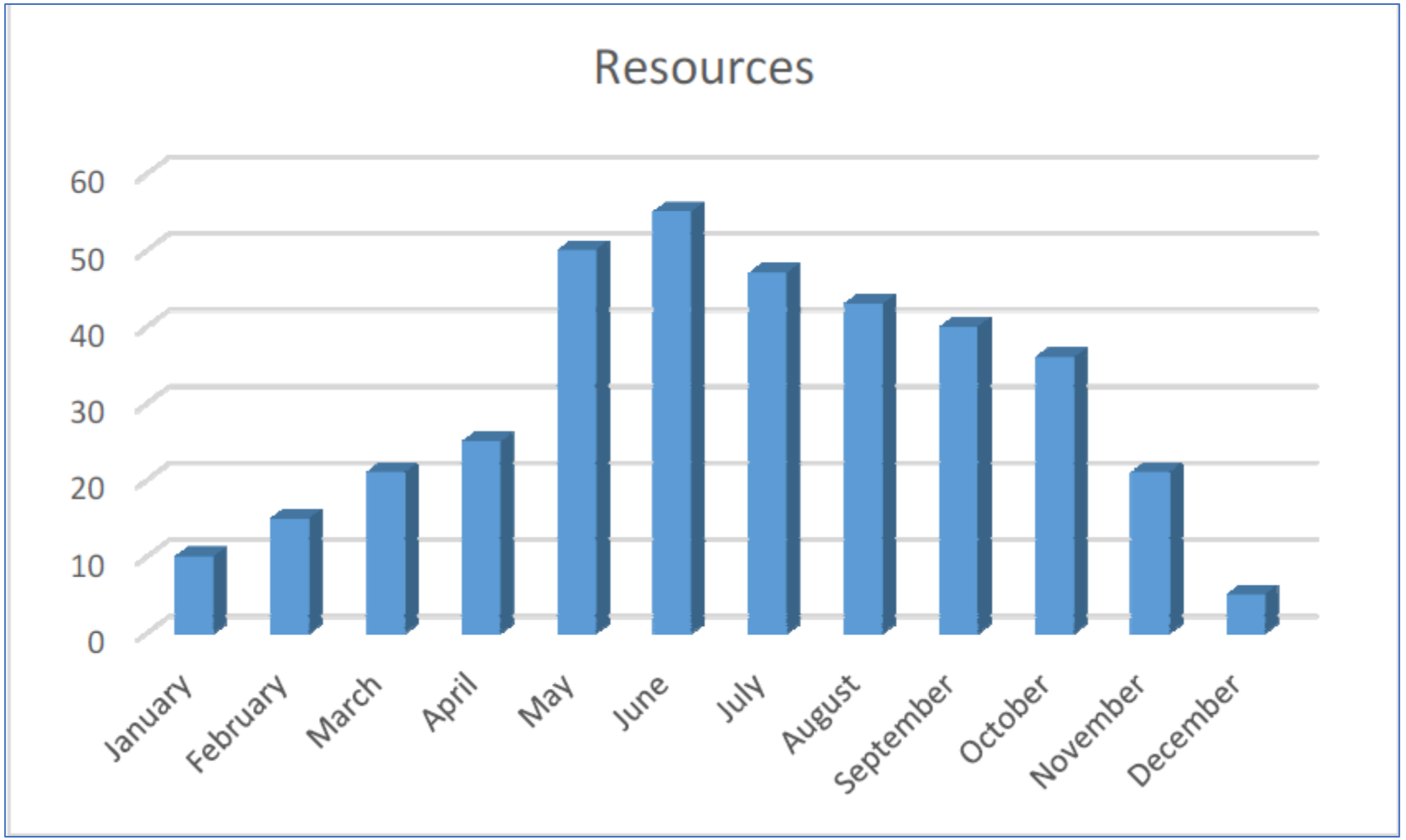
Simple Fishbone Diagram



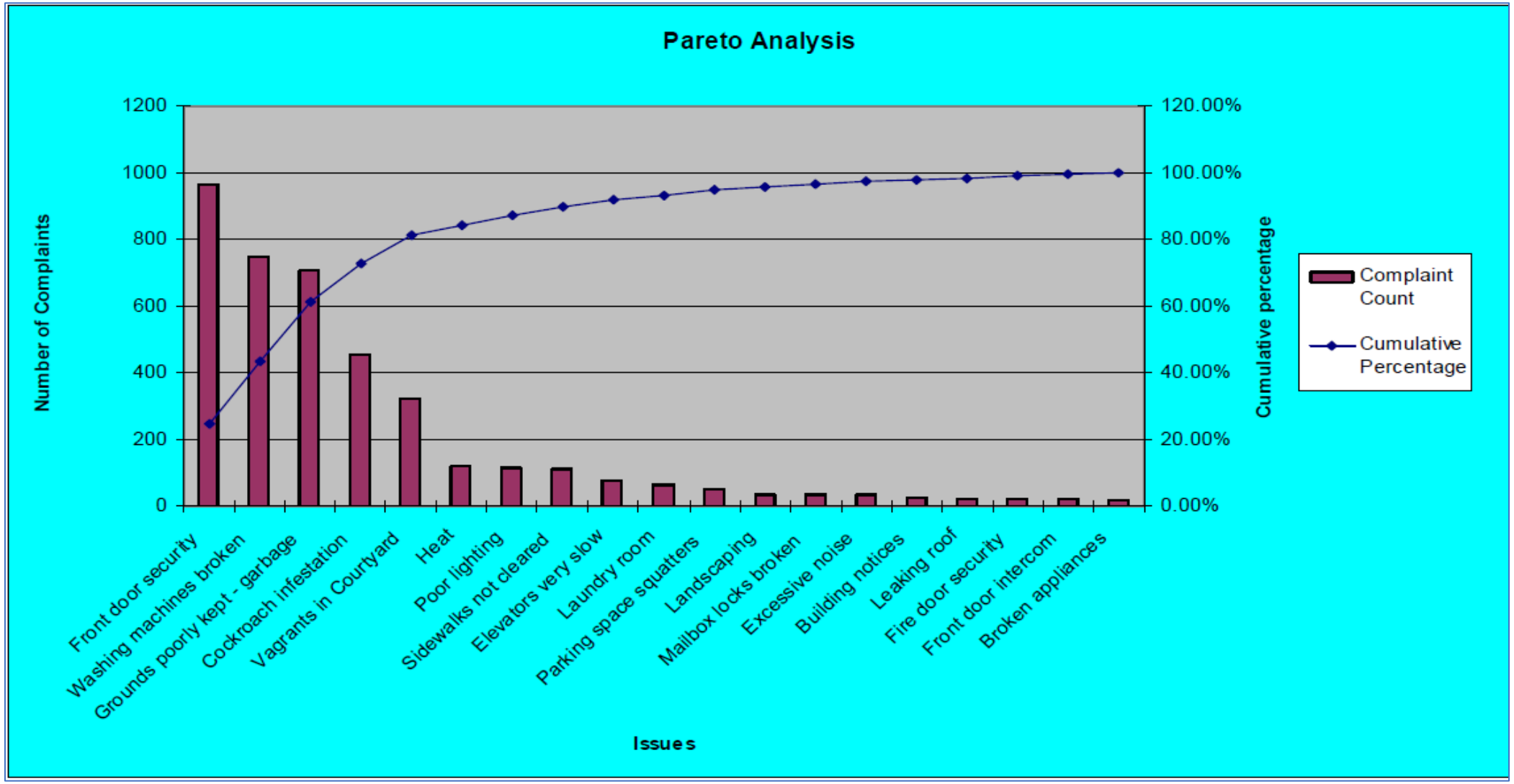
Ishikawa Diagram



Histograms


Resources
60
50
40
30
20
10
0
January
February
March
April
May
June
July
August
September
October
November
December

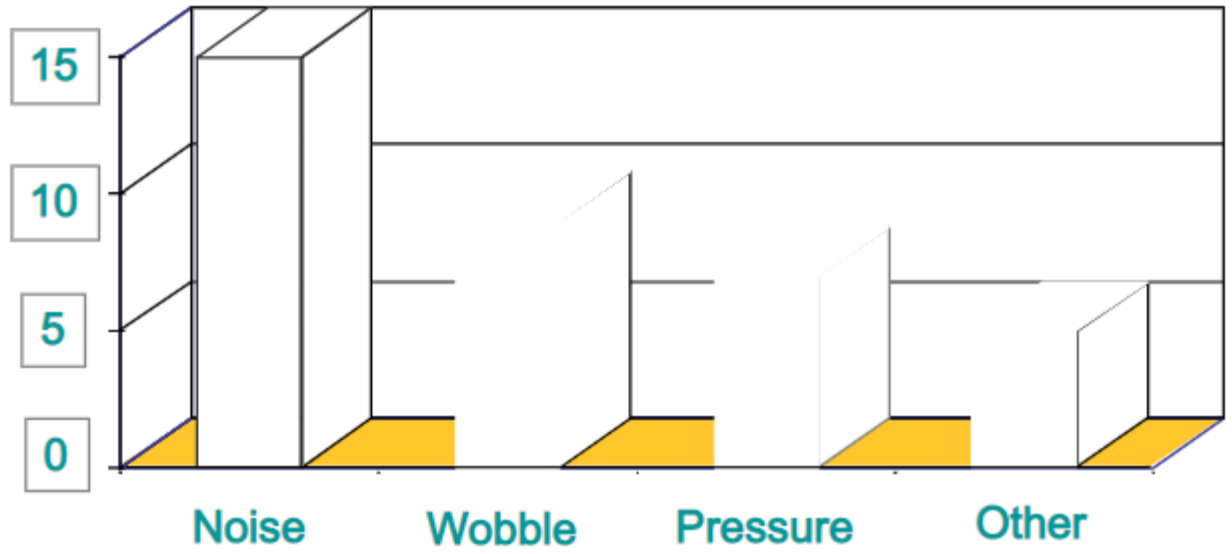
Pareto Charts



Pareto Charts

Primary Purpose:

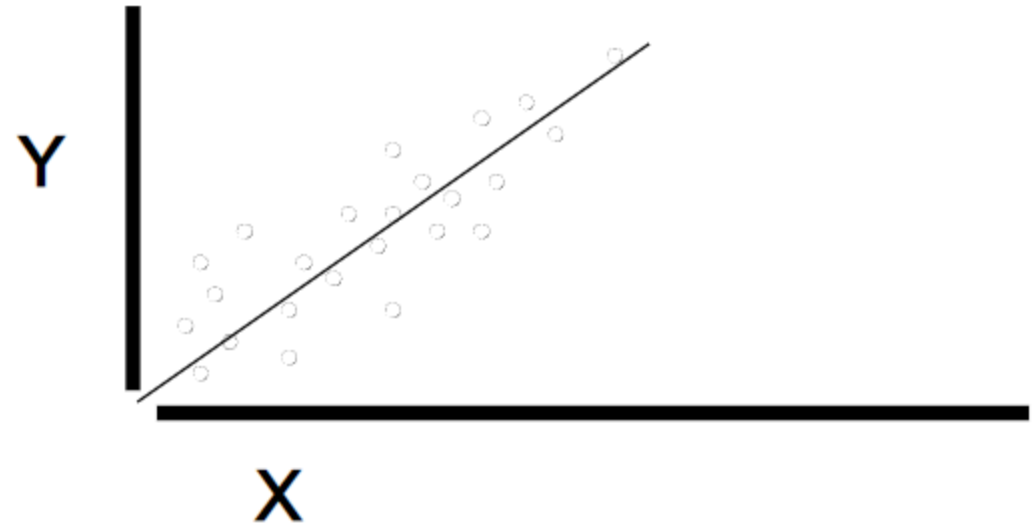
Focus improvement efforts on the most important causes



Pareto's rule:

A large number of defects are the result of a small number of causes. Fix the problems that are causing the greatest number of defects first.

Scatter Diagram

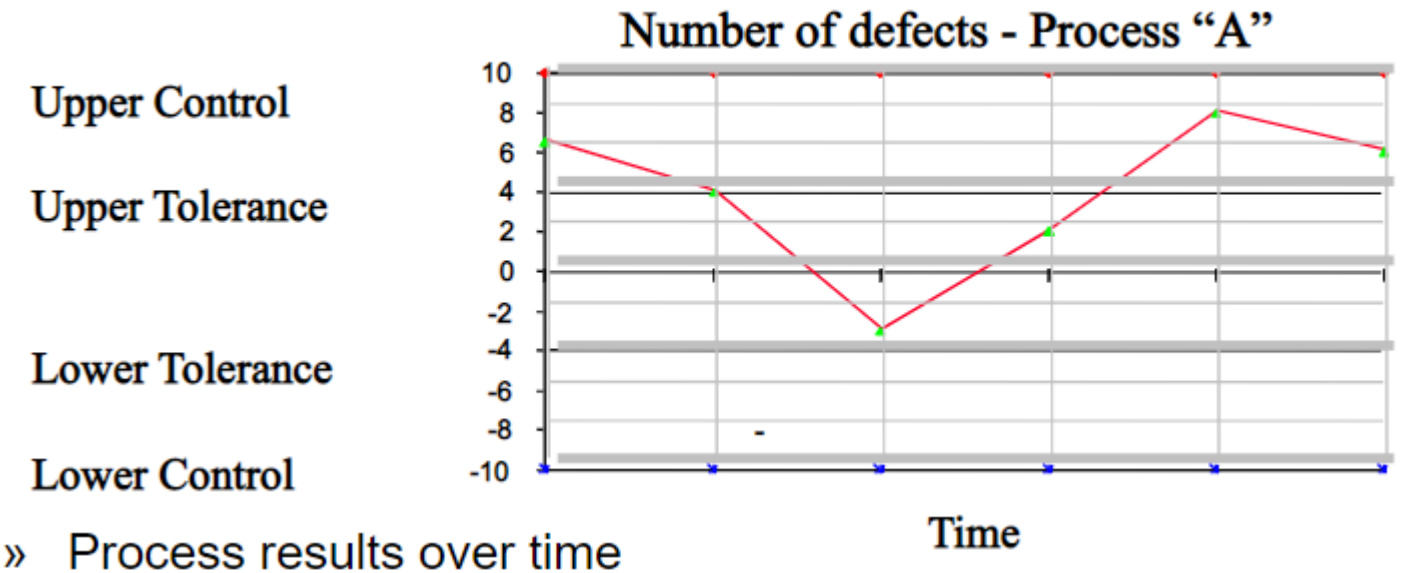


- Plot the results of two variables
- Show trends
- Show distribution around Central tendency
- Highlight Exceptions (out of tolerance condition)
- Source of data for the Pareto Chart

Statistical Sampling

- **Statistical sampling** involves choosing part of a population of interest for inspection.
- The size of a sample depends on how representative you want the sample to be.
- Be sure to consult with an expert when using statistical analysis.
  - *Example: QA team randomly selected 8 drawings from 80 engineering drawings generated during the planning and design phase for inspection.*
  - This exercise of random selection is Statistical sampling.

Control Charts



- Process results over time
- Process is in control when the number of defects fall within upper and lower control limits.
- Process adjustments are immediate corrective actions based on QC measure.
- Process can be improved to meet tighter control limits: Processes in control should not be adjusted.

Quality Assurance or Manage Quality

- Manage Quality is the process of translating the quality management plan into executable quality activities that incorporate the organization's quality policies into the project

- Major Activities
  - Increases the probability of meeting the quality objectives
  - Identifying ineffective processes and causes of poor quality
  - Involves following and meeting standards to assure stakeholders that the final product will meet their needs, expectations, and requirements
  - Concerned with the product design aspects and process improvements.
  - Performed by all project team members
  - Data Gathering - Capture actual quality values as per the defined process.
  - Process Analysis
  - Risk report made if any and communicated to the stakeholders

Quality Assurance or Manage Quality

- Quality Audits - An audit is a structured, independent process used to determine if project activities comply with organizational and project policies, processes, and procedures
  - Identifying all nonconformity, gaps, and shortcomings
  - Sharing good practices introduced or implemented in similar projects in the organization and/or industry
  - Identifying all good and best practices being implemented
  - Highlighting contributions of each audit in the lessons learned repository of the organization
- Problem Solving – Define → RCA → Possible solutions → Choose Best Solution → Implement Solution
- Decision Making

Quality Assurance or Manage Quality

- Alternate Analysis – Different Quality Approaches which are best to use.
- Reviews / Peer Reviews – Improvement methods

- Output : Quality Reports
  - Graphical / Numerical
  - The information presented in the quality reports may include all quality management issues escalated by the team; recommendations for process, project, and product improvements; corrective actions recommendations (including rework, defect/bugs repair, 100% inspection, and more)
  - Change Requests

Quality Control

- Control Quality is the process of monitoring and recording results of executing the quality management activities in order to assess performance and ensure the project outputs are complete, correct, and meet customer expectations

- Major Activities
  - Internal Testing and Sign off by QA team / Testing team
  - Deliverables are verified by the Quality team and certified
  - Checklists are filled
  - Performance review of deliverables as per requirement done
  - Test cases are executed, and testing is done
  - Internal defects are reported – Defects are tracked in JIRA / Bugzilla / Excel Sheets
  - RCA of bugs/ defects is done
  - Issue log is updated
  - Risk register is updated

- Major Output is Verified deliverables

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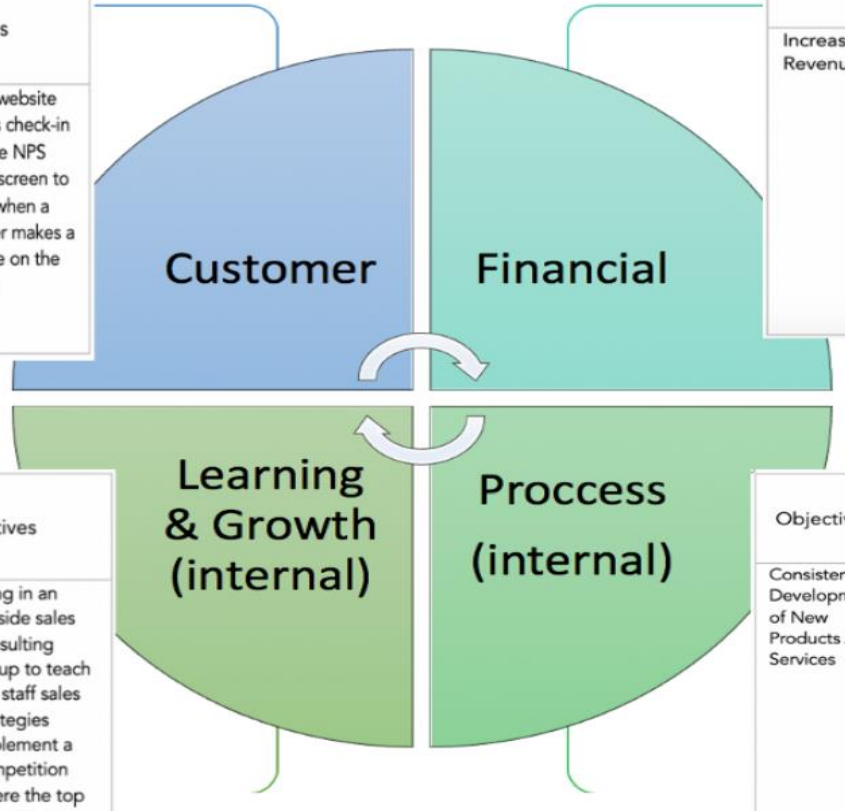
Types of Testing

- **Unit testing** tests each individual component (often a program) to ensure it is as defect-free as possible.
- **Integration testing** occurs between unit and system testing to test functionally grouped components.
- **System testing** tests the entire system as one entity.
- **User acceptance testing** is an independent test performed by end users prior to accepting the delivered system.

Exercise – Balance Scorecard

Objectives	Measures	Target	Initiatives
Improve customer net promoter score (NPS) rating *NPS = "on a scale from 1 – 10 likely are you to recommend our product/ service to a friend?	Success = better NPS this month than last month Failure = worse NPS this month than last month	Average NPS greater than or equal to 6	- Weekly website analytics check-in - Code the NPS pop-up screen to display when a customer makes a purchase on the website

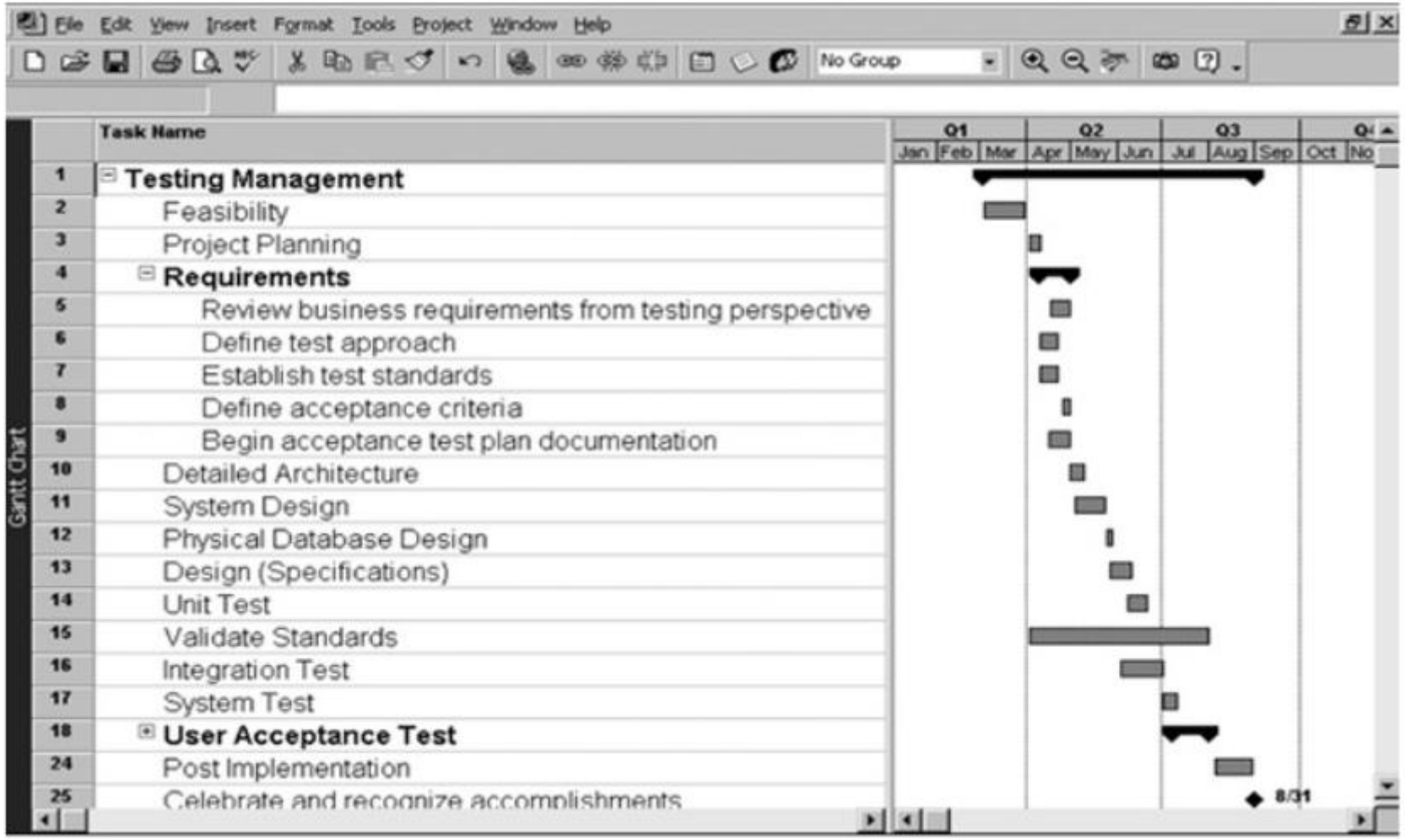


Objectives	Measures	Target	Initiatives
Increase Revenue	Success = increased revenue this quarter as compared to last quarter Failure = decreased revenue this quarter as compared to last quarter	Increase net revenue by 10%	- Hire 3 additional consultants - Increase marketing efforts - Implement a customer referral bonus

Objectives	Measures	Target	Initiatives
To have everyone on the consulting team confident in their ability to sell products	Success = 100% of the consulting team staff being able to sell a product/ service and close a deal Failure = even one person on the consulting team staff is not confident in their ability to close a deal	Each consulting team staff member closes 2 deals per month	- Bring in an outside sales consulting group to teach the staff sales strategies - Implement a competition where the top sales person is awarded a prize each month

Objectives	Measures	Target	Initiatives
Consistent Development of New Products / Services	Success = at least as much, if not more, product development happening this month than the month prior Failure = less project development activities happening this month than last month	At least 5 new product development projects happening at any given time	- Implement bi-weekly reoccurring meeting to address new product development - Assign a team member to be responsible for the researching new potential products

Exercise - Gantt Chart – Quality Planning in Project Plan



Exercise – Testing Metrics – Quality Metrics

S.No.	Testing Metric	Data retrieved during test case development & execution
1	No. of Requirements	5
2	Avg. No. of Test cases written per Requirement	20
3	Total no. of Test cases written for all requirements	100
4	Total no. of Test cases Executed	65
5	No. of Test cases Passed	30
6	No. of Test cases Failed	26
7	No. of Test cases Blocked	9
8	No. of Test cases un executed	35
9	Total No. of Defects identified	30
10	Critical Defects count	6
11	High Defects Count	10
12	Medium Defects Count	6
13	Low Defects Count	8

Conclusions

- Gold plating is not acceptable
- Quality is Utmost important and comes with Cost
- RCA
- Lessons Learnt
- Continuous improvements
- Process improvements
- Regular Audits
- Quality Control methods to be established and followed
- Communicate quality related to risks to stakeholders

Reference Books

- Project Management – The System Approach to Planning, Scheduling, and Controlling - Harold Kerzner
- Project Management – The Managerial Process - Clifford F. Gray, Erik W. Larson, Gautam V. Desai
- PMBOK 6th Edition – www.pmi.org
- EdWel Programs – Richard Perrin