



Quality in Information Technology Project



What Is a Project?

- ▶ A **project** is “a temporary endeavor undertaken to create a unique product, service, or result” (PMBOK® Guide, Fifth Edition, 2012)
- ▶ Operations is work done to sustain the business
- ▶ Projects end when their objectives have been reached or the project has been terminated
- ▶ Projects can be large or small and take a short or long time to complete



Examples of IT Projects

- ▶ A team of students creates a smartphone application and sells it online
- ▶ A company develops a driverless car
- ▶ A small software development team adds a new feature to an internal software application for the finance department
- ▶ A college upgrades its technology infrastructure to provide wireless Internet access across the whole campus



Project Attributes

- ▶ A project
 - has a unique purpose
 - is temporary
 - is developed using progressive elaboration
 - requires resources, often from various areas
 - should have a primary customer or sponsor
 - The **project sponsor** usually provides the direction and funding for the project
 - involves uncertainty

What Is Quality?

- The International Organization for Standardization (ISO) defines quality as the totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs
- Other experts define quality based on
 - conformance to requirements: meeting written specifications
 - fitness for use: ensuring a product can be used as it was intended



Project Quality Management Processes

- Quality planning: identifying which quality standards are relevant to the project and how to satisfy them
- Quality assurance: evaluating overall project performance to ensure the project will satisfy the relevant quality standards
- Quality control: monitoring specific project results to ensure that they comply with the relevant quality standards while identifying ways to improve overall quality



Quality Planning

- It is important to design in quality and communicate important factors that directly contribute to meeting the customer's requirements
- Design of experiments helps identify which variables have the most influence on the overall outcome of a process
- Many scope aspects of IT projects affect quality like functionality, features, system outputs, performance, reliability, and maintainability



Quality Assurance

- Quality assurance includes all the activities related to satisfying the relevant quality standards for a project
- Another goal of quality assurance is continuous quality improvement
- Benchmarking can be used to generate ideas for quality improvements
- Quality audits help identify lessons learned that can improve performance on current or future projects



ISO 9126

To list the software quality attributes, the ISO/IEC 9126 standard is used. It defines the following software quality attributes:

Functionality—A set of attributes that bear on the existence of a set of functions and their specified properties. The functions satisfy stated or implied needs.

- Suitability
- Accuracy
- Interoperability
- Security
- Functionality Compliance

Reliability—A set of attributes that bear on the capability of software to maintain its level of performance under stated conditions for a stated period of time.

- Maturity
- Fault Tolerance
- Recoverability
- Reliability Compliance



Continue

Efficiency—A set of attributes that bear on the relationship between the level of performance of the software and the amount of resources used under stated conditions.


- Time Behavior
- Resource Utilization

Maintainability—A set of attributes that bear on the effort needed to make specified modifications.


- Analyzability
- Changeability
- Stability
- Testability

Portability—A set of attributes that bear on the ability of software to be transferred from one environment to another.

- Adaptability
- Installability
- Conformance
- Replaceability



Usability—A set of attributes that bear on the effort needed for use, and on the individual assessment of such use, by a stated or implied set of users.

- Understandability
 - Learnability
 - Operability
- 



Software Quality Assurance (SQA)

Software Quality Assurance (SQA) is simply a way to assure quality in the software.

It is the set of activities which ensure processes, procedures as well as standards suitable for the project and implemented correctly. Software Quality Assurance is a process which works parallel to development of a software. It focuses on improving the process of development of software so that problems can be prevented before they become a major issue.

Software Quality Assurance is a kind of an Umbrella activity that is applied throughout the software process.

Software Quality Assurance have:

1. A quality management approach
2. Formal technical reviews
3. Multi testing strategy
4. Effective software engineering technology
5. Measurement and reporting mechanism

How to do Quality Assurance: Complete Process

Quality Assurance methodology has a defined cycle called PDCA cycle or Deming cycle. The phases of this cycle are:

- Plan
- Do
- Check
- Act





Major Software Quality Assurance Activities:

1. SQA Management Plan:

Make a plan how you will carry out the sqa through out the project. Think which set of software engineering activities are the best for project. Check level of sqa team skills.

2. Set The Check Points:

SQA team should set checkpoints. Evaluate the performance of the project on the basis of collected data on different check points.

3. Multi testing Strategy:

Do not depend on single testing approach. When you have lot of testing approaches available use them.

4. Measure Change Impact:

The changes for making the correction of an error sometimes re introduces more errors keep the measure of impact of change on project. Reset the new change to change check the compatibility of this fix with whole project.

5. Manage Good Relations:

In the working environment managing the good relation with other teams involved in the project development is mandatory. Bad relation of sqa team with programmers team will impact directly and badly on project. Don't play politics.



Benefits of Software Quality Assurance (SQA):

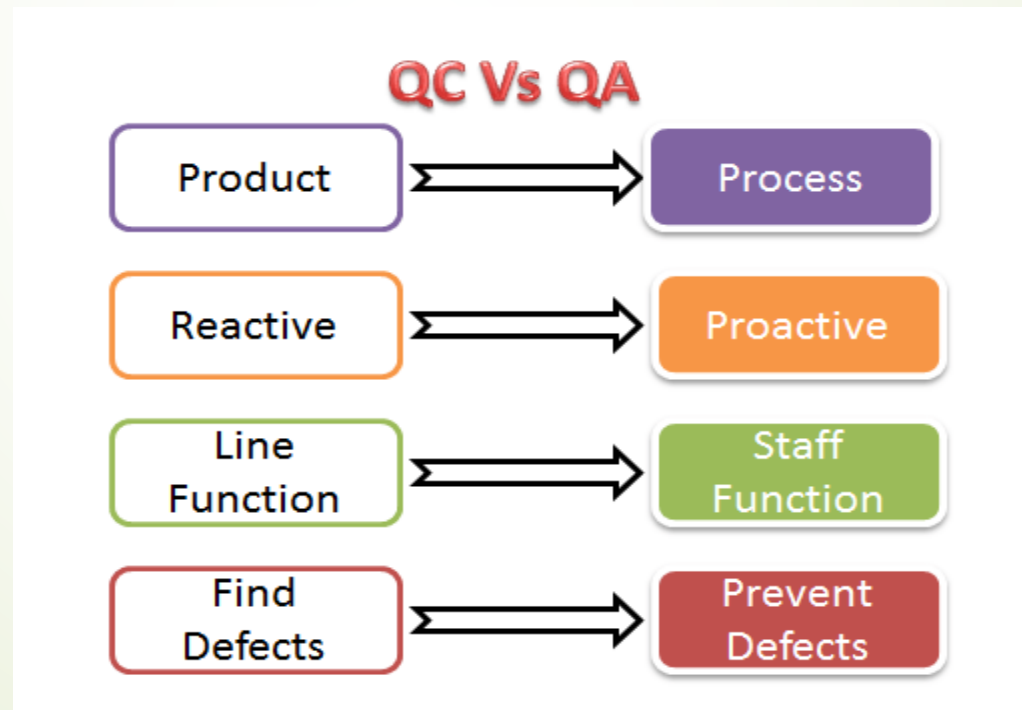
1. SQA produce high quality software.
2. High quality application saves time and cost.
3. SQA is beneficial for better reliability.
4. SQA is beneficial in the condition of no maintenance for long time.
5. High quality commercial software increase market share of company.
6. Improving the process of creating software.
7. Improves the quality of the software.

Disadvantage of SQA:

There are a number of disadvantages of quality assurance. Some of them include adding more resources, employing more workers to help maintain quality and so much more.

Difference between Quality Control and Quality Assurance?

- QC is confused with the QA. Quality control is to examine the product or service and check for the result. Quality Assurance in Software Engineering is to examine the processes and make changes to the processes which led to the end-product.






Examples of QC and QA activities are as follows:

Quality Control Activities	Quality Assurance Activities
Walkthrough	Quality Audit
Testing	Defining Process
Inspection	Tool Identification and selection
Checkpointreview	Training of Quality Standards and Processes



traits that define the quality of any projects:



Characteristic	How it's measured
Accuracy	Is the information correct in every detail?
Completeness	How comprehensive is the information?
Reliability	Does the information contradict other trusted resources?
Relevance	Do you really need this information?
Timeliness	How up- to-date is information? Can it be used for real-time reporting?



Quality Control



- ▶ The main outputs of quality control are
 - ▶ acceptance decisions
 - ▶ rework
 - ▶ process adjustments
- ▶ Some tools and techniques include
 - ▶ Pareto analysis
 - ▶ statistical sampling
 - ▶ Six Sigma
 - ▶ quality control charts

Quality Standard

- ISO (International Standards Organization) is a group or consortium of 63 countries established to plan and fosters standardization. ISO declared its 9000 series of standards in 1987. It serves as a reference for the contract between independent parties.

ISO 9000 is a series of three standards:

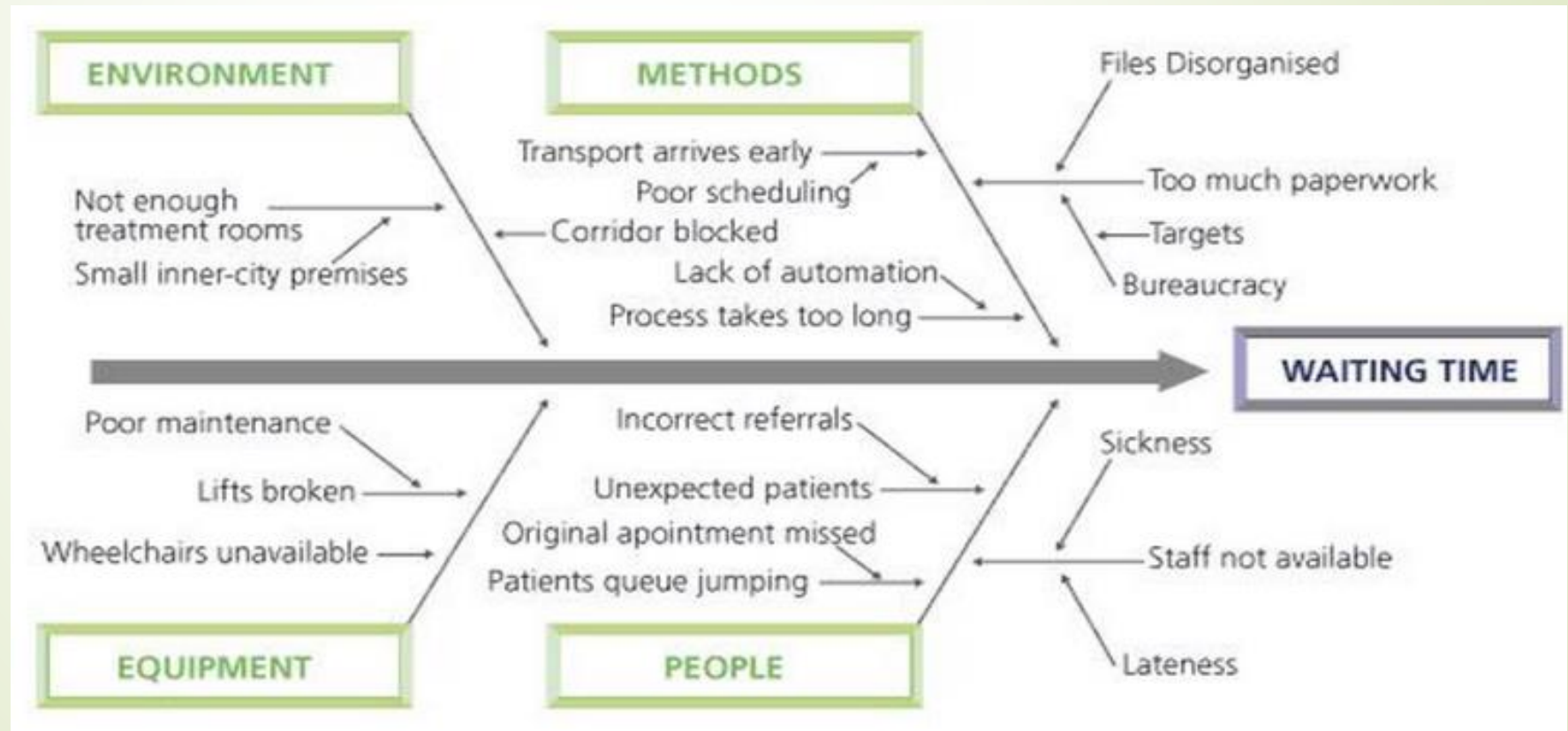


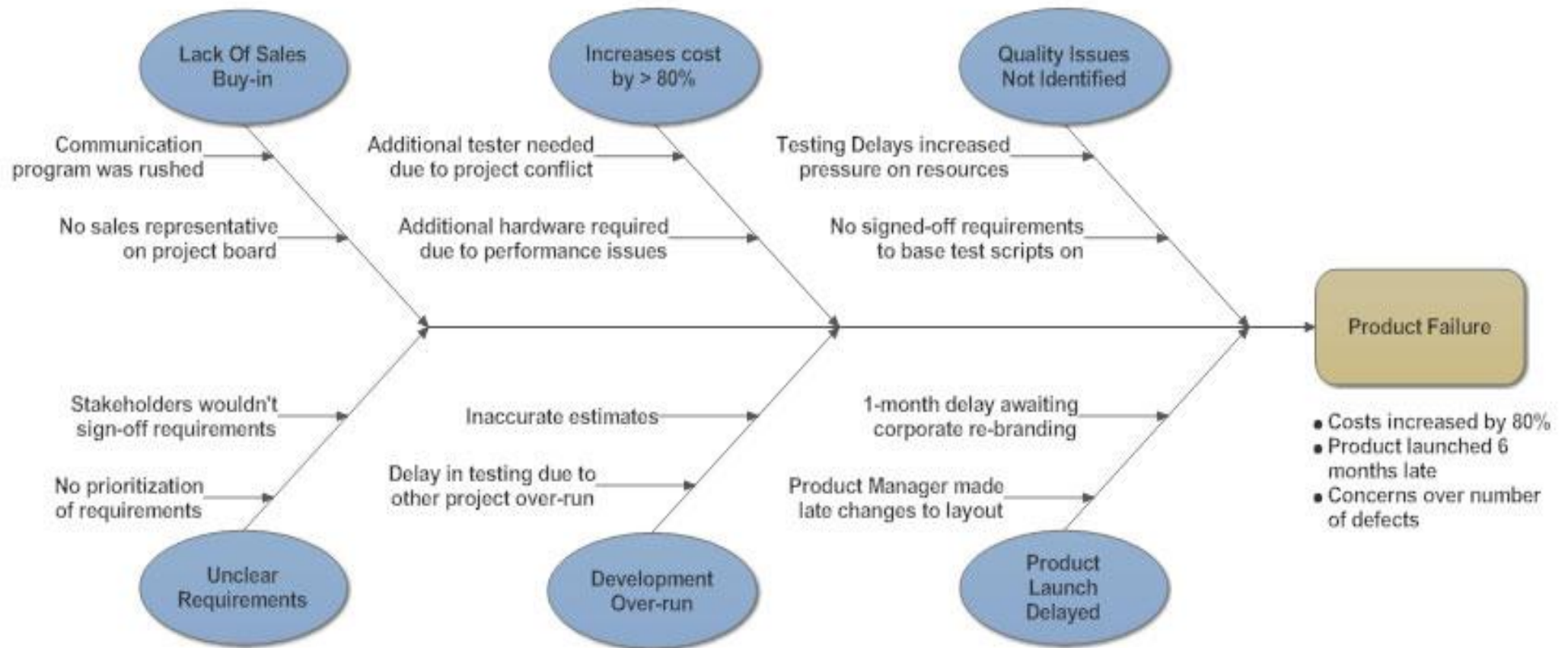
How to apply for ISO Certification



Tools Useful in Both Quality Planning and Control Quality

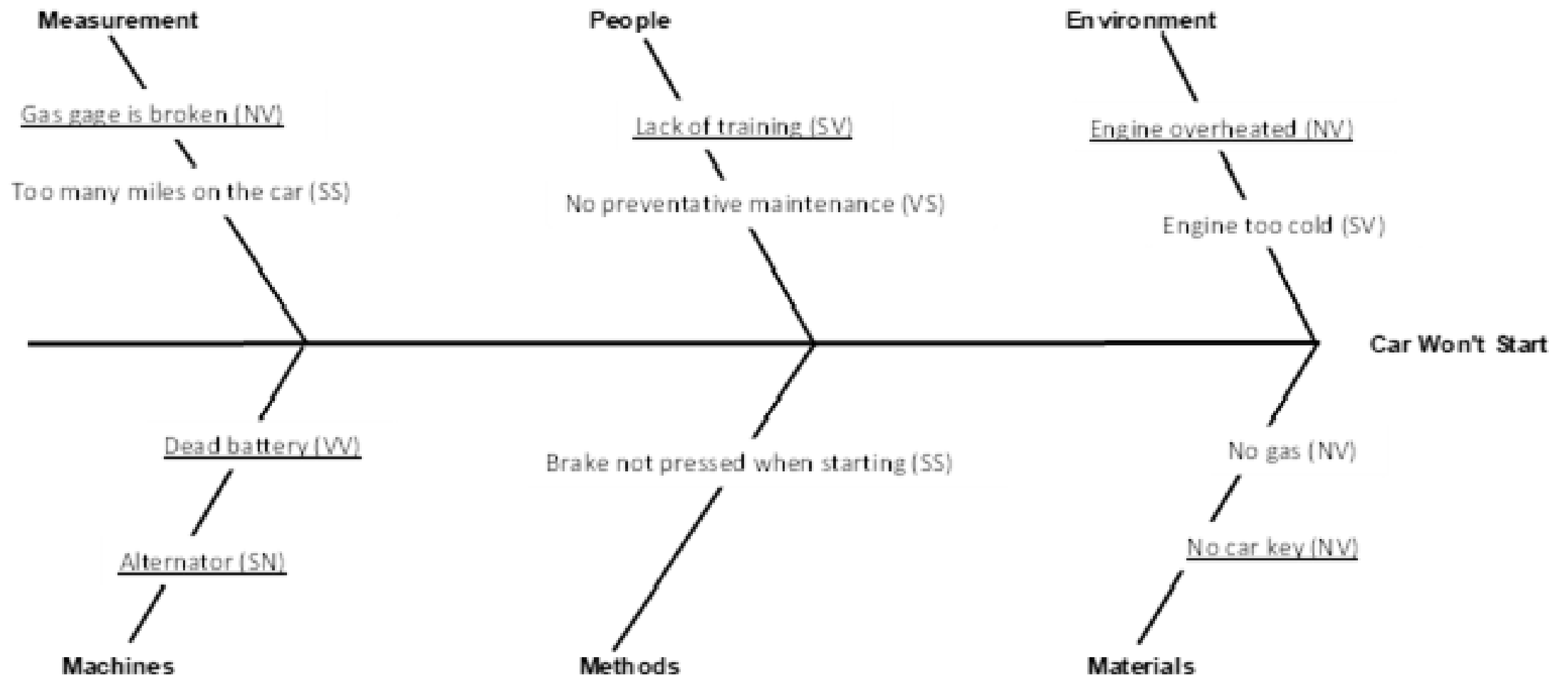
► Cause and Effect Diagrams





Action Plan:

- Carry out review of testing approach and procedures (QA Manager)
- Source suitable requirements and estimating training for development team (HR)
- Arrange meeting with Sales to revitalize product support (Project Manager)
- Revisit project communications to ensure clear project message has been given (Project Manager)





CAUSE 1

CAUSE 2

CAUSE 3

CAUSE 4

DETAILS

DETAILS

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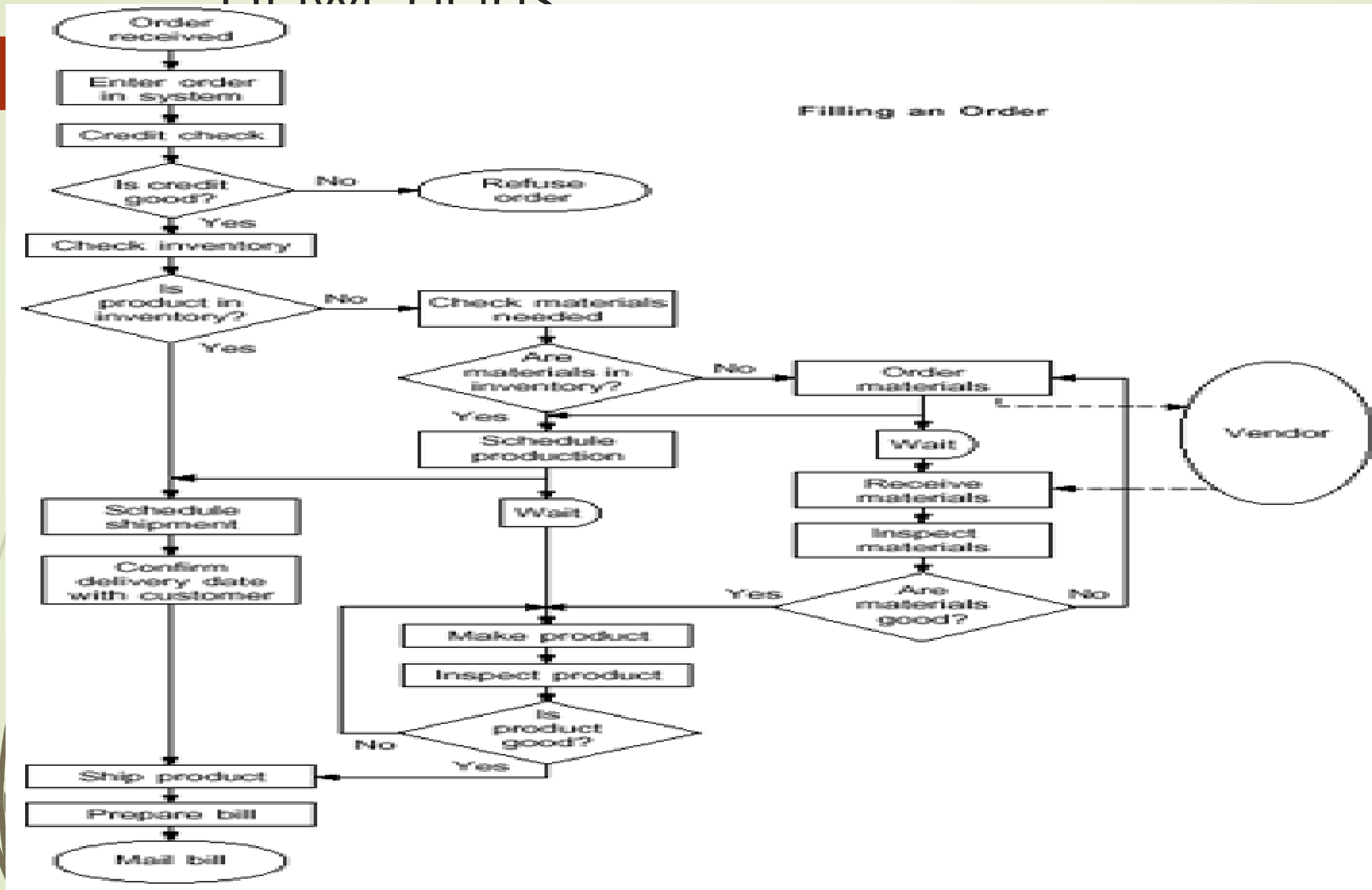
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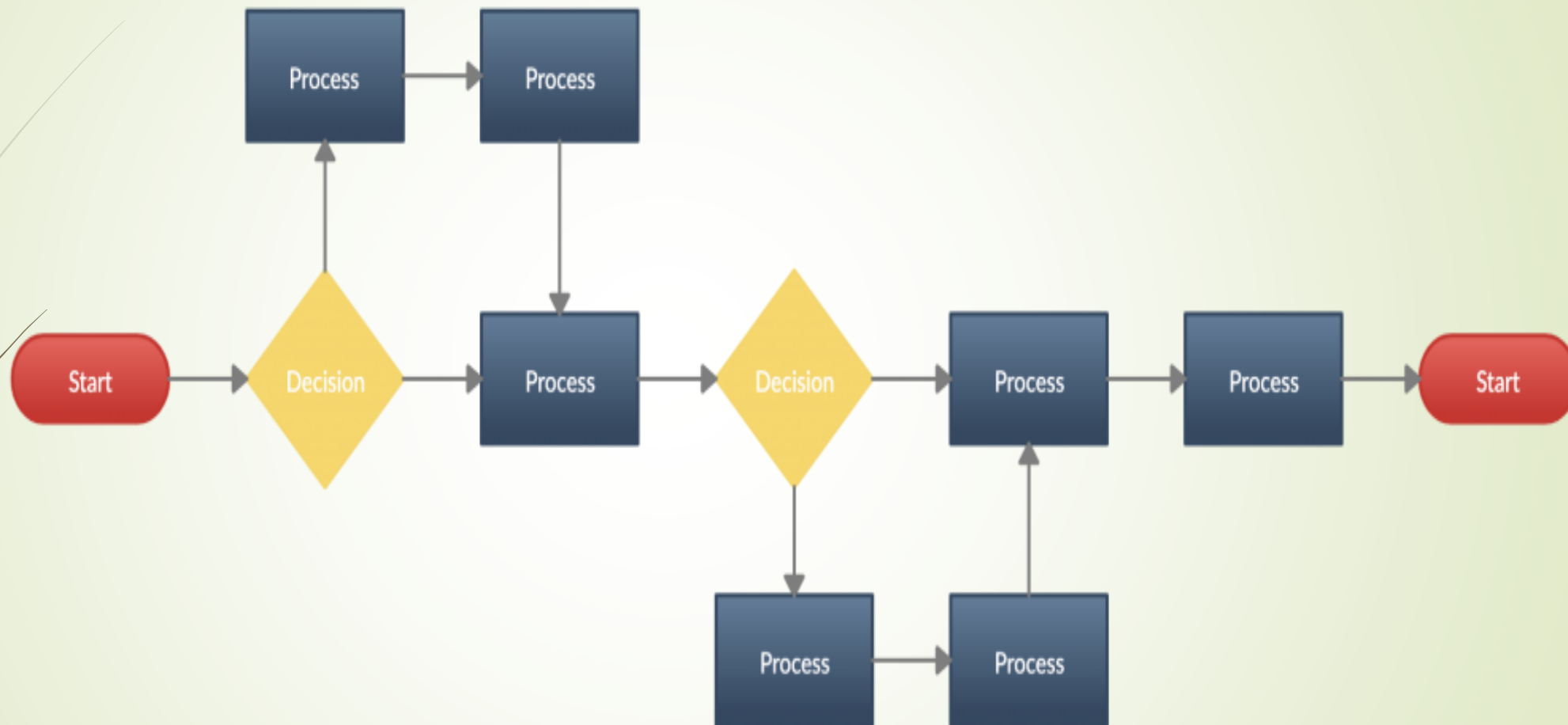
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IDEA

Flowcharts





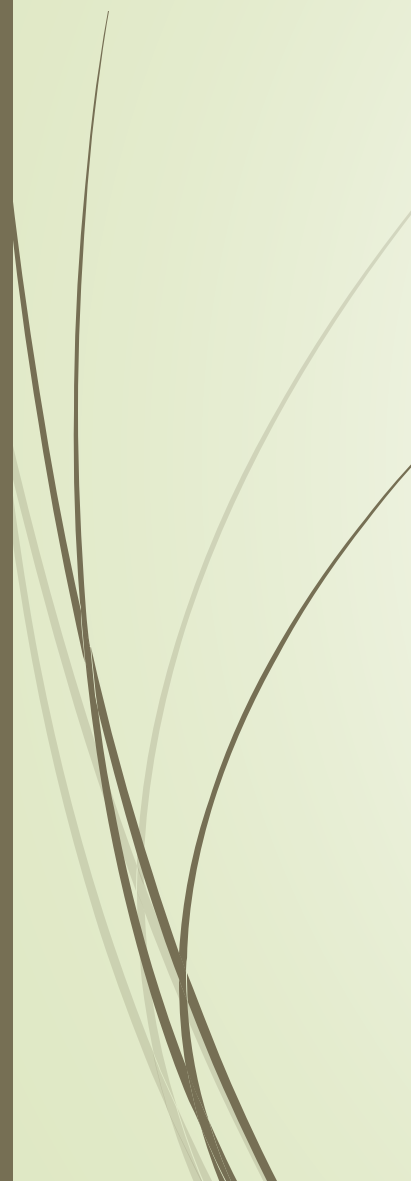

Check Sheets

Telephone Interruptions

Reason	Day					
	Mon	Tues	Wed	Thurs	Fri	Total
Wrong number						20
Info request						10
Boss						19
Total	12	6	10	8	13	49

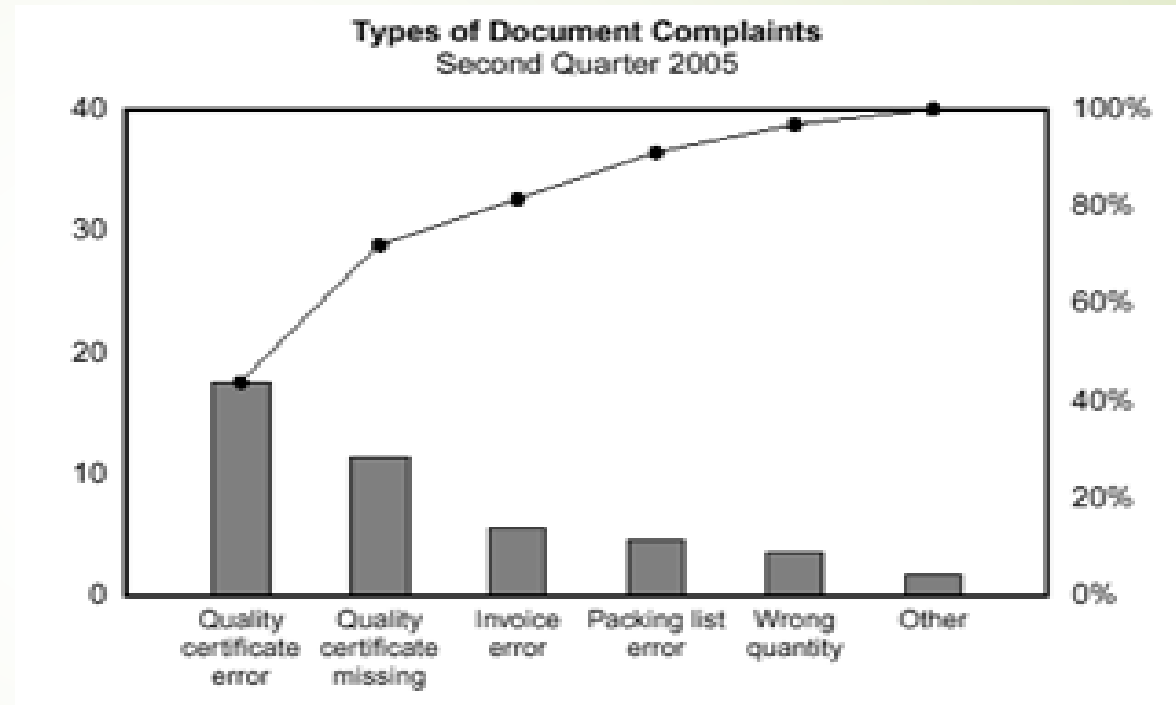
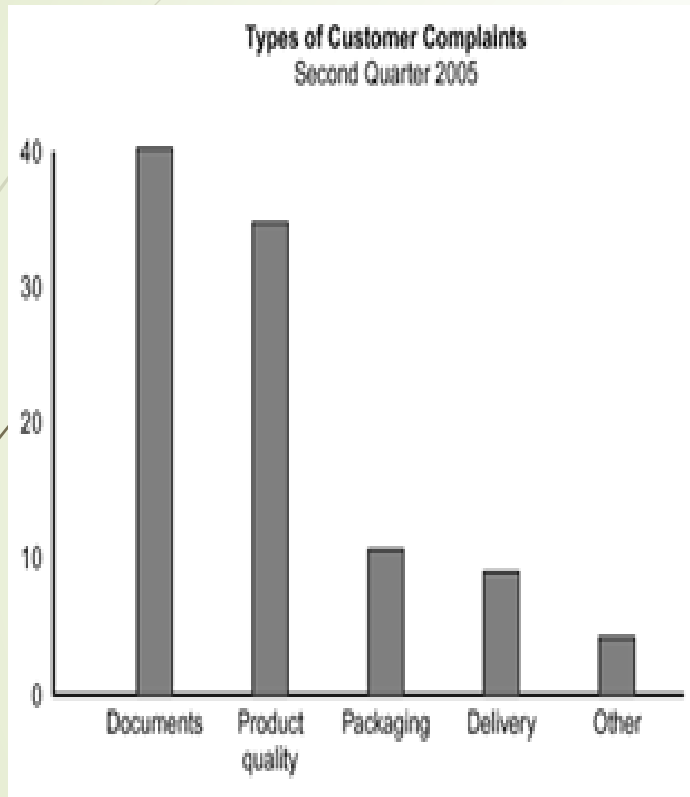
CHECK SHEET – COMPUTER RELATED PROBLEMS

S. NO.	Problem	Weekly Status				Total
		1	2	3	4	
1	Network problem					16
2	Server Problem					13
3	Email					18
4	Server Access					17
Total		10	20	13	21	

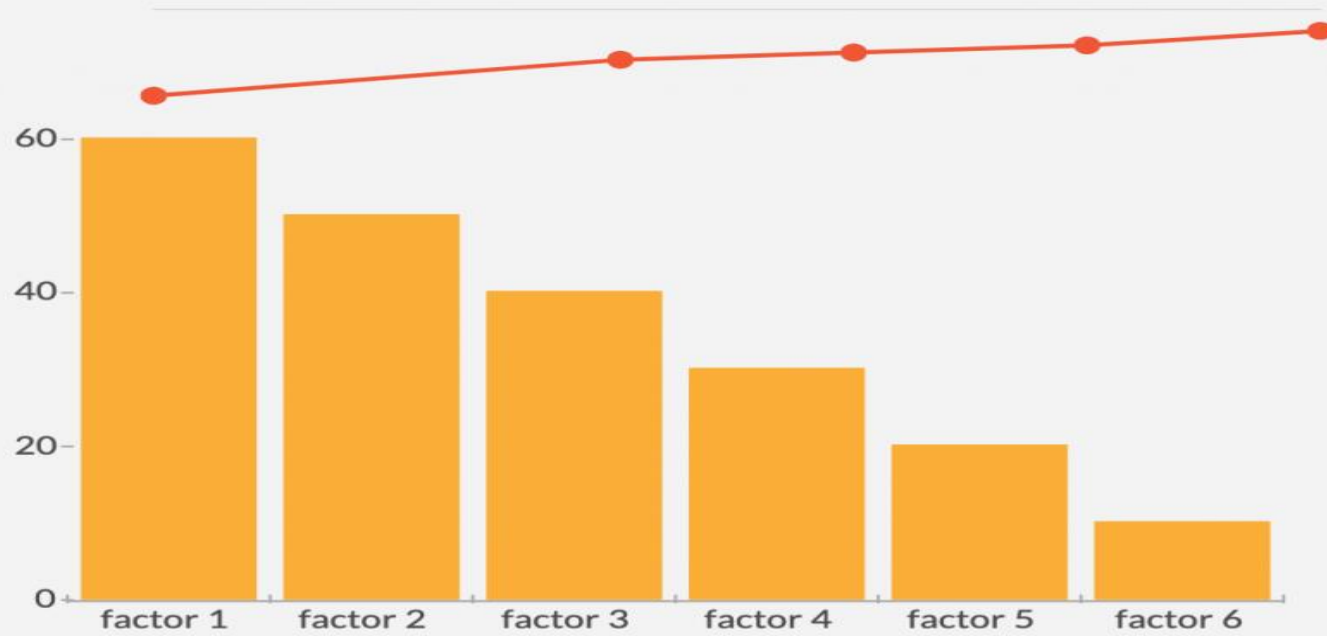


Defect Types/ Effect Occurence	Dates							Total
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
Total								

Pareto Diagrams

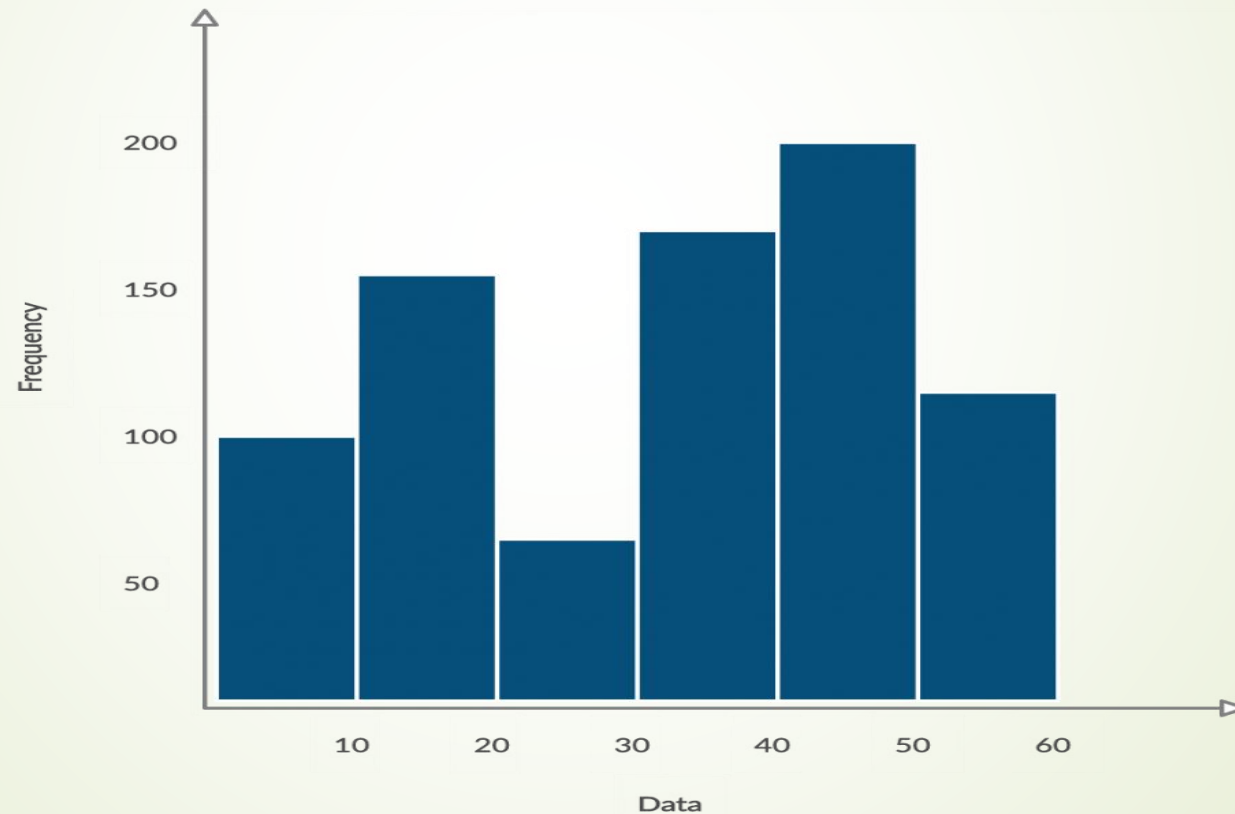


PARETO CHART Example



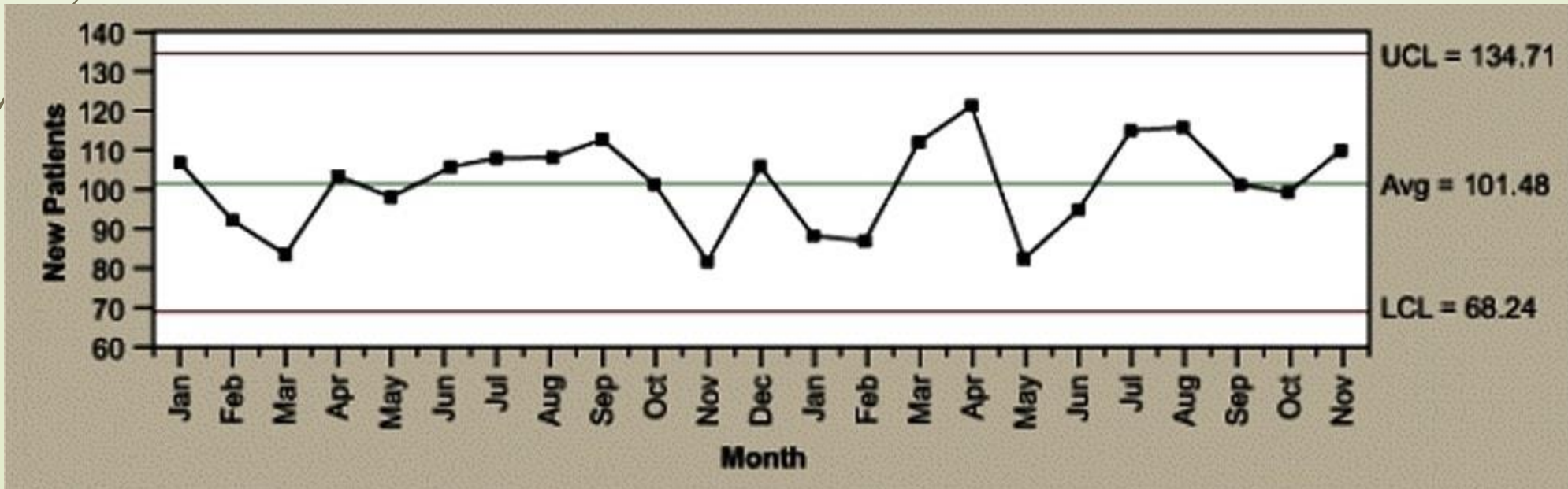
Histograms

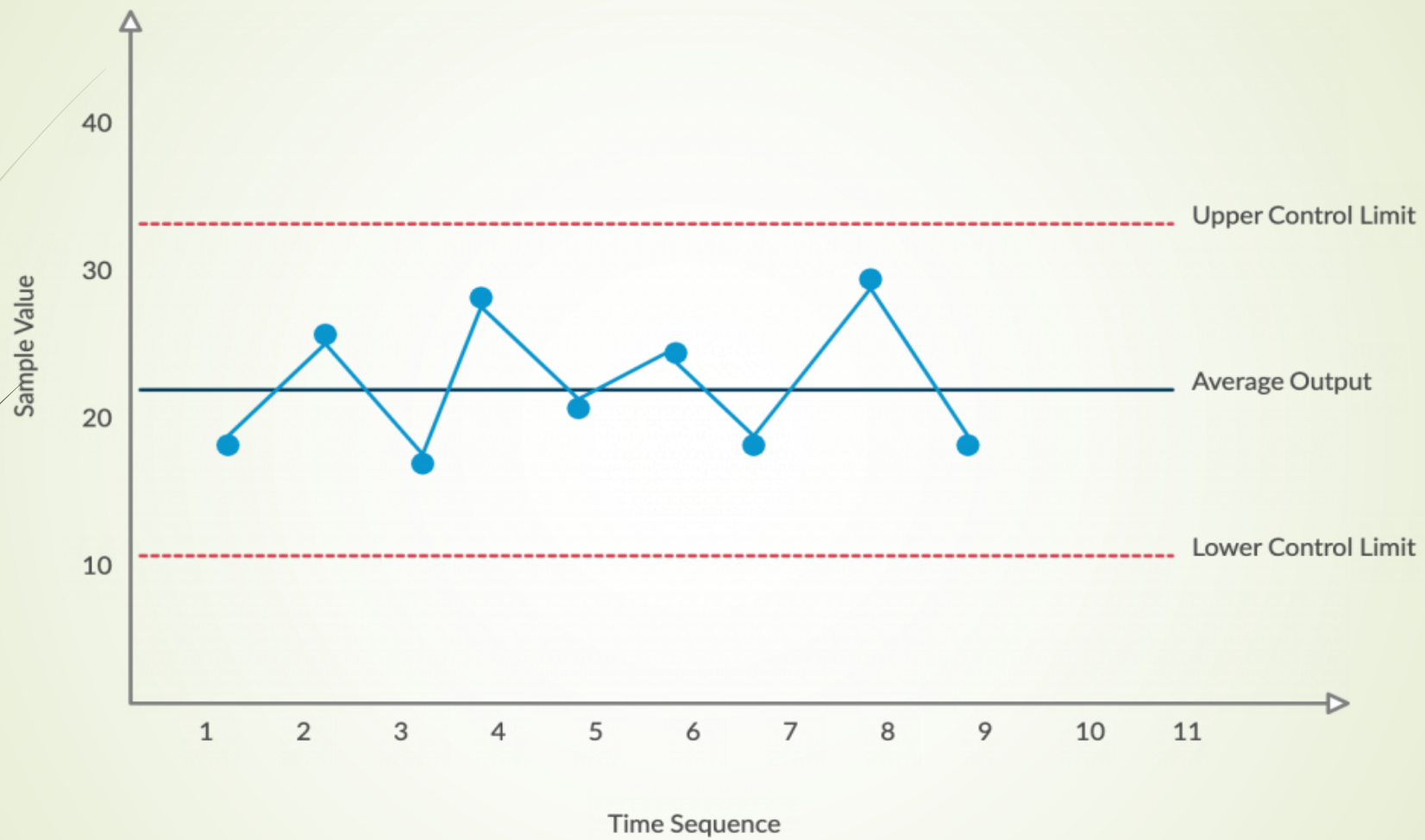
- A histogram is a vertical bar graph that represents the frequency of each measured category (known as bins) of variable.



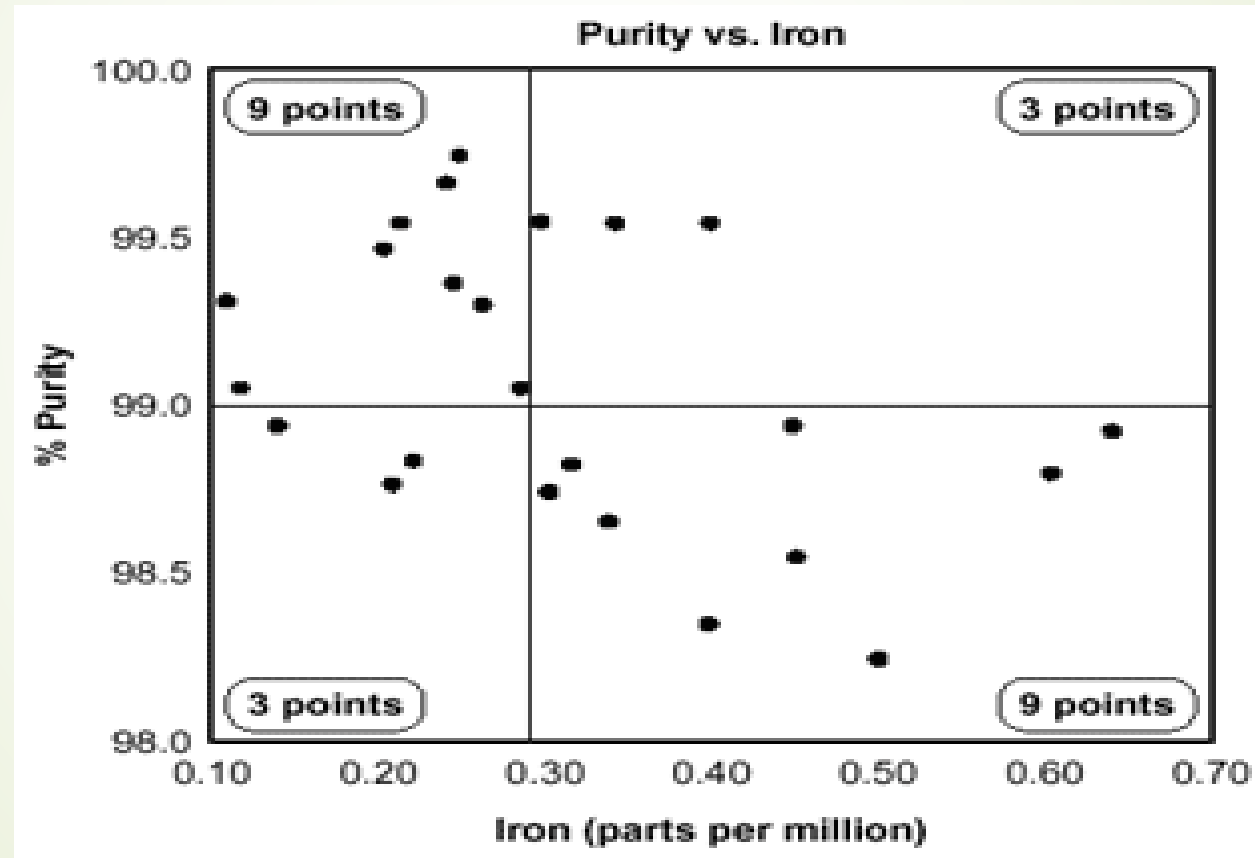
Control Charts

- Control charts are used to determine if processes are in or out of statistical control. Most processes experience a degree of normal variation (or common cause variation); that is to say, most processes do not achieve target performance all the time.





Scattered Diagram

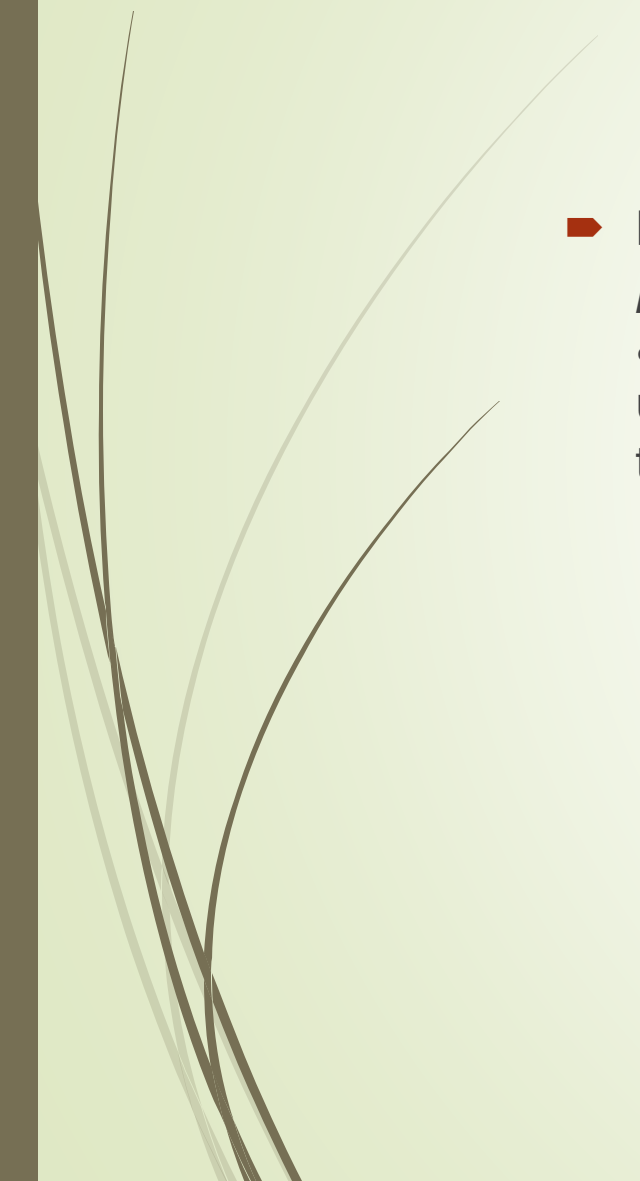


Scatter Diagram





Benchmarking



- **Benchmarking** is defined as *the process of measuring products, services, and processes against those of organizations known to be leaders in one or more aspects of their operations*. Benchmarking provides necessary insights to help you understand how your organization compares with similar organizations, even if they are in a different business or have a different group of customers.



PMBOK in Project Management

- PMBOK stands for Project Management Body of Knowledge, and it is the entire collection of processes, best practices, terminologies, and guidelines that are accepted as standard within the project management industry. PMBOK is considered valuable for companies as it helps them standardize practices across various departments, tailor processes to suit specific needs, and prevent project failures.