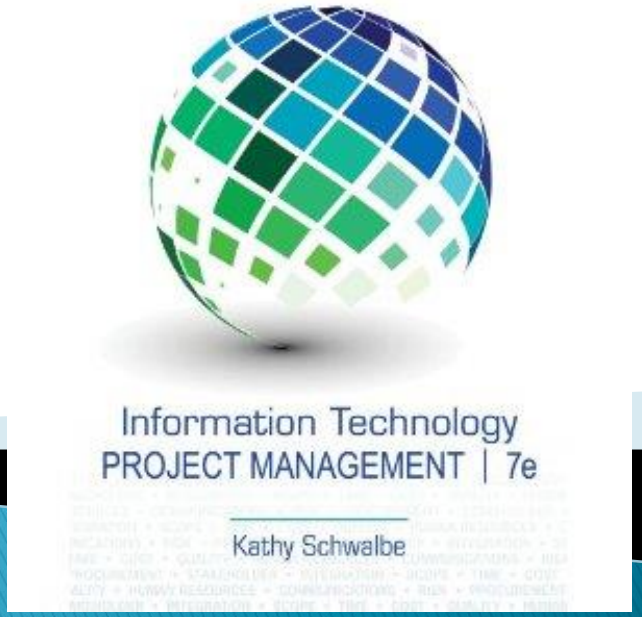
Chapter 8: Project Quality Management

Information Technology Project Management, Seventh Edition



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Learning Objectives

- Define project quality management and understand how quality relates to various aspects of IT projects
- Describe quality management planning and how quality and scope management are related
- Explain the main outputs of the quality control process
- Understand the tools and techniques for quality control, such as the Seven Basic Tools of Quality, statistical sampling, Six Sigma, and testing

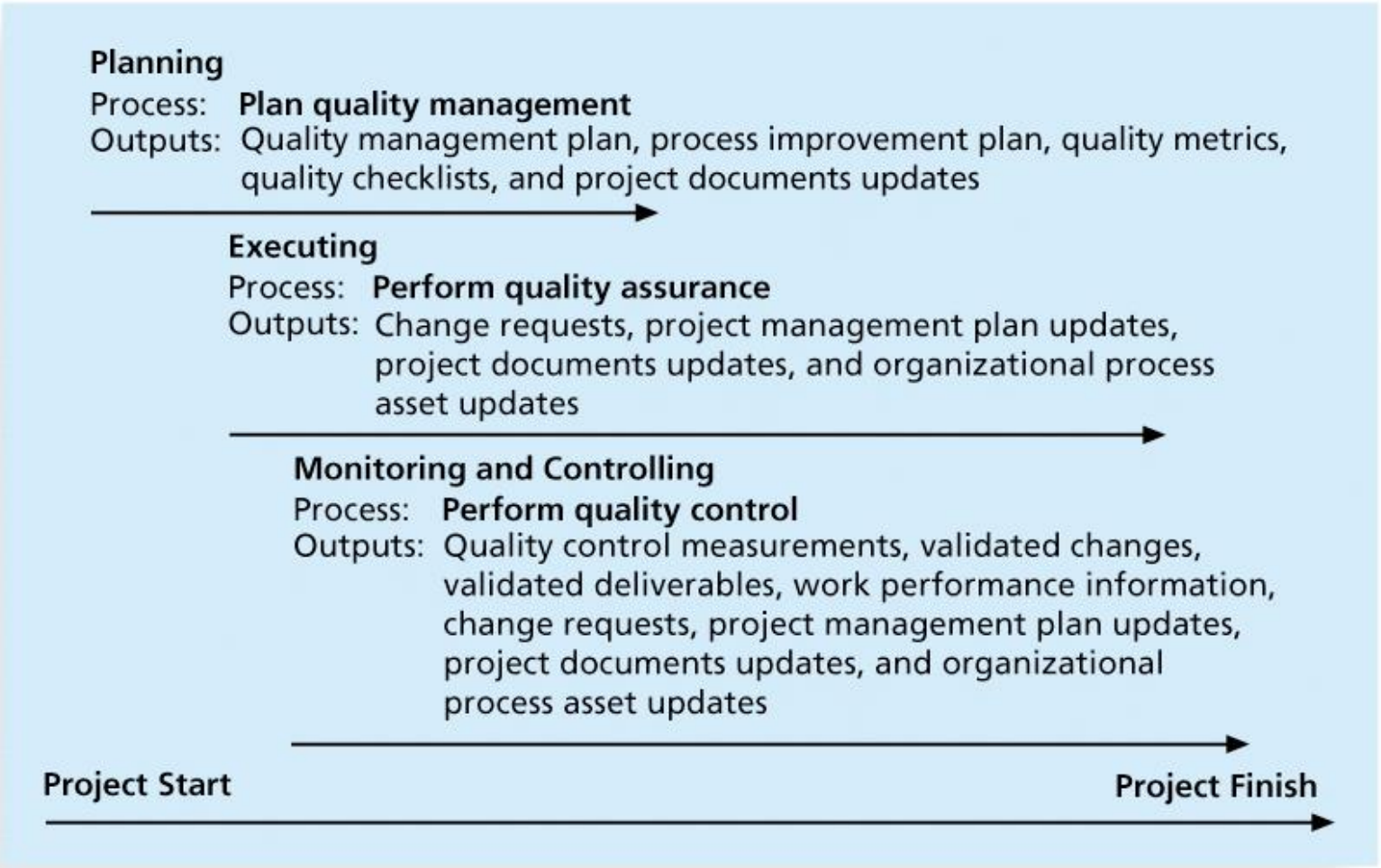
What Is Project Quality?

- The International Organization for Standardization (ISO) defines **quality** as “the degree to which a set of inherent characteristics fulfils requirements” (ISO9000:2000)
- Other experts define quality based on:
  - **Conformance to requirements**: The project’s processes and products meet written specifications
  - **Fitness for use**: A product can be used as it was intended

What Is Project Quality Management?

- **Project quality management** ensures that the project will satisfy the needs for which it was undertaken
- Processes include:
  - **8.1.Planning quality management**: Identifying which quality standards are relevant to the project and how to satisfy them; a **metric** is a standard of measurement
  - **8.2.Performing quality assurance**: Periodically evaluating overall project performance to ensure the project will satisfy the relevant quality standards
  - **8.3.Performing quality control**: Monitoring specific project results to ensure that they comply with the relevant quality standards

Figure 8-1. Project Quality Management Summary



8.1.Planning Quality

- Implies the ability to anticipate situations and prepare actions to bring about the desired outcome
- Important to prevent defects by:
  - Selecting proper materials
  - Training and indoctrinating people in quality
  - Planning a process that ensures the appropriate outcome

Scope Aspects of IT Projects

- **Functionality** is the degree to which a system performs its intended function
- **Features** are the system's special characteristics that appeal to users
- **System outputs** are the screens and reports the system generates
- **Performance** addresses how well a product or service performs the customer's intended use
- **Reliability** is the ability of a product or service to perform as expected under normal conditions
- **Maintainability** addresses the ease of performing maintenance on a product

Who's Responsible for the Quality of Projects?

- Project managers are ultimately responsible for quality management on their projects
- Several organizations and references can help project managers and their teams understand quality
  - International Organization for Standardization (www.iso.org)

8.2.Performing Quality Assurance

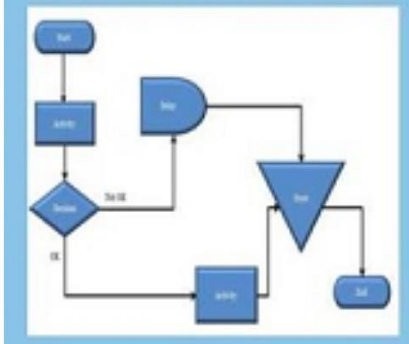
- **Quality assurance** includes all the activities related to satisfying the relevant quality standards for a project
- Another goal of quality assurance is continuous quality improvement
- **Benchmarking** generates ideas for quality improvements by comparing specific project practices or product characteristics to those of other projects or products within or outside the performing organization
- A **quality audit** is a structured review of specific quality management activities that help identify lessons learned that could improve performance on current or future projects

8.3.Controlling Quality

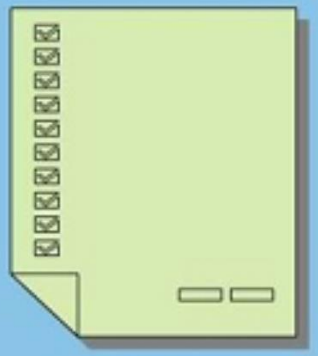
- The main outputs of quality control are:
  - Acceptance decisions
  - Rework
  - Process adjustments
- There are Seven Basic Tools of Quality that help in performing quality control

7 Q C Tools

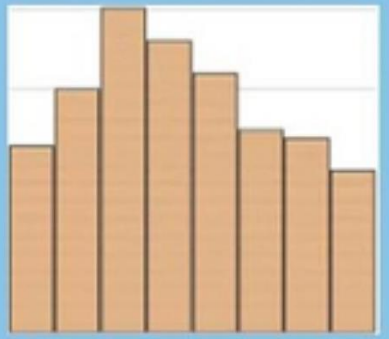
Process Flow Diagram



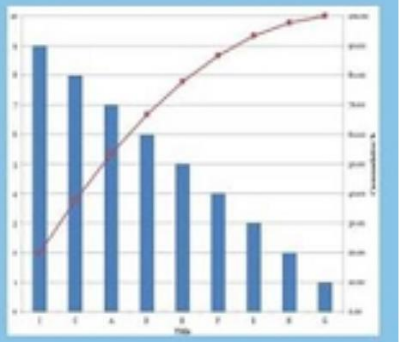
Check Sheet



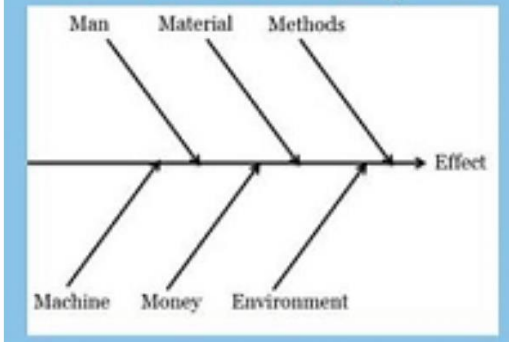
Histogram



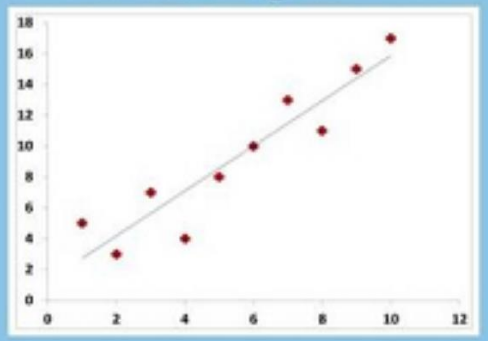
Pareto Diagram



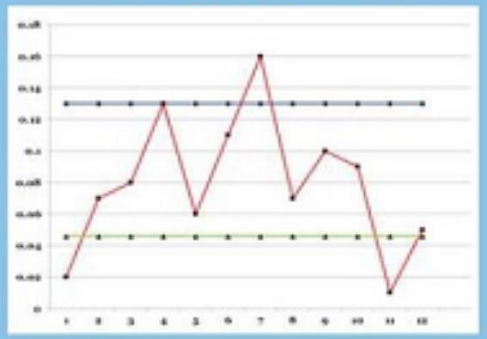
Cause and Effect Diagram



Scatter Diagram



Control Charts



Quanlity Controlling Tools

- 8.3.1 Cause-and-effect diagrams
- 8.3.2 A control chart
- 8.3.3 A check-sheet
- 8.3.4 A scatter diagram
- 8.3.5. A histogram
- 8.3.6. A Pareto chart
- 8.3.7 Flowcharts

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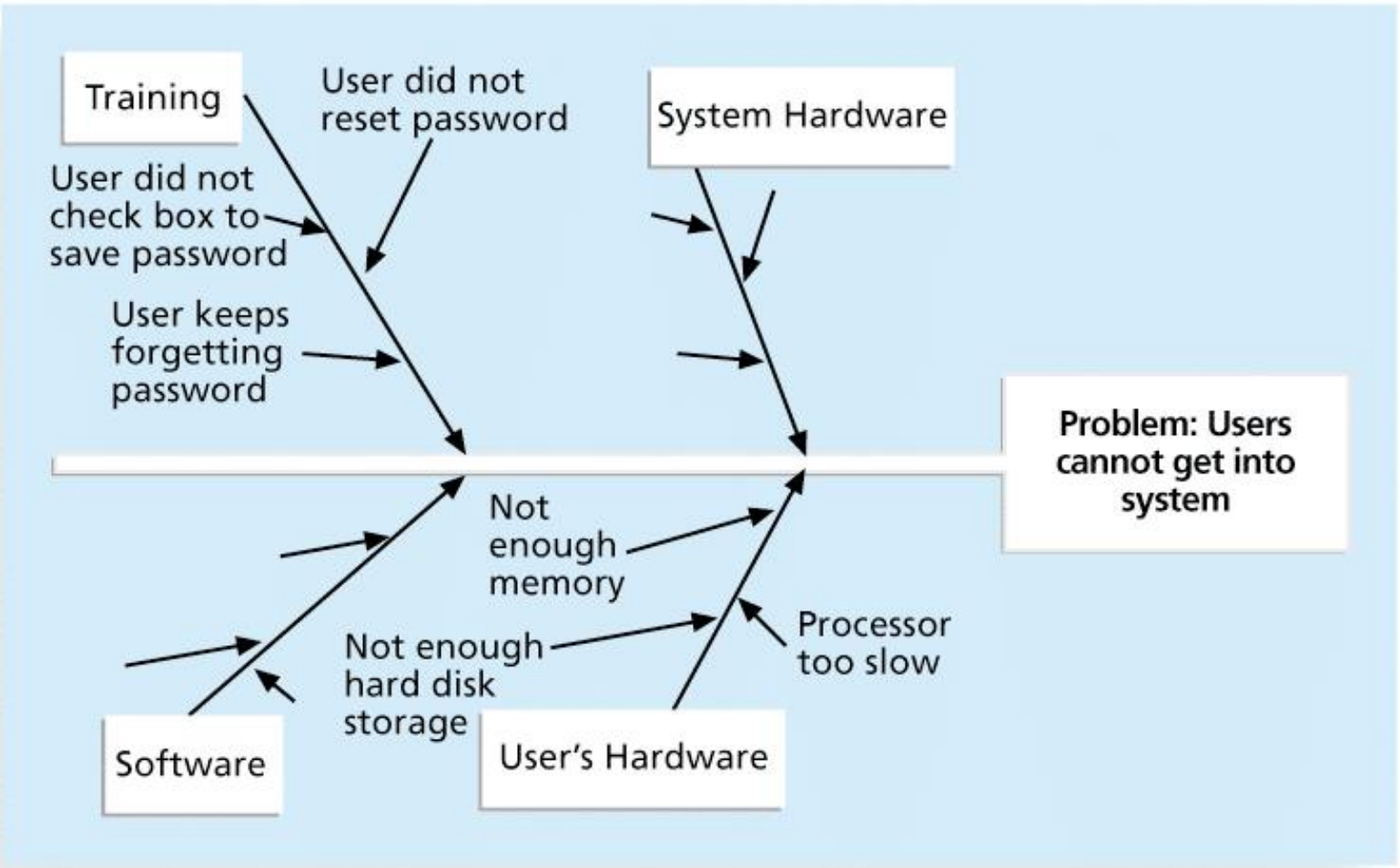
Cause-and-Effect Diagrams

- **Cause-and-effect diagrams** trace complaints about quality problems back to the responsible production operations
- They help you find the root cause of a problem
- Also known as **fishbone** or **Ishikawa diagrams**
- Can also use the **5 whys** technique where you repeated ask the question “Why” (five is a good rule of thumb) to peel away the layers of symptoms that can lead to the root cause

Figure 8-2. Sample Cause-and-Effect Diagram



How to Create a Cause and Effect Diagram

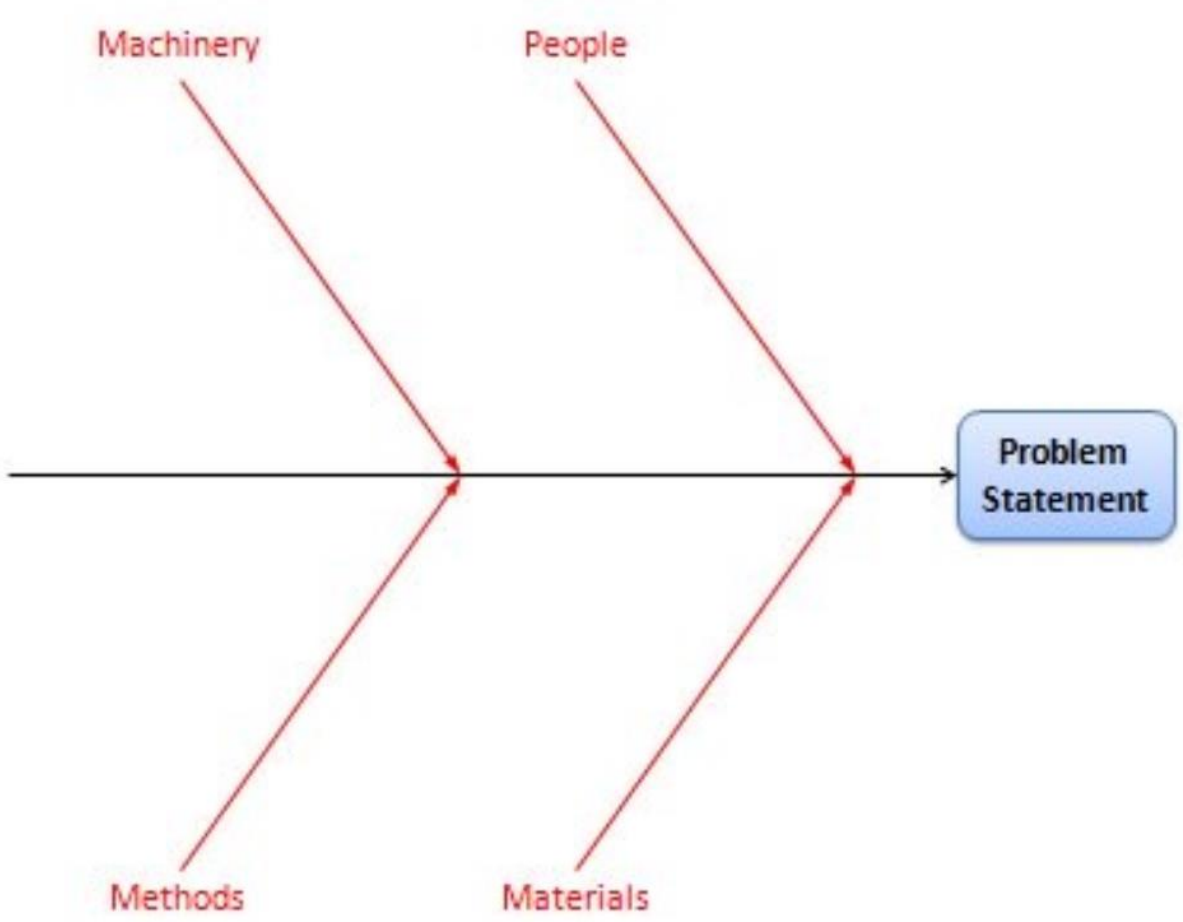
- A cause and effect diagram can be created in six steps:
  1. Draw Problem Statement
  2. Draw Major Cause Categories
  3. Brainstorm Causes
  4. Categorize Causes
  5. Determine Deeper Causes
  6. Identify Root Causes

1. DRAW PROBLEM STATEMENT

Fishbone Diagram - Problem Statement

2. DRAW MAJOR CAUSE CATEGORIES

- In a manufacturing environment, the traditional categories are...
  - Machines/Equipment
  - Methods
  - Materials
  - People
- In a service organization, the traditional categories are...
  - Policies
  - Procedures
  - Plant
  - People

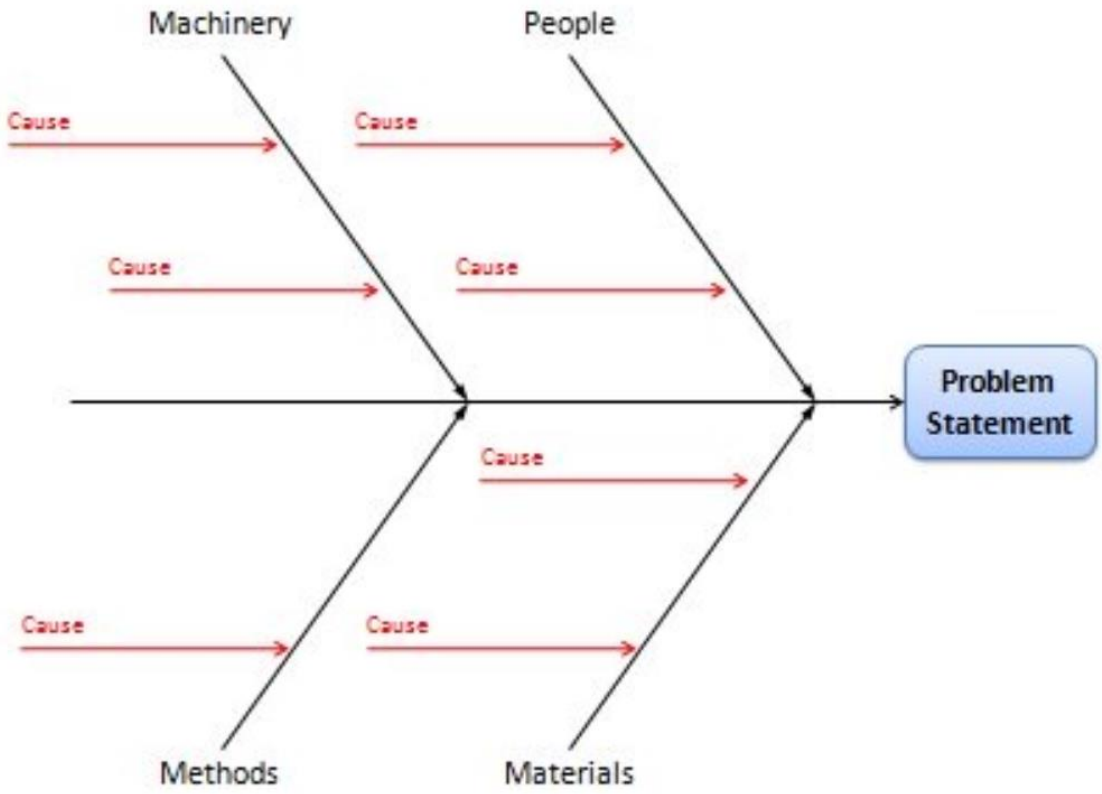


Cause and Effect Diagram - Major Cause Categories

3. BRAINSTORM CAUSES

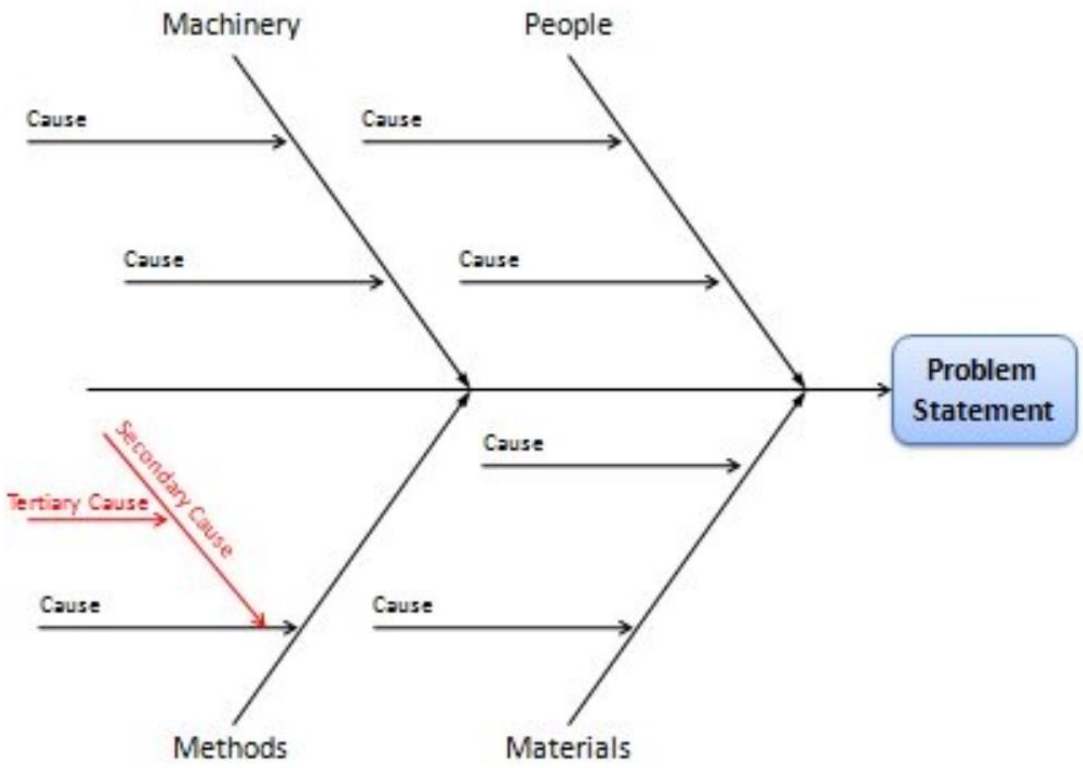
- Brainstorming the causes of the problem is where most of the effort in creating your Ishikawa diagram takes place.
- Some people prefer to generate a list of causes before the previous steps in order to allow ideas to flow without being constrained by the major cause categories.

4. CATEGORIZE CAUSES



Ishikawa Diagram - Categorize Causes

5. DETERMINE DEEPER CAUSES



Fishbone Chart - Deeper Causes

6. IDENTIFY ROOT CAUSES

- The final step for creating a fishbone diagram is to identify the root causes of the problem. This can be done in several ways...
  - Look for causes that appear repeatedly
  - Select using **group consensus methods**
  - Select based on frequency of occurrence

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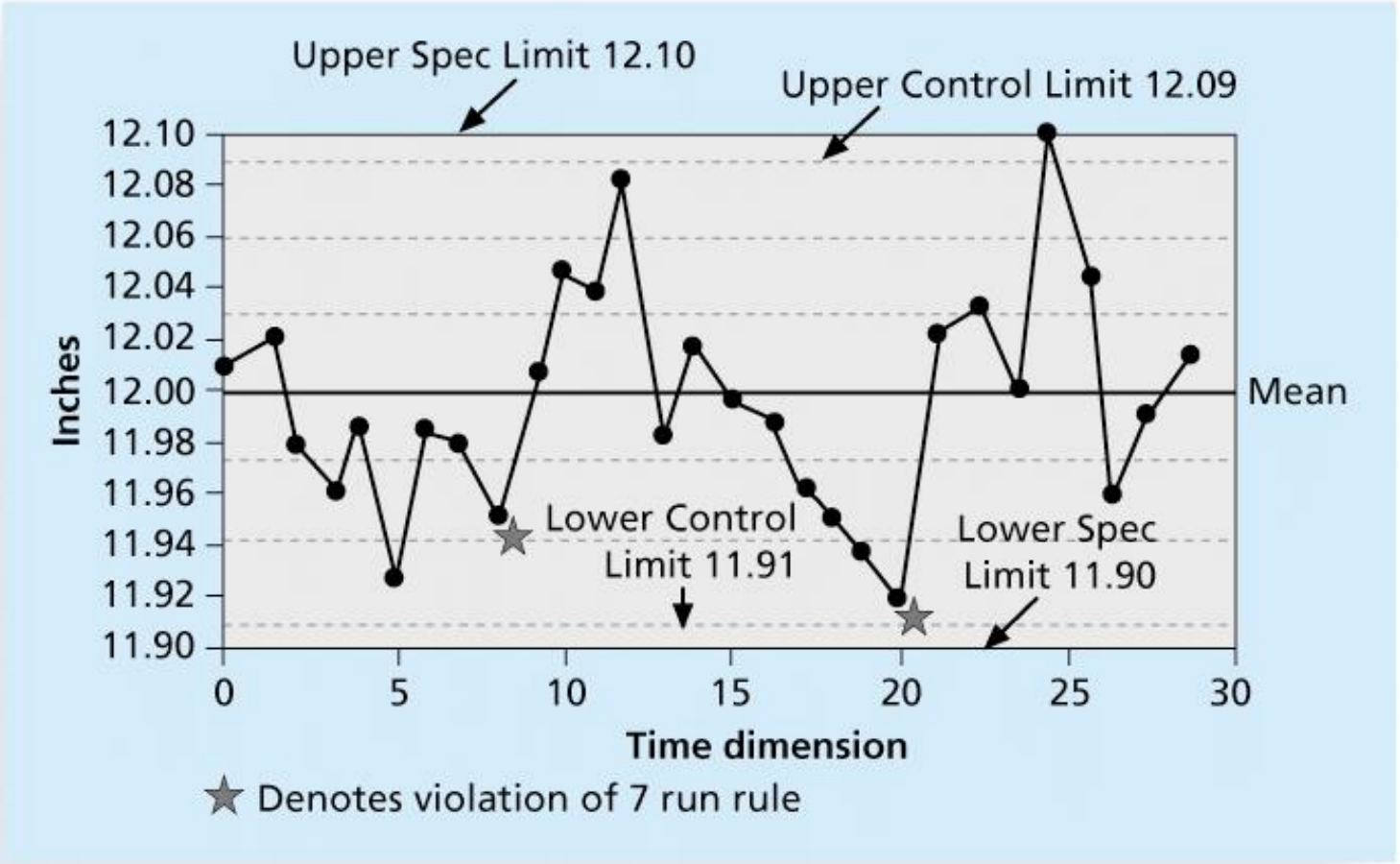
Control Charts

- A **control chart** is a graphic display of data that illustrates the results of a process over time
- The main use of control charts is to prevent defects, rather than to detect or reject them
- Quality control charts allow you to determine whether a process is in control or out of control
  - When a process is in control, any variations in the results of the process are created by random events; processes that are in control do not need to be adjusted
  - When a process is out of control, variations in the results of the process are caused by non-random events; you need to identify the causes of those non-random events and adjust the process to correct or eliminate them

Figure 8-3. Sample Quality Control Chart



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Checksheet

- A checksheet is used to collect and analyze data
- It is sometimes called a tally sheet or checklist, depending on its format
- In the example in Figure 8-4, most complaints arrive via text message, and there are more complaints on Monday and Tuesday than on other days of the week
- This information might be useful in improving the process for handling complaints

Figure 8-4. Sample Checksheet

System Complaints

Source	Day							
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total
Email	𝍸	𝍸	𝍸	𝍸	𝍸		𝍸	12
Text	𝍸 𝍸	𝍸	𝍸 𝍸	𝍸	𝍸	𝍸	𝍸	29
Phone call	𝍸	𝍸	𝍸	𝍸	𝍸	𝍸		8
Total	11	10	8	6	7	3	4	49

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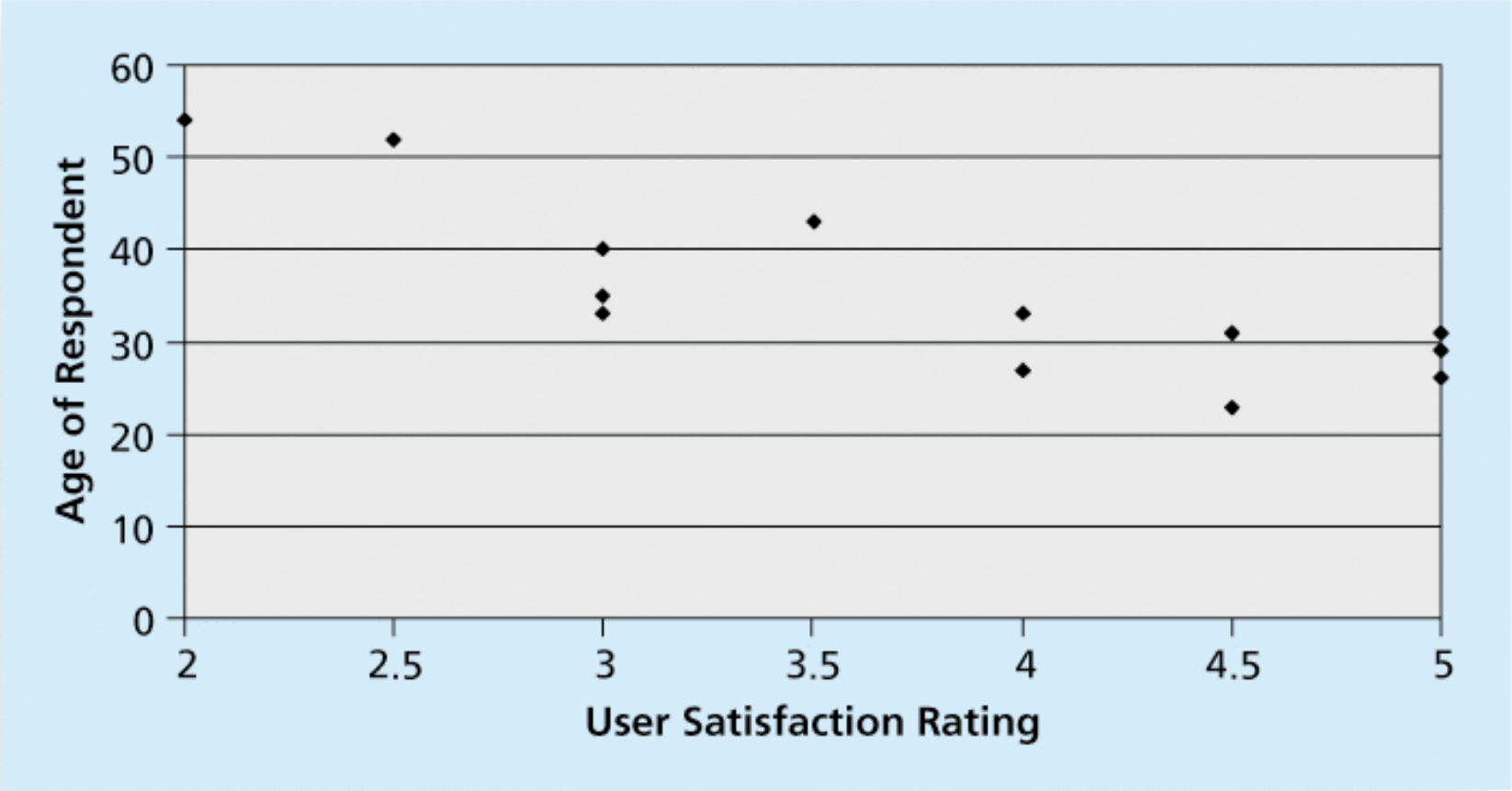
Scatter diagram

- A **scatter diagram** helps to show if there is a relationship between two variables
- The closer data points are to a diagonal line, the more closely the two variables are related

Figure 8-5. Sample Scatter Diagram



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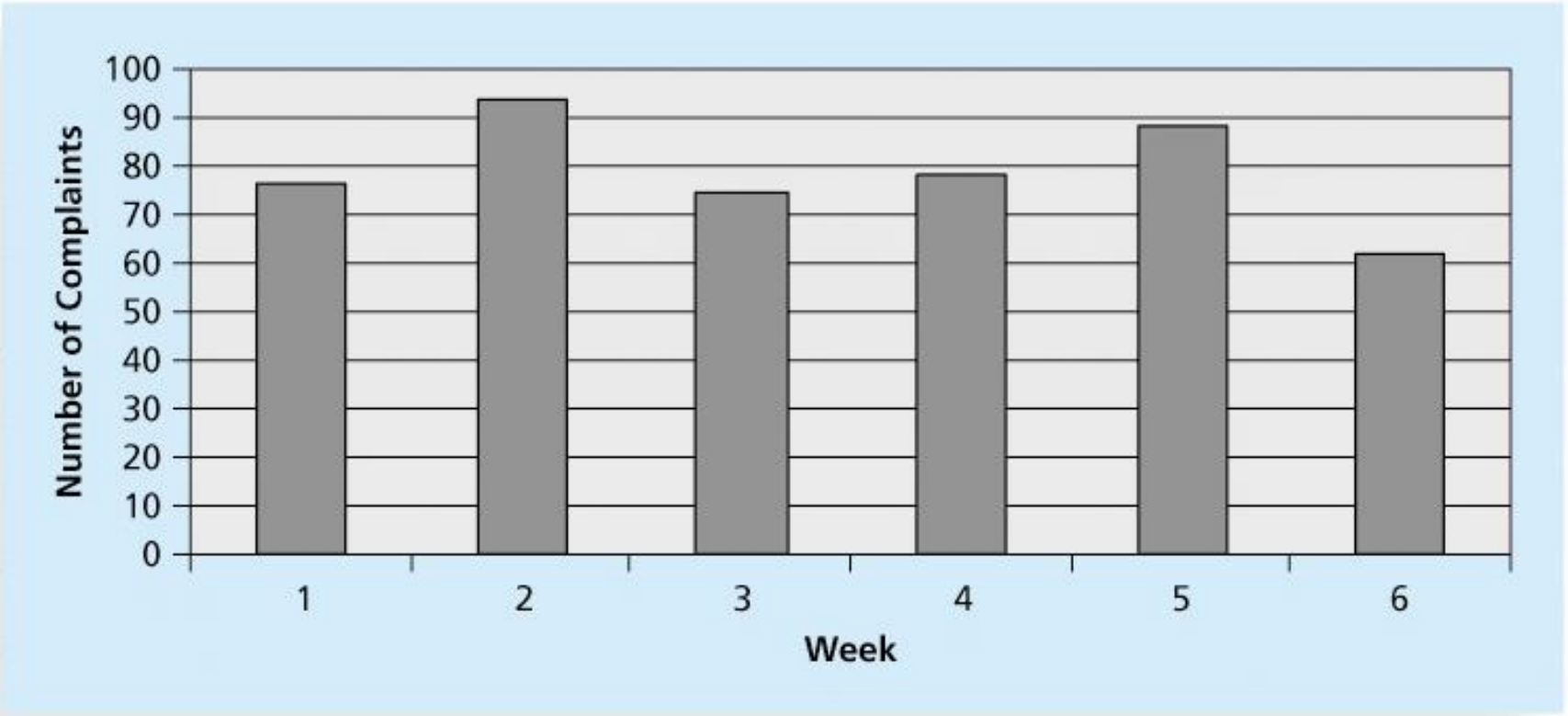
Histograms

- A **histogram** is a bar graph of a distribution of variables
- Each bar represents an attribute or characteristic of a problem or situation, and the height of the bar represents its frequency

Figure 8-6. Sample Histogram



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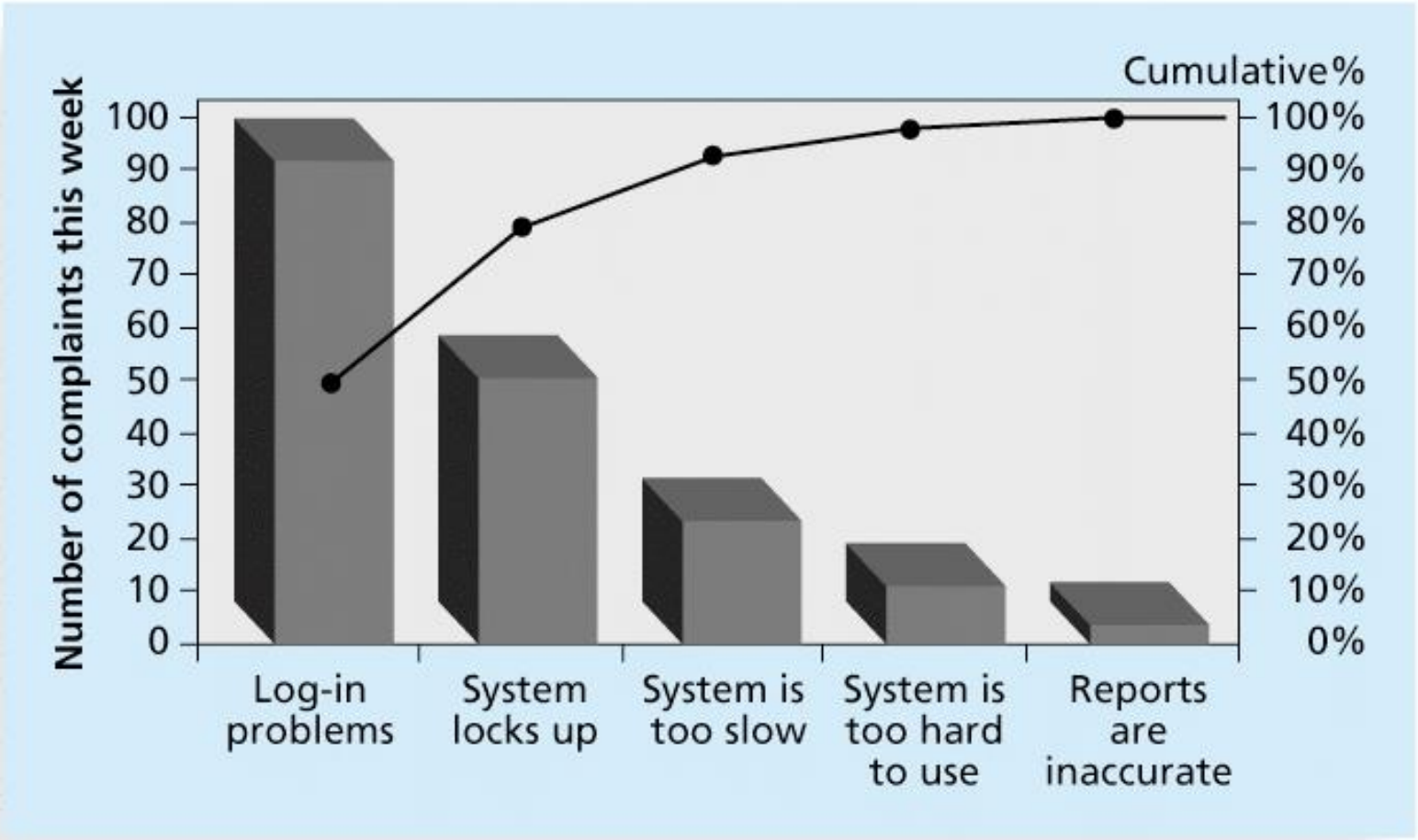
Pareto Charts

- A **Pareto chart** is a histogram that can help you identify and prioritize problem areas
- **Pareto analysis** is also called the 80-20 rule, meaning that 80 percent of problems are often due to 20 percent of the causes

Figure 8-7. Sample Pareto Chart



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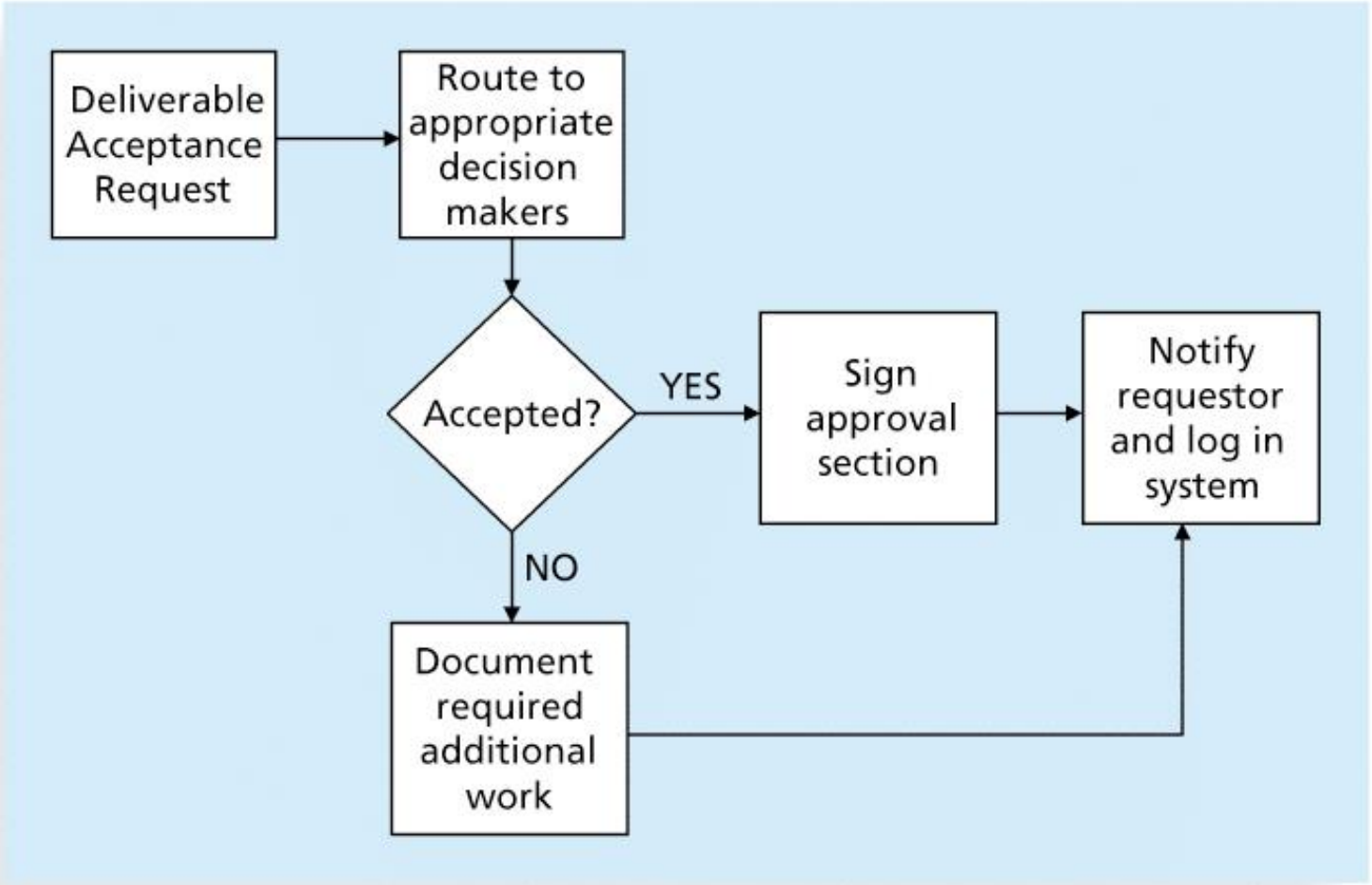
Flowcharts

- Flowcharts are graphic displays of the logic and flow of processes that help you analyze how problems occur and how processes can be improved
- They show activities, decision points, and the order of how information is processed

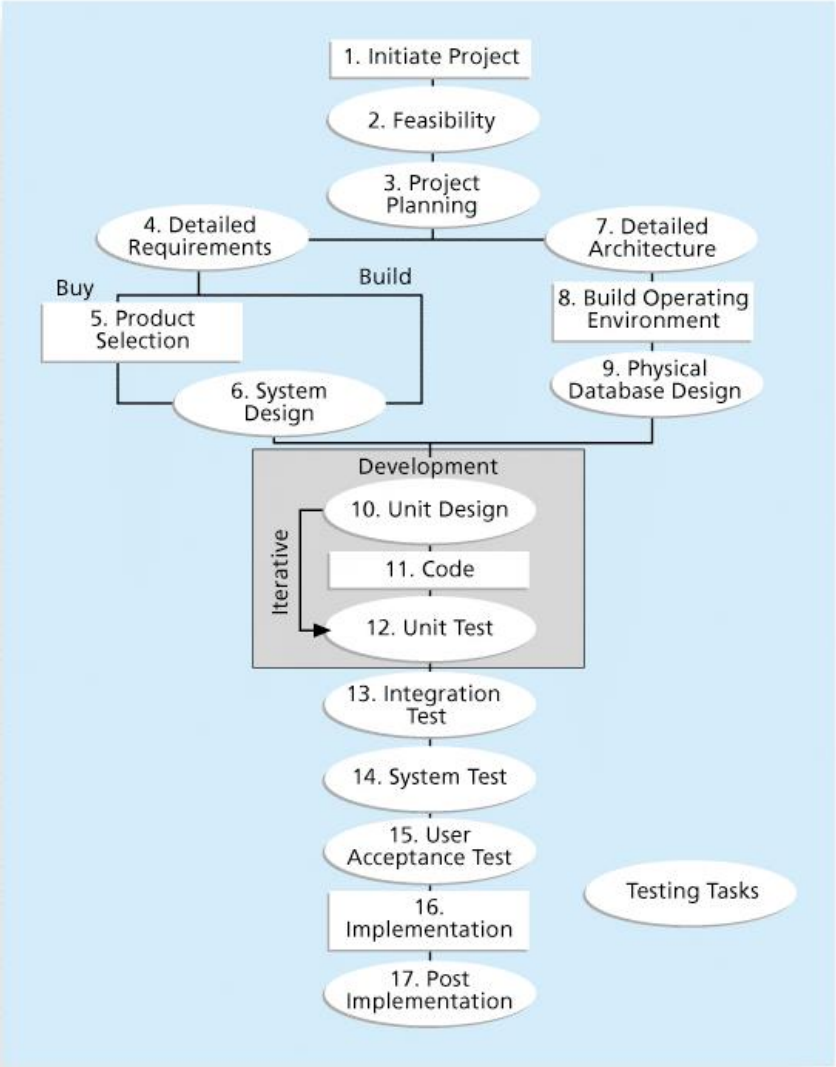
Figure 8-8. Sample Flowchart



Testing

- Many IT professionals think of testing as a stage that comes near the end of IT product development
- Testing should be done during almost every phase of the IT product development life cycle

Figure 8-11. Testing Tasks in the Software Development Life Cycle



Types of Tests

- **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

ISO Standards

- **ISO 9000** is a quality system standard that:
  - Is a three-part, continuous cycle of planning, controlling, and documenting quality in an organization
  - Provides minimum requirements needed for an organization to meet its quality certification standards
  - Helps organizations around the world reduce costs and improve customer satisfaction
- See www.iso.org for more information

Improving Information Technology Project Quality

- Several suggestions for improving quality for IT projects include:
  - Establish leadership that promotes quality
  - Understand the cost of quality
  - Focus on organizational influences and workplace factors that affect quality
  - Follow maturity models

Leadership

- As Joseph M. Juran said in 1945, “It is most important that top management be quality-minded. In the absence of sincere manifestation of interest at the top, little will happen below”*
- A large percentage of quality problems are associated with management, not technical issues.

*American Society for Quality (ASQ), *(www.asqc.org/about/history/juran.html*).

Five Cost Categories Related to Quality

- **Prevention cost**: Cost of planning and executing a project so it is error-free or within an acceptable error range
- **Appraisal cost**: Cost of evaluating processes and their outputs to ensure quality
- **Internal failure cost**: Cost incurred to correct an identified defect before the customer receives the product
- **External failure cost**: Cost that relates to all errors not detected and corrected before delivery to the customer
- **Measurement and test equipment costs**: Capital cost of equipment used to perform prevention and appraisal activities

Expectations and Cultural Differences in Quality

- Project managers must understand and manage stakeholder expectations.
- Expectations also vary by:
  - Organization's culture
  - Geographic regions

Chapter Summary

- Project quality management ensures that the project will satisfy the needs for which it was undertaken
- Main processes include:
  - Plan quality
  - Perform quality assurance
  - Perform quality control