Project Quality Management

Prepared by:
Dr. Nouf Alromaih and Dr. Hend Albassam

The Importance of Project Quality Management

- Many people joke about the poor quality of IT products
- People seem to accept systems being down occasionally or needing to reboot their PCs
- But quality is very important in many IT projects

The Importance of Project Quality Management

- In 1986, two hospital patients died after receiving fatal doses of radiation from a Therac 25 machine after a software problem caused the machine to ignore calibration data

- In one of the biggest software errors in banking history, Chemical Bank mistakenly deducted about $15 million from more than 100,000 customer accounts.

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

Project Quality Management

- **Project quality management** ensures that the project will satisfy the needs for which it was undertaken

- **Processes** include:
  - **Planning quality management**: Identifying which quality standards are relevant to the project and how to satisfy them
    - A **metric** is a standard of measurement
  - **Performing quality assurance**: Periodically evaluating overall project performance to ensure the project will satisfy the relevant quality standards
  - **Performing quality control**: Monitoring specific project results to ensure that they comply with the relevant quality standards

Project Quality Management

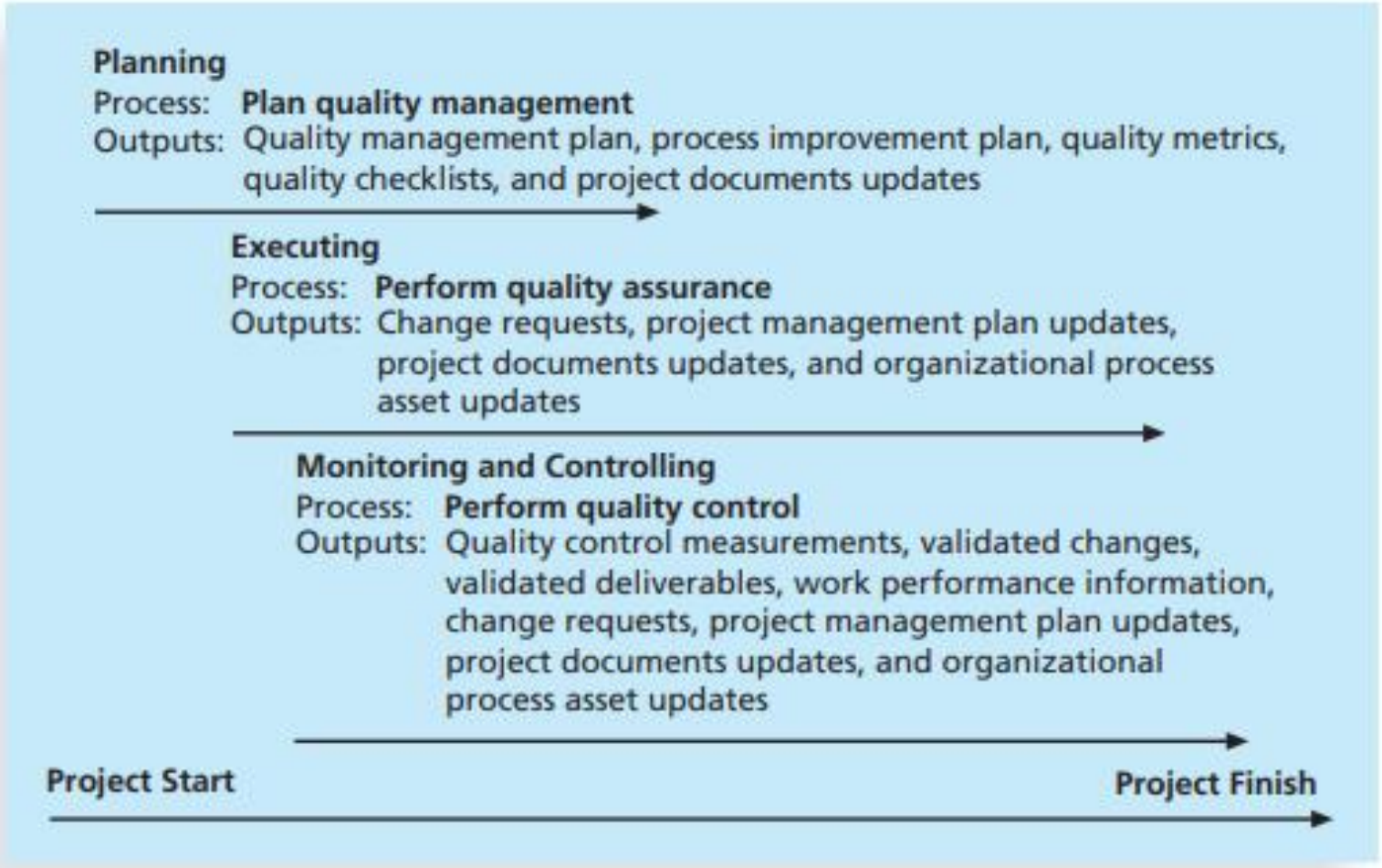


FIGURE 8-1 Project quality management summary

1. Planning Quality Management

- Includes identifying *which quality requirements and standards are relevant to the project* and *how to satisfy them*.

- For an IT project, quality standards might include:
  - Allowing for system growth,
  - Planning a reasonable response time for a system, or
  - Ensuring that the system produces consistent and accurate information.

- Quality standards can also apply to IT services. For example:
  - You can set standards for how long it should take to get a reply from a help desk, or
  - How long it should take to ship a replacement part for a hardware item under warranty.

1. Planning Quality Management cont.

- The main outputs of planning quality management are a quality management plan, a process improvement plan, quality metrics, quality checklists, and project documents updates.

- A metric is a standard of measurement. Examples of common metrics include failure rates of products, availability of goods and services, and customer satisfaction ratings.

1. Planning Quality Management cont.

- Important scope aspects of IT projects that affect quality:
  - **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

2. Performing Quality Assurance

- Quality assurance includes all of the *activities related to satisfying the relevant quality standards* for a project.

- Another goal of quality assurance is *continuous quality improvement*.

- Important inputs for performing quality assurance are the quality management plan, process improvement plan, quality metrics, quality control measurements, and project documents.

2. Performing Quality Assurance cont.

- Several tools used in quality assurance:
  - 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 and that could improve performance on current or future projects.
    - In-house auditors or third-party industrial engineers often perform quality audits by helping to design specific quality metrics for a project and then applying and analyzing the metrics throughout the project.

3. Performing Quality Control

- Involves *monitoring specific project results* to ensure that they comply with the relevant quality standards while identifying ways to improve overall quality.

- Often associated with the technical tools and techniques of quality management

- The main outputs of quality control are:
  - Acceptance decisions
  - Rework
  - Process adjustments

3. Performing Quality Control cont.

- **Acceptance decisions** determine if the products or services produced as part of the project will be accepted or rejected.
  - If they are accepted, they are considered to be validated deliverables.
  - If project stakeholders reject some of the project's products or services, there must be **rework**.

3. Performing Quality Control cont.

- **Rework** is action taken to bring rejected items into compliance with product requirements, specifications, or other stakeholder expectations.

- Often results in requested changes and validated defect repair, and it results from recommended defect repair or corrective or preventive actions.

- Can be very expensive

3. Performing Quality Control cont.

- **Process adjustments** correct or prevent further quality problems based on quality control measurements.

- Often result in updates to the quality baseline, organization process assets, and the project management plan.

3. Performing Quality Control: Tools and techniques

- **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**

Cause-and-Effect Diagram

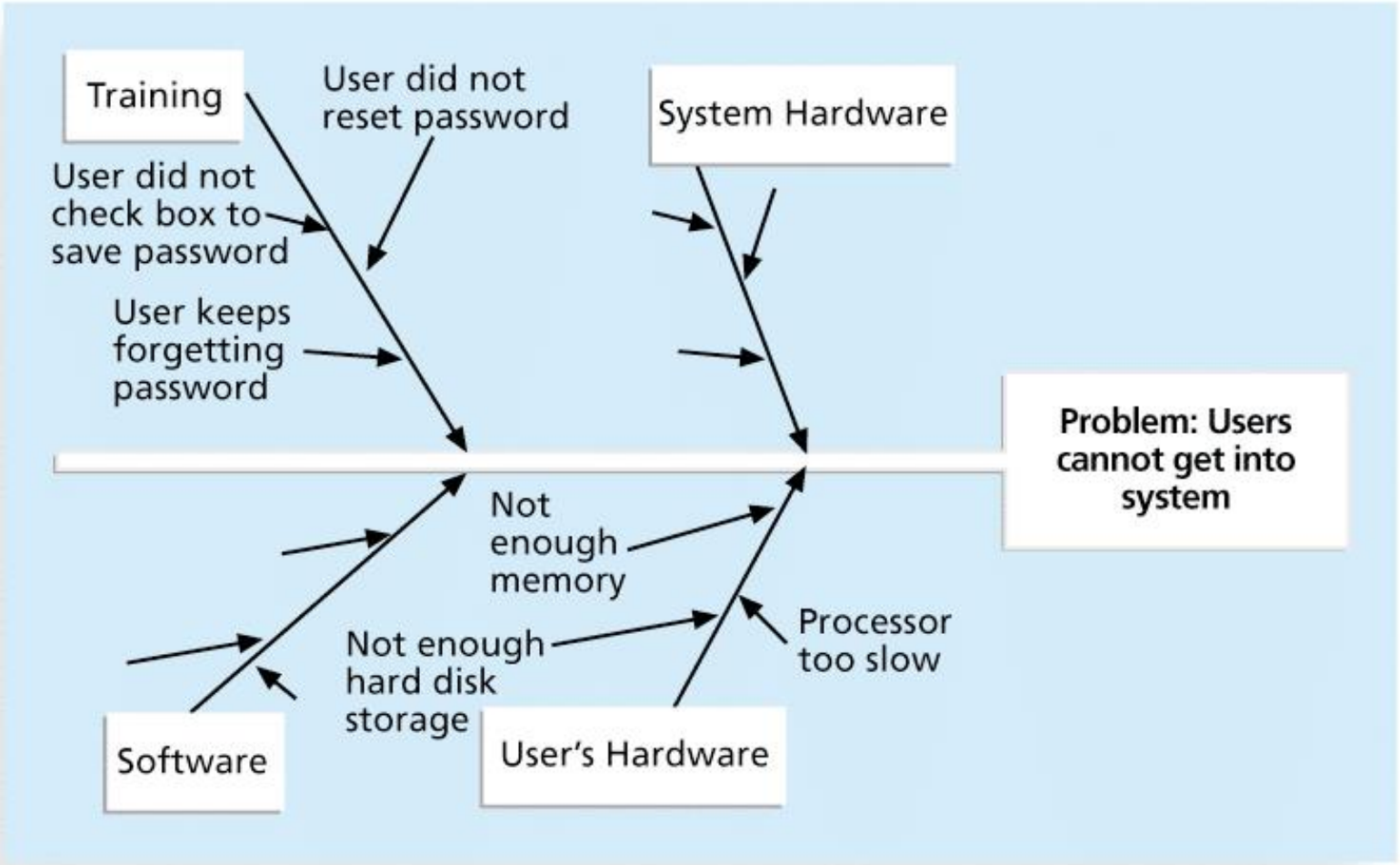
- **The 5 whys technique:**
  - Identify a quality problem.
  - Repeatedly ask the question "Why?" to help peel away the layers of symptoms that can lead to the root cause of the problem.
    - Using five questions is a good rule of thumb, although other numbers can be used.
  - These symptoms can be branches on the cause-and-effect diagram
    - Notice that it resembles the skeleton of a fish (fishbone diagram).
  - This diagram lists the main areas that could be the cause of the problem.
    - The root cause of the problem would have a significant impact on the actions taken to solve the problem.

Cause-and-Effect Diagram - Example

- **Problem: Users cannot get into the system**

- Using the 5 whys, you could ask:
  1. Why the users cannot get into the system?
  2. Why they keep forgetting their passwords?
  3. Why they did not reset their passwords?
  4. Why they did not check a box to save a password?
  5. Why users cannot log in to the EIS?

Sample Cause-and-Effect Diagram



3. Performing Quality Control: Tools and techniques cont.

- A **control chart** is a graphic display of data that illustrates the results of a process over time

- Quality control charts allow you to determine whether a process is in control or out of control

- Use quality control charts and the seven run rule to look for patterns in data

- The **seven run rule** states that if seven data points in a row are all below the mean, above the mean, or are all increasing or decreasing, then the process needs to be examined for nonrandom problems

3. Performing Quality Control: Tools and techniques cont.

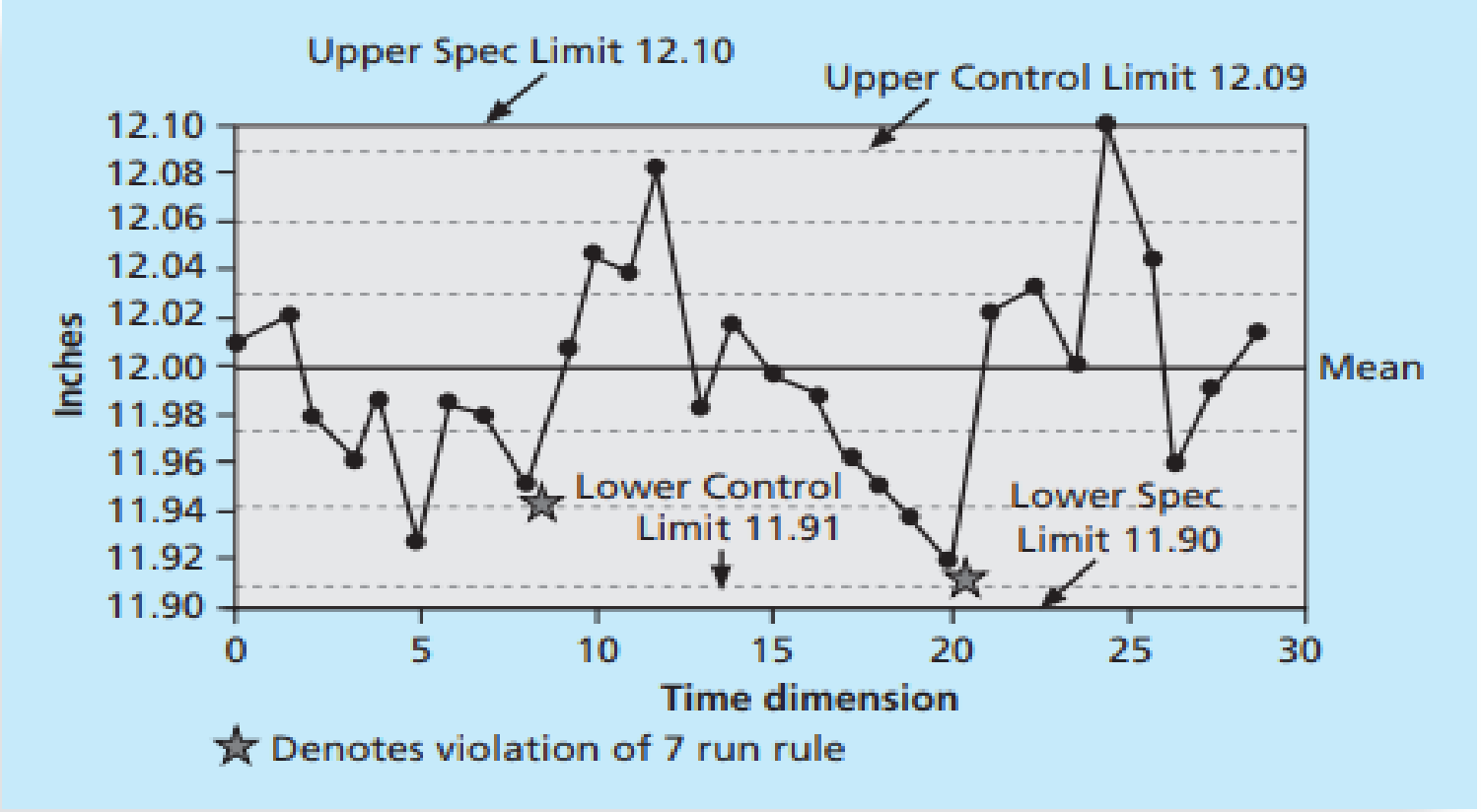


FIGURE 8-3 Sample control chart

3. Performing Quality Control: Tools and techniques cont.

- A **checksheet** is used to collect and analyze data.
- It is sometimes called a tally sheet or checklist, depending on its format.
- Might be useful in improving a process

3. Performing Quality Control: Tools and techniques cont.

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

FIGURE 8-4 Sample checksheet

3. Performing Quality Control: Tools and techniques cont.

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

3. Performing Quality Control: Tools and techniques cont.

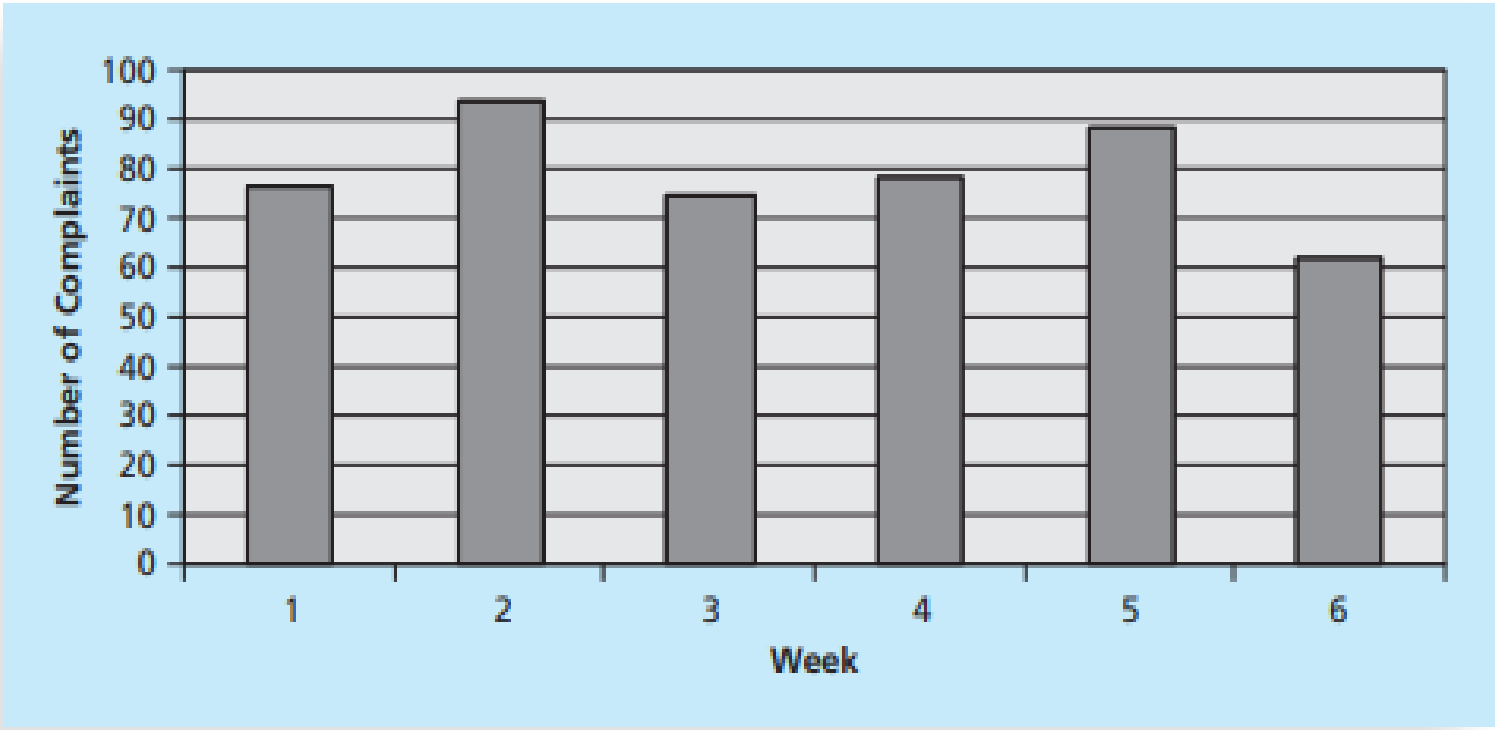


FIGURE 8-6 Sample histogram

3. Performing Quality Control: Tools and techniques cont.

- 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

3. Performing Quality Control: Tools and techniques cont.

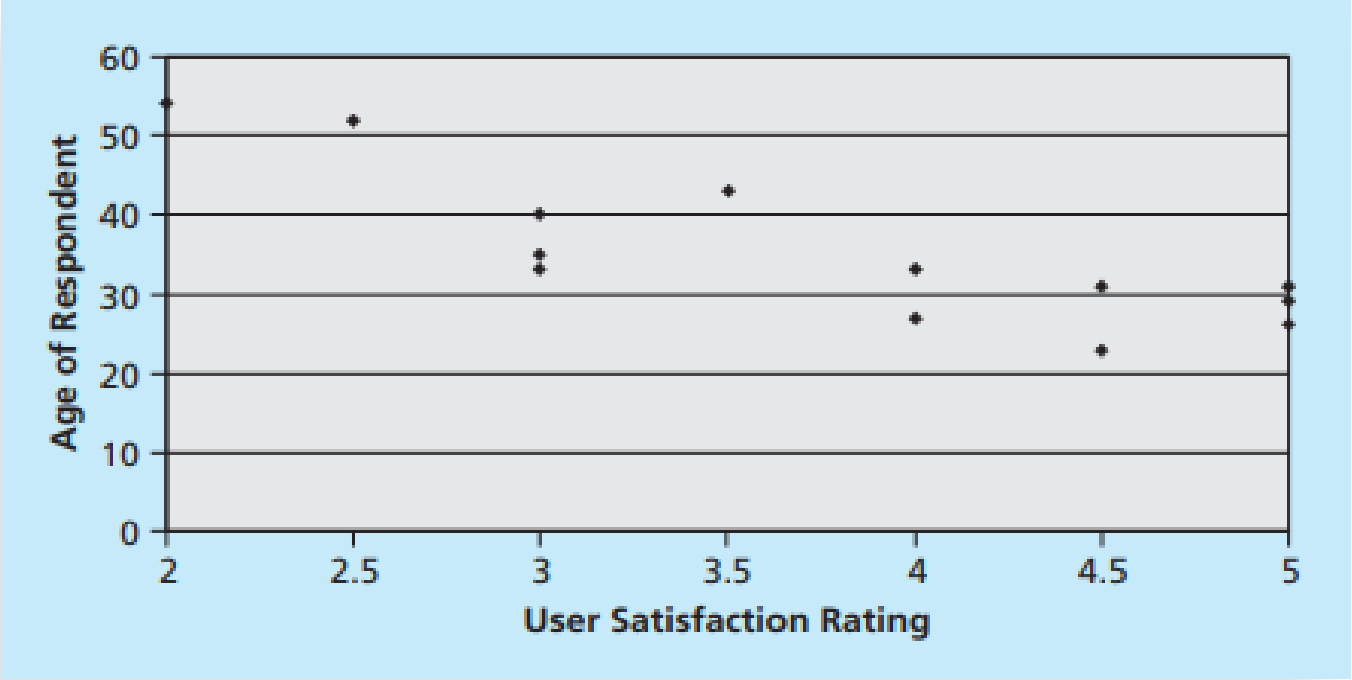


FIGURE 8-5 Sample scatter diagram

The Cost of Quality

- The **cost of quality** is the cost of conformance plus the cost of nonconformance
  - **Conformance** means delivering products that meet requirements and fitness for use
  - **Cost of nonconformance** means taking responsibility for failures or not meeting quality expectations

- A study reported that
  - Software bugs cost the U.S. economy $59.6 billion each year and
  - One third of the bugs could be eliminated by an improved testing infrastructure

The Cost of Quality cont.

- The five major cost categories related to quality include:
  1. **Prevention cost:** cost of planning and executing a project so that it is error-free or within an acceptable error range.
     - Actions include training, detailed studies related to quality, and quality surveys of suppliers and subcontractors.
     - Detecting defects during the early phases of the systems development life cycle is much less expensive than during the later phases.

could be in-house/ out-house,, audits

  2. **Appraisal cost:** cost of evaluating processes and their outputs to ensure that a project is error-free or within an acceptable error range
     - Activities include inspection and testing of products, maintenance of inspection and test equipment, and processing and reporting inspection data.

The Cost of Quality cont.

3. **Internal failure cost:** cost incurred to correct an identified defect before the customer receives the product.
   - Items include rework, charges related to late payment of bills, inventory costs that are a direct result of defects, costs of engineering changes related to correcting a design error, premature failure of products, and correcting documentation

4. **External failure cost:** cost that relates to all errors not detected and corrected before delivery to the customer
   - Items include warranty cost, field service personnel training cost, product liability suits, complaint handling, and future business losses.

5. **Measurement and test equipment costs:** The capital cost of equipment used to perform prevention and appraisal activities.

Using Software to Assist in Project Quality Management

- Spreadsheet and charting software helps create fishbone and other diagrams.
- Specialized software products help create quality control charts.
- Project management software helps create Gantt charts and other tools to help plan and track work related to quality management.

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