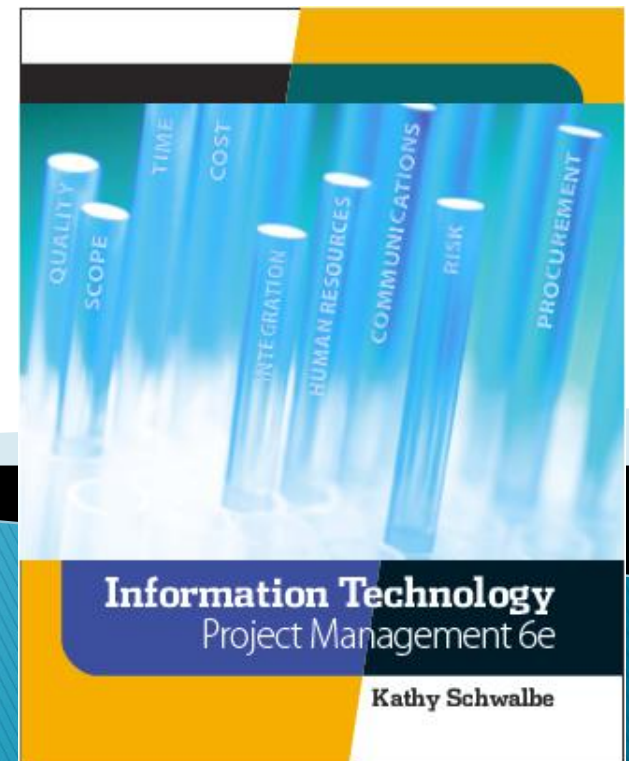


# Chapter 8: Project Quality Management

**Information Technology Project  
Management, Sixth Edition**

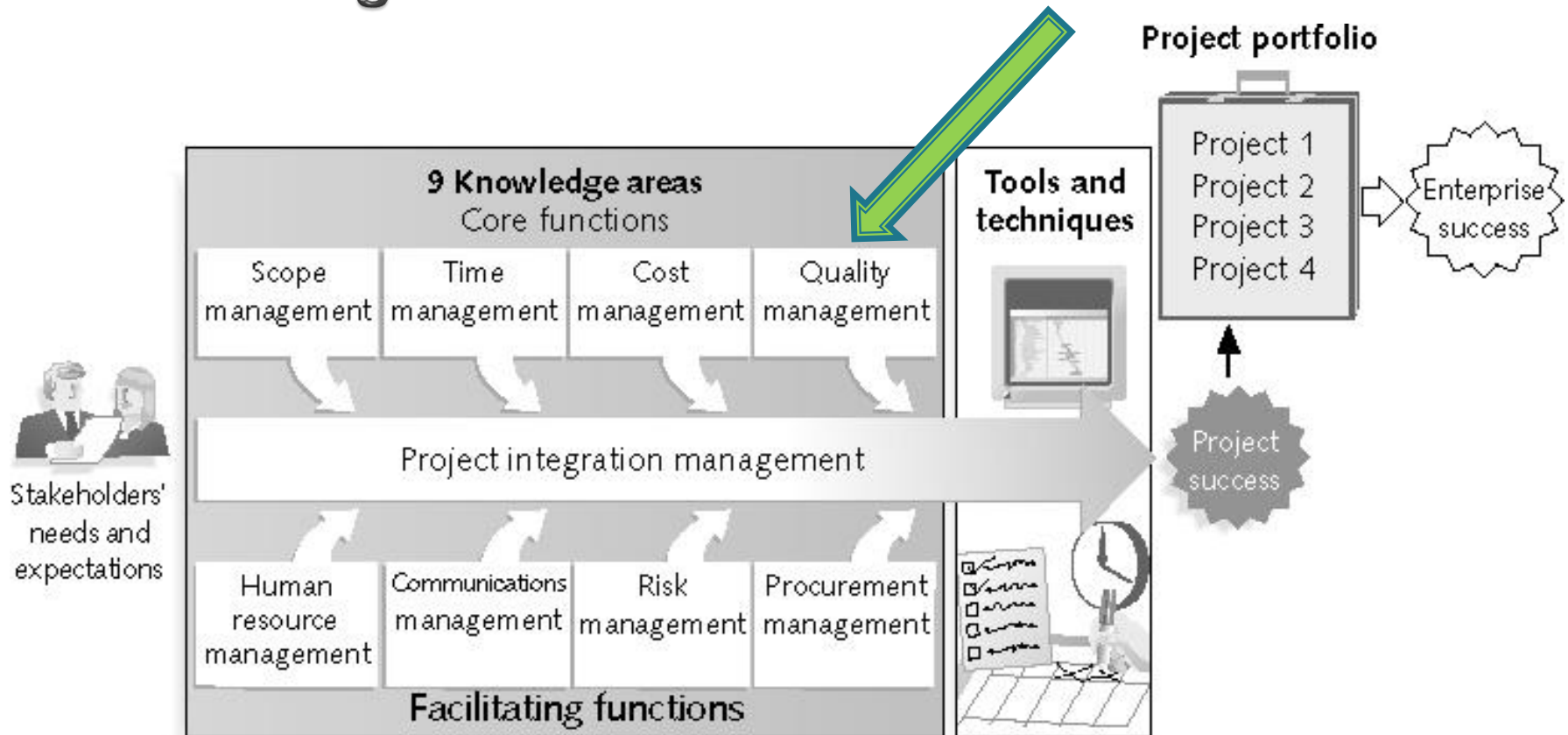
Note: See the text itself for full citations.



# Announcements

- ▶ ~~10/27 - Chapter 7, then team breakouts~~
- ▶ 11/3 - Chapter 8, then team breakouts
- ▶ 11/10 - Chapter 9, then team breakouts
- ▶ 11/17 - Chapter 10 & 11
- ▶ 11/24 - No Class Happy Thanksgiving
- ▶ 12/1 - Chapter 12
- ▶ 12/8 - Final Demo presented; Final reports due
- ▶ 12/15 - Final Exam

# REVIEW: Project Management Framework – 9 Knowledge Areas



# REVIEW:(continued)

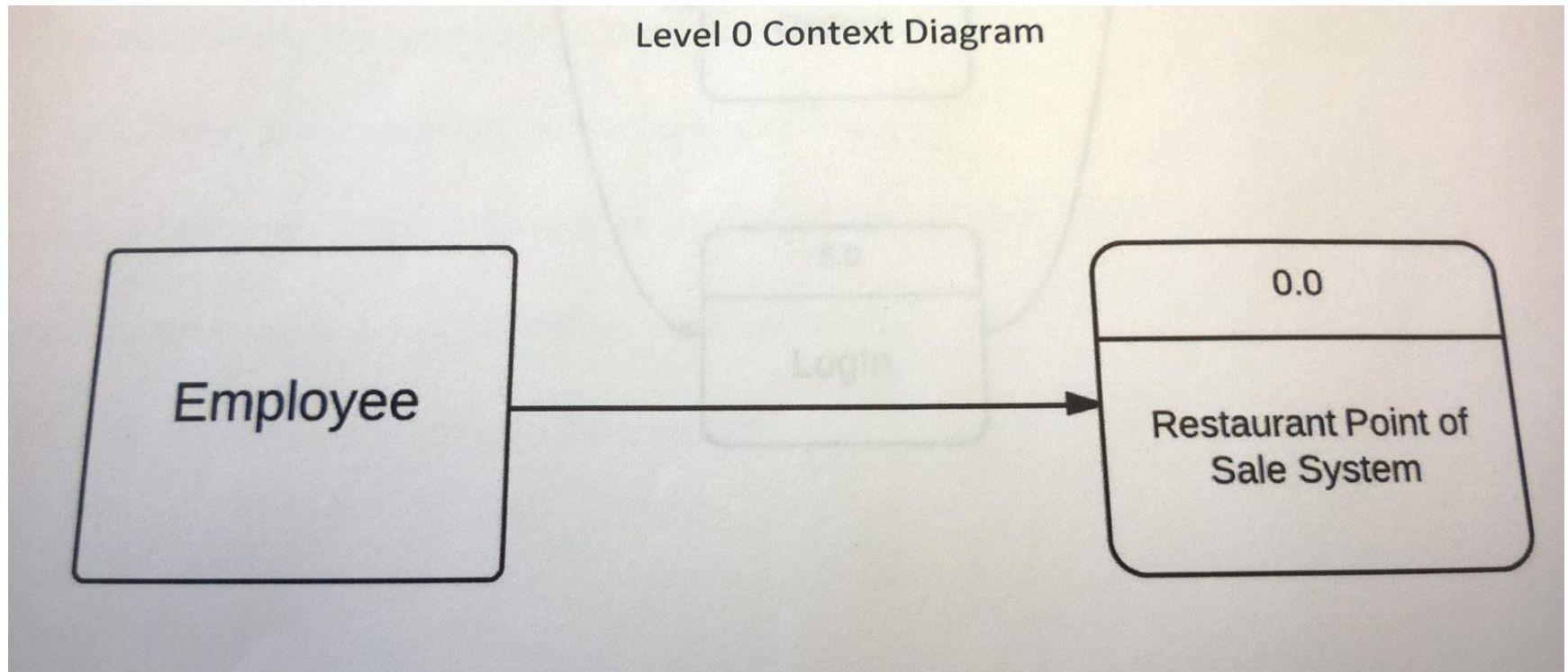
Knowledge Area	Project Management Process Groups				
	Initiating	Planning	Executing	Monitoring and Controlling	Closing
<i>Project Time Management (continued)</i>		Estimate activity resources, Estimate activity durations, Develop schedule			
<i>Project Cost Management</i>		Estimate costs, Determine budget		Control costs	
<i>Project Quality Management</i>		Plan quality	Perform quality assurance	Perform quality control	
<i>Project Human Resource Management</i>		Develop human resource plan	Acquire project team, Develop project team, Manage project team		

# Context Diagrams

- ▶ Good Resource for UML Diagrams:  
<http://www.smartdraw.com/uml-diagram/>
- ▶ <http://www.slideshare.net/mohit4192/dfd-examples>
- ▶ UML – Unified Modeling Language: is a general-purpose modeling language in the field of software engineering, which is designed to provide a standard way to visualize the design of a system.
- ▶ Context-Level Data-Flow Diagram: The Context Diagram shows the system under consideration as a single high-level process and then shows the relationship that the system has with other external entities (systems, organizational groups, external data stores, etc.)



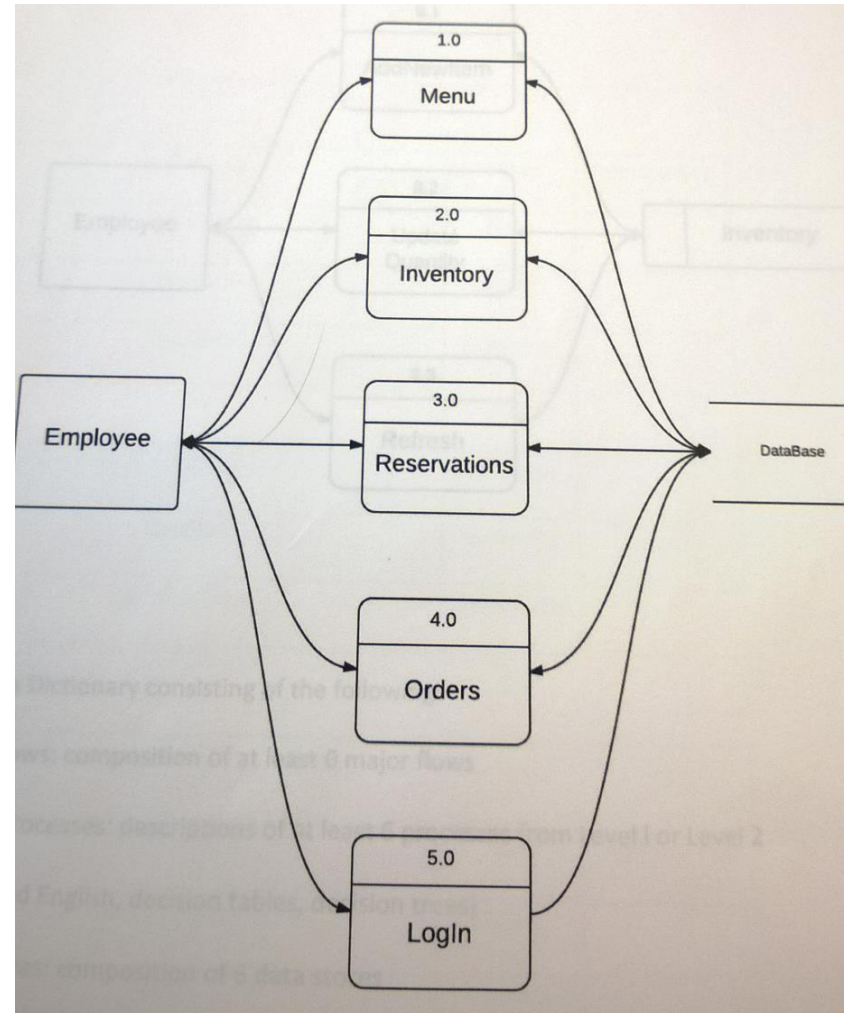
# Context Diagrams Examples



Who is the user, and what is the system

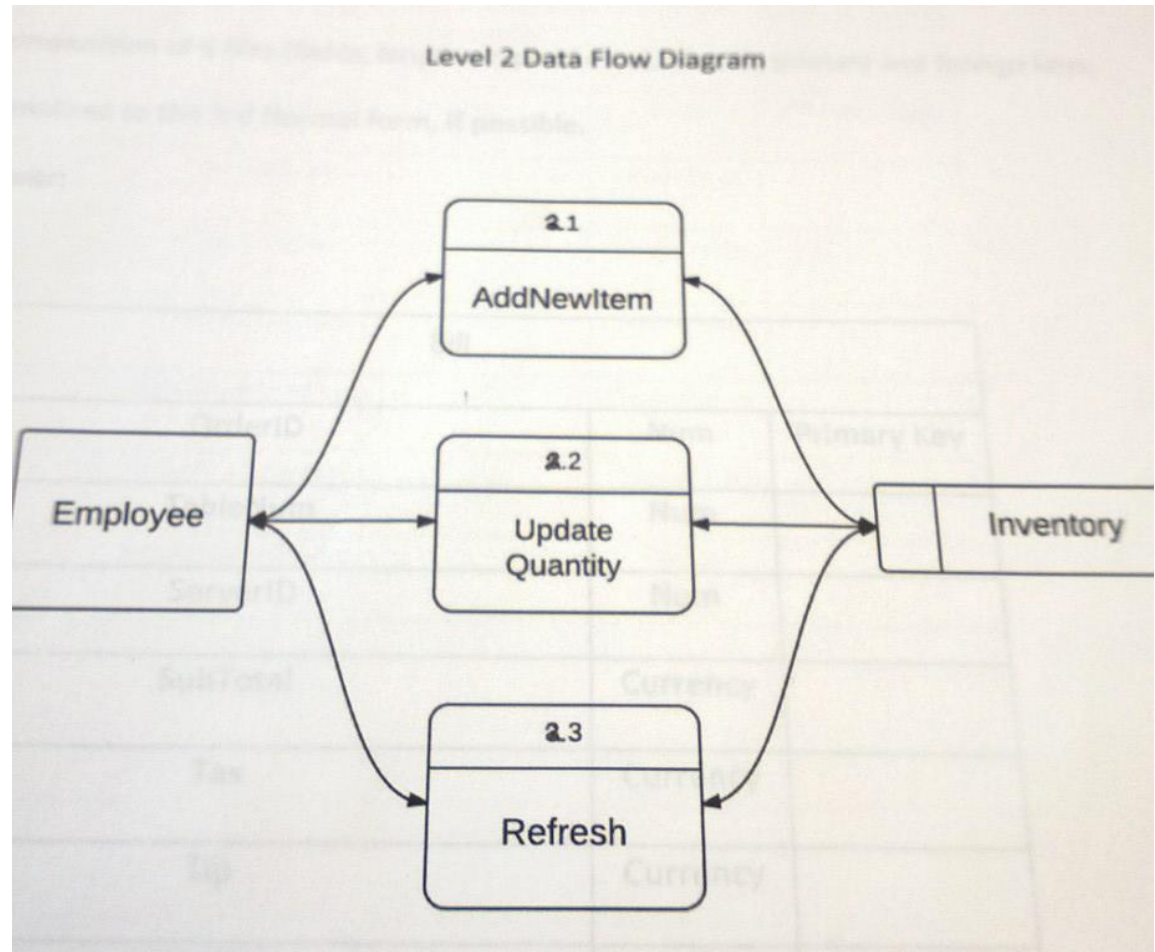
# Context Diagrams: Level 1

Who is the user, and  
what is in the system,  
what features



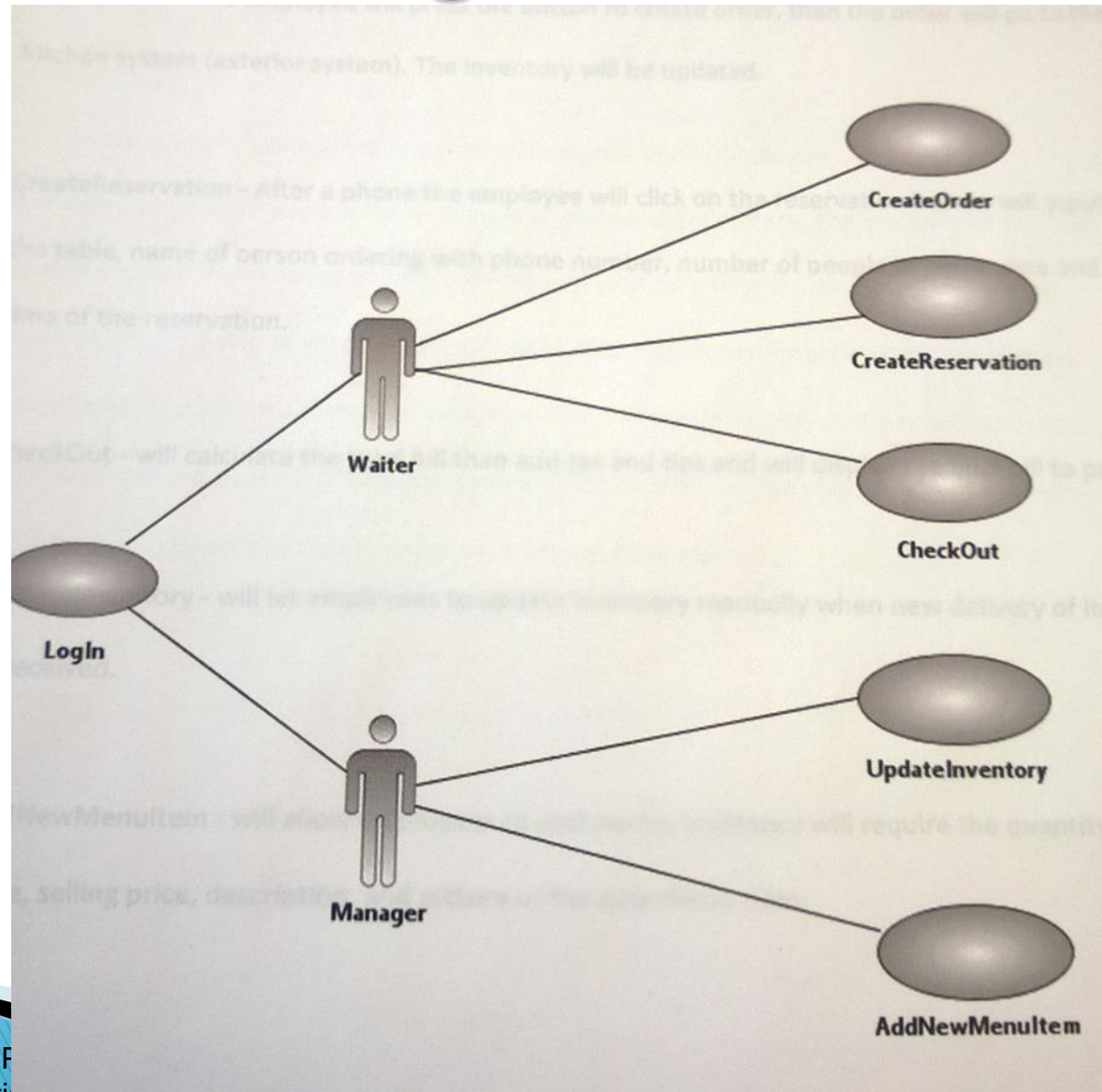
# Context Diagrams: Level 2

Who is the user, and what can they do in the system





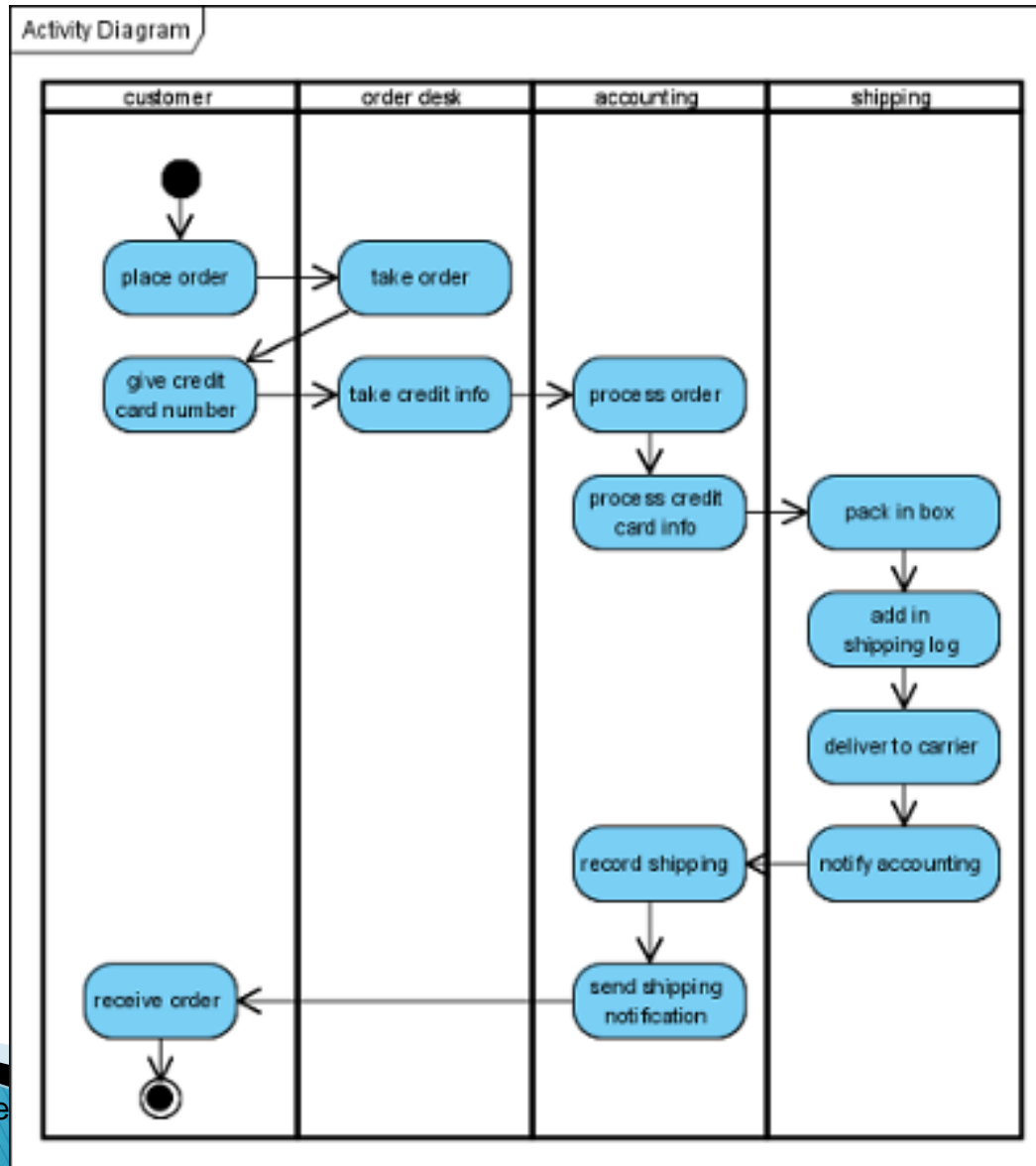
# Use Case Diagrams



# Activity Diagrams

- ▶ Activity Diagrams illustrate the dynamic nature of a system by modeling the flow of control from activity to activity.
- ▶ An activity represents an operation on some class in the system that results in a change in the state of the system. Typically, activity diagrams are used to model workflow or business processes and internal operation

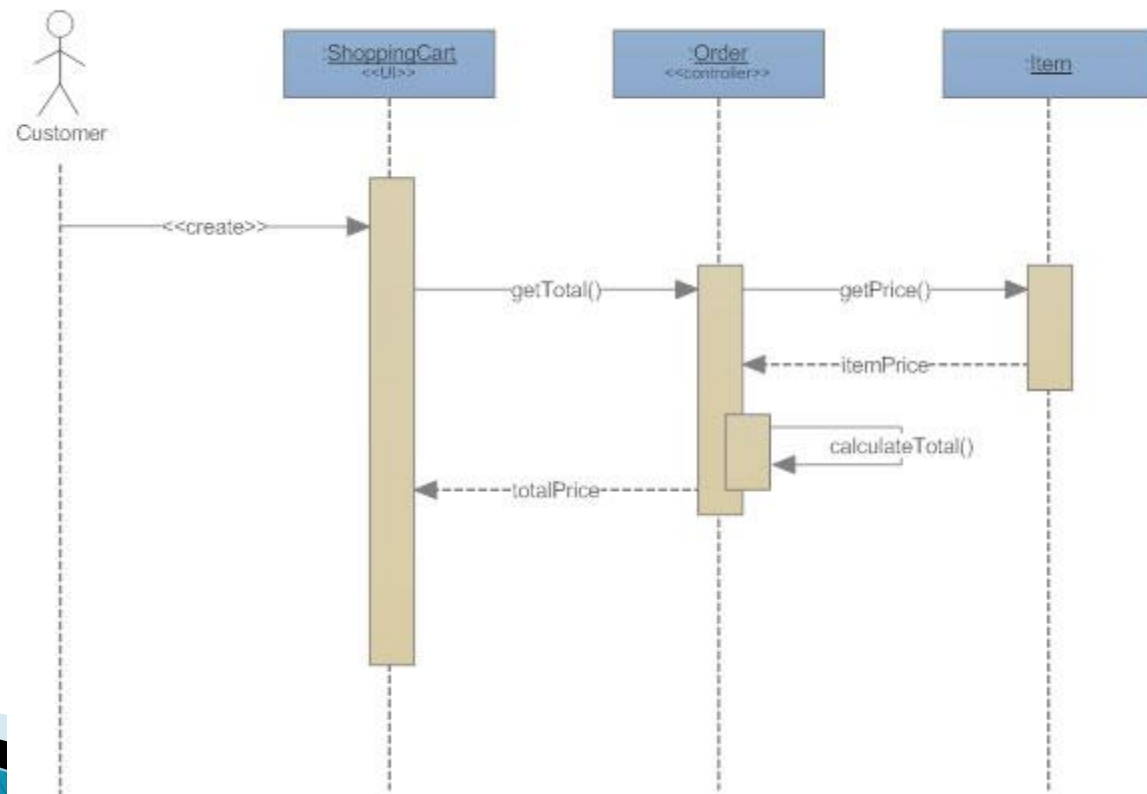
# Activity Diagrams



# Sequence Diagrams

- ▶ Sequence Diagrams describe interactions among classes in terms of an exchange of messages over time.

Sequence Diagram: Shopping Cart



# Learning Objectives

- ▶ Understand the importance of project quality management for IT Projects
- ▶ Discuss the importance of quality assurance
- ▶ Explain the main outputs of the quality control process
- ▶ Describe how leadership, the cost of quality, organizational and cultural influences relate to improving quality in IT projects



# 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 systems
- ▶ **But** quality is very important in many IT projects and bad products should not have to be accepted!!!

# What Went Wrong?

- ▶ 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
- ▶ In a 3 year period, the Privacy Rights Clearinghouse stated that more than 236 million data records of U.S. residents have been exposed due to security breaches

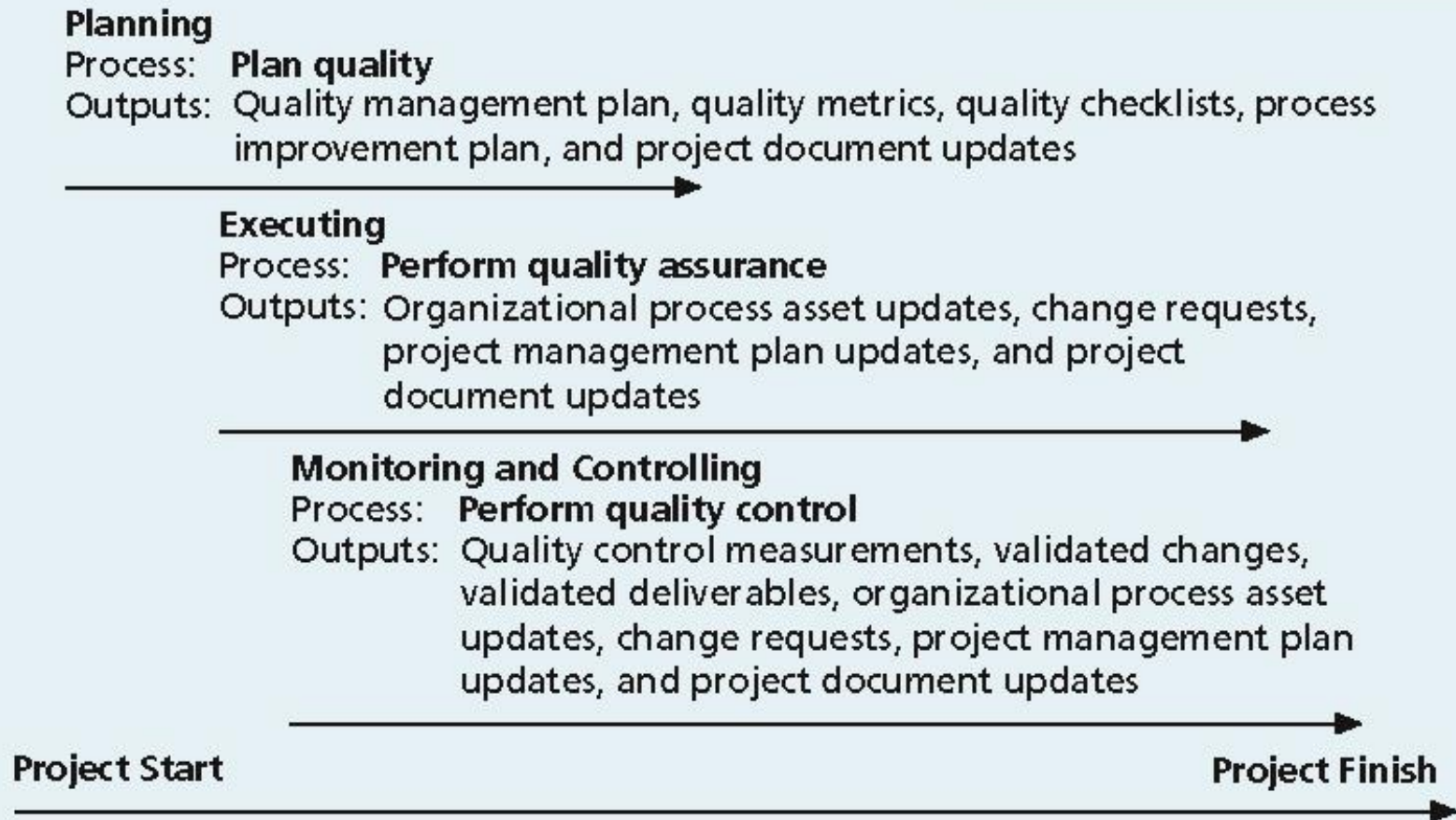
# What Is Project Quality?

- ▶ The International Organization for Standardization (ISO) defines **quality** as “*the degree to which a set of inherent characteristics fulfils requirements*”
- ▶ Other experts define quality based on:
  - **Conformance to requirements:** the project’s processes and products meet written specifications
  - **Fit for use:** a product can be used as it was intended
    - *Basically, you should expect things to be right **not** hope*

# What Is Project Quality Management?

- ▶ **Project quality management** ensures that the project will satisfy the needs for which it was undertaken
- ▶ Processes include:
  - **Planning quality:** identifying which quality standards are relevant to the project and how to satisfy them
  - **Performing quality assurance:** evaluating overall project performance
  - **Performing quality control:** **monitoring** specific project results to ensure that they comply with the relevant quality standards

# Figure 8-1. Project Quality Management Summary





# Planning Quality

- ▶ Implies the ability to anticipate situations, use the right technology, or materials and prepare actions to bring about the desired outcome
- ▶ Important to prevent defects by:
  - Selecting proper materials, tools, technology
  - Training and indoctrinating people in quality
  - Planning a process that ensures the appropriate outcome, test and re-test

# IT Projects Quality Terminology

- ▶ **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, also at what speed
- ▶ **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
- ▶ But also- organizations and leadership can help project managers and their teams understand and adhere to quality

What about products? what is the orgs stance on quality? If quality goods and services are important then it is everyone's business!

# Performing Quality Assurance / Quality Improvement

- ▶ **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

# Quality Control

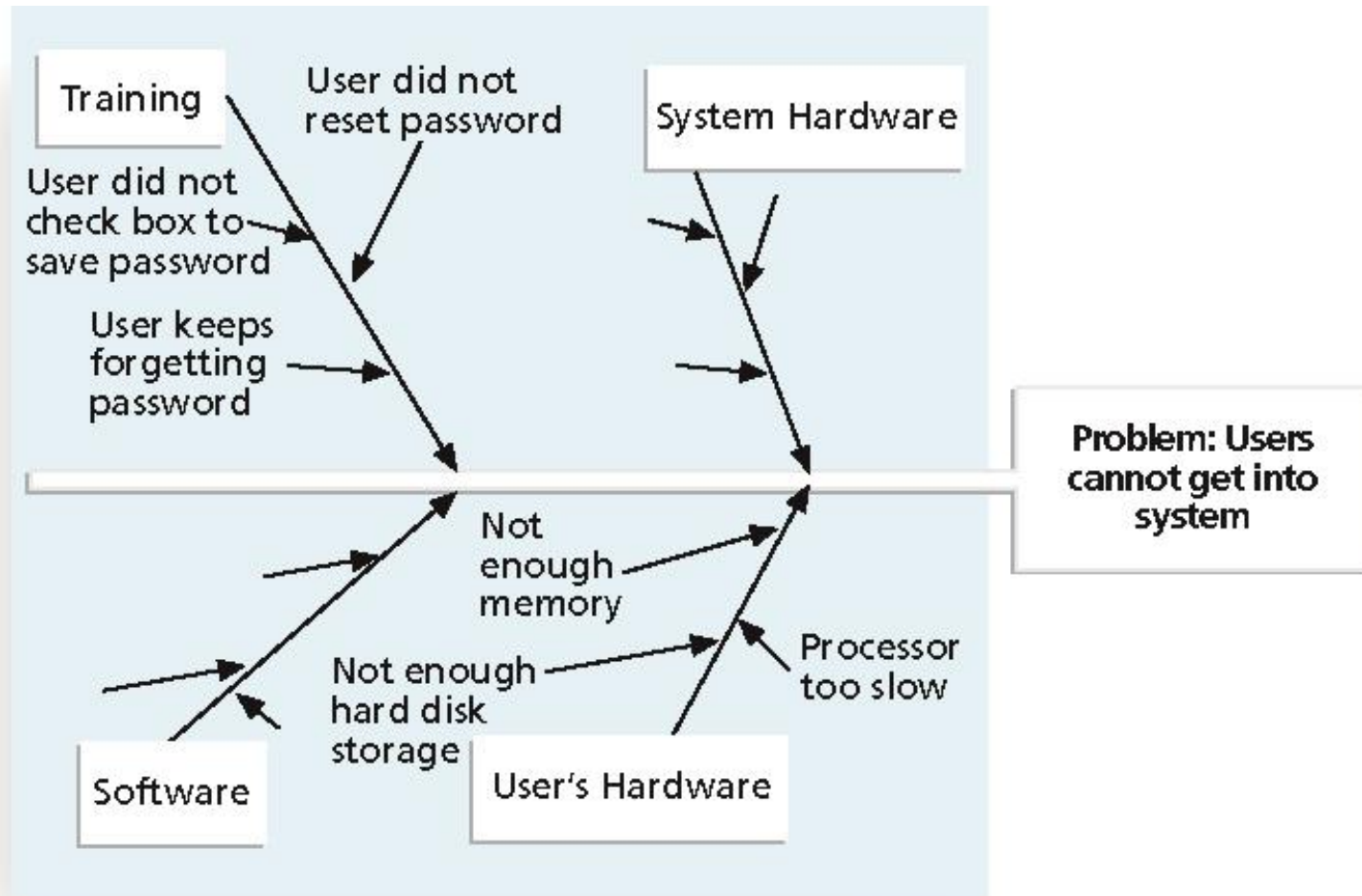
- ▶ The main outputs of quality control are:
  - Acceptance decisions
  - Rework / Fixes
  - Process adjustments
- ▶ There are Seven Basic Tools of Quality that help in performing quality control
  - ▶ Cause-and-effect diagram (aka "fishbone" or Ishikawa diagram)
  - ▶ Check sheet
  - ▶ Control chart
  - ▶ Histogram
  - ▶ Pareto chart
  - ▶ Scatter diagram
  - ▶ Stratification (alternately, flow chart or run chart)



# 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**

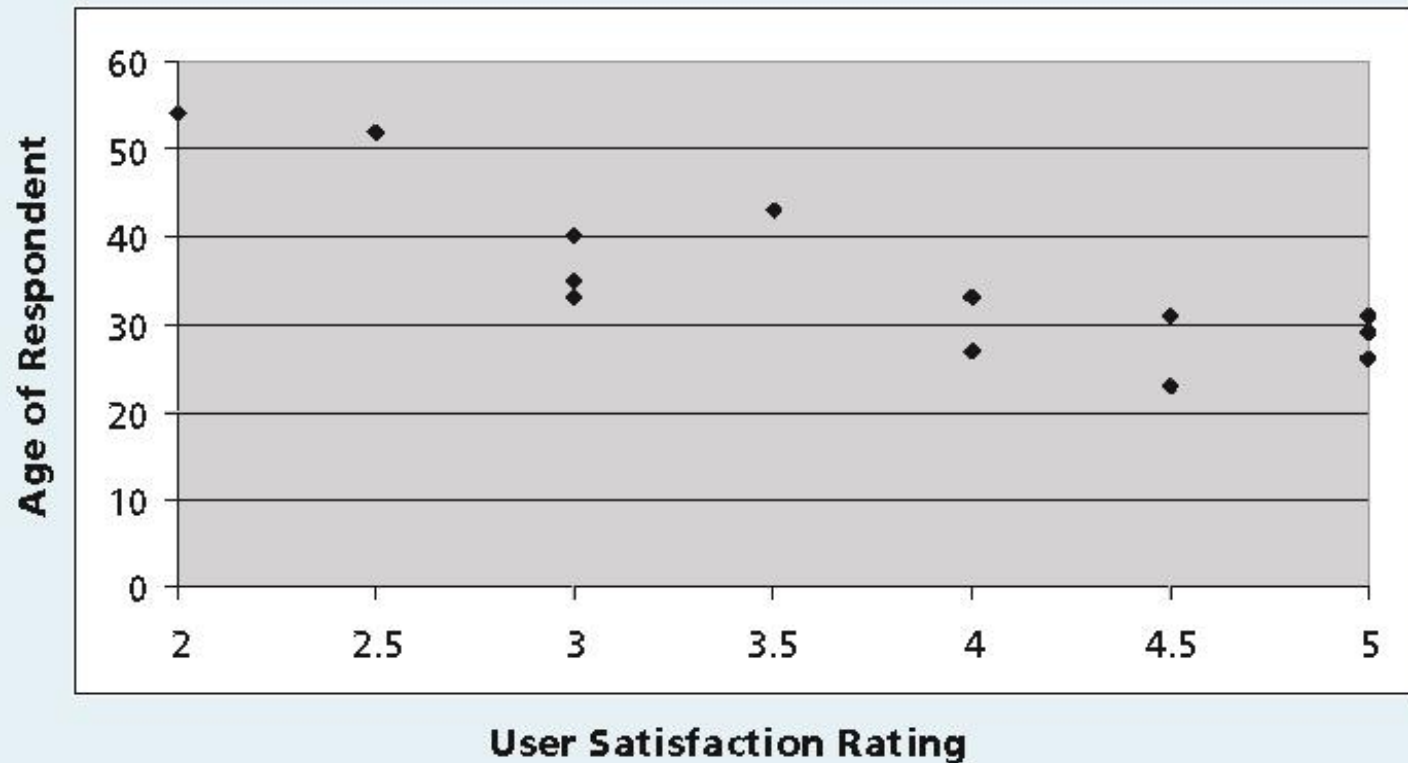
# Figure 8-2. Sample Cause-and-Effect Diagram



# 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

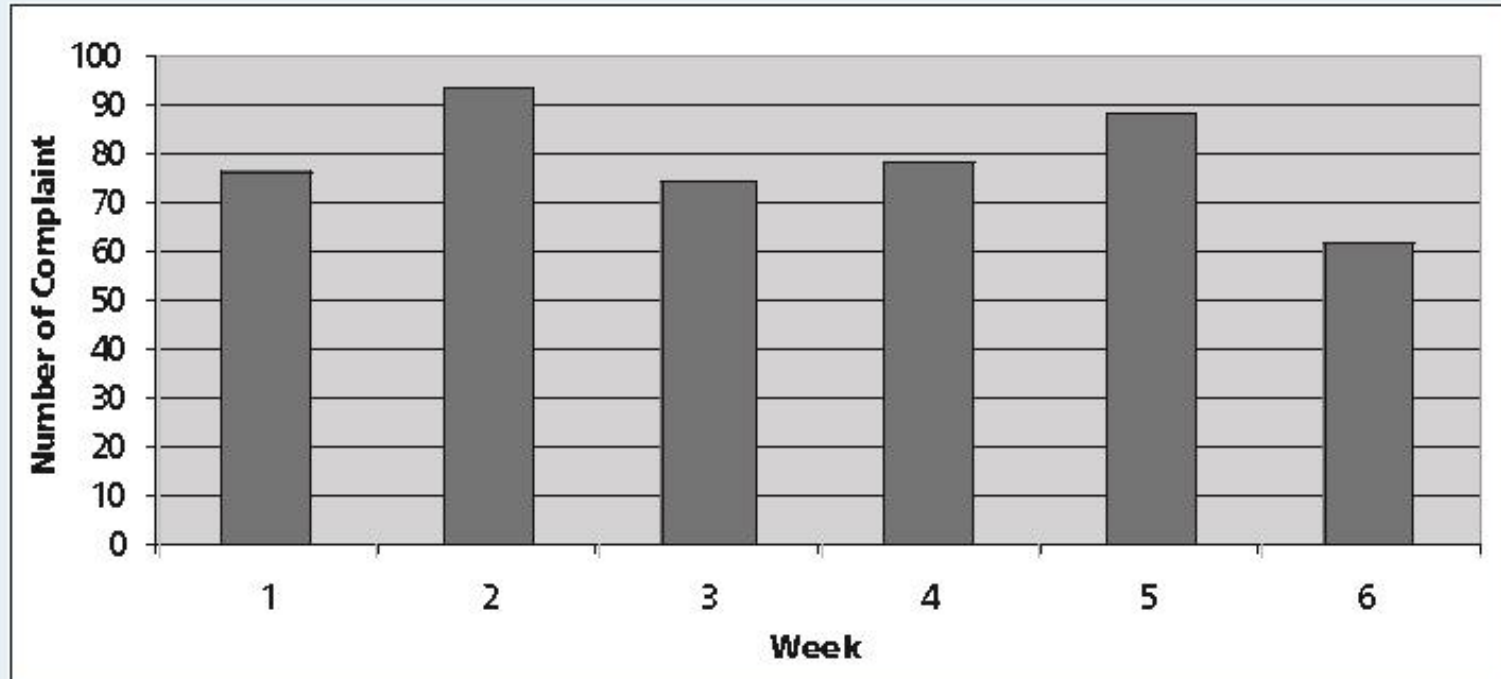
# Figure 8-5. Sample Scatter Diagram



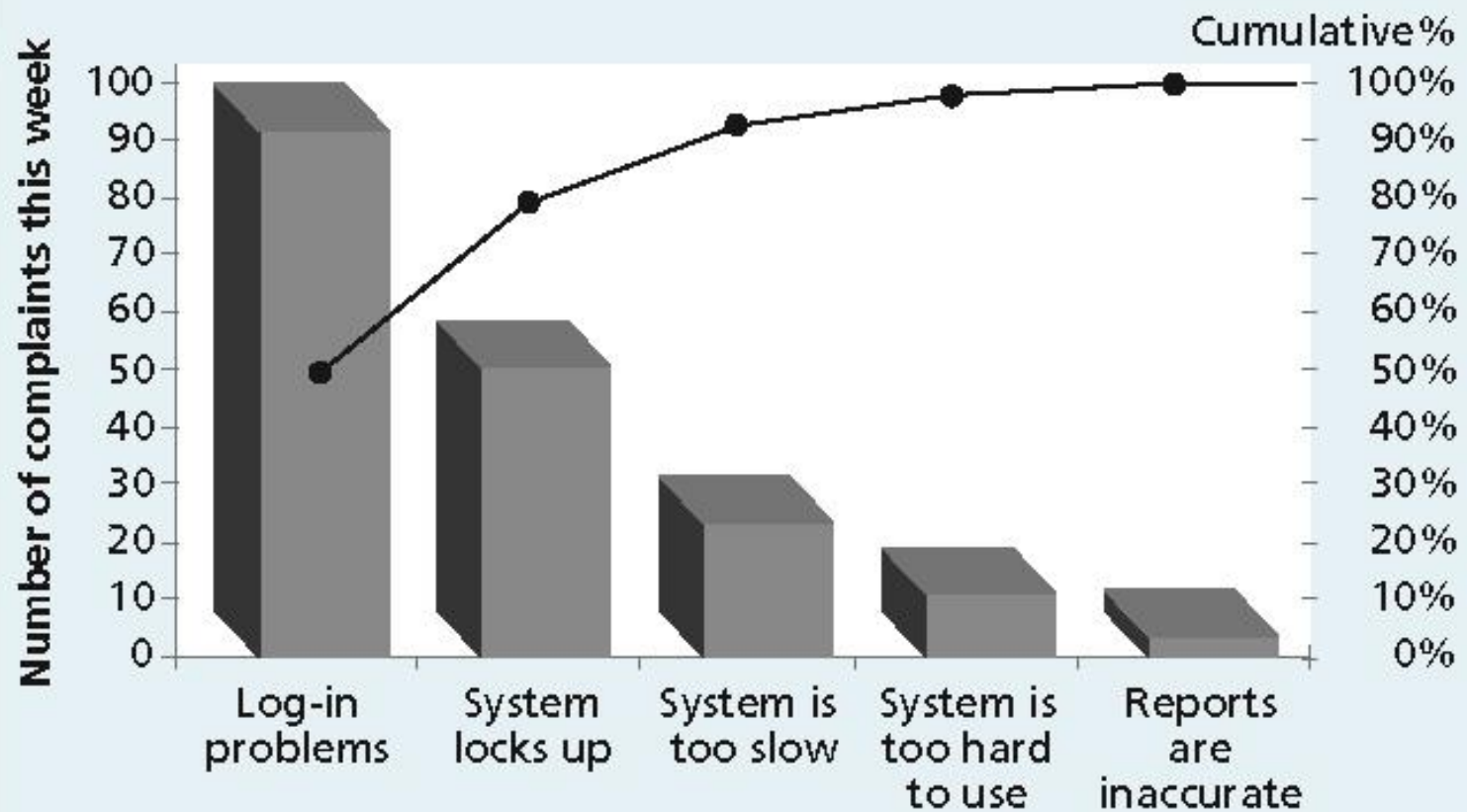
# Histograms

- ▶ 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



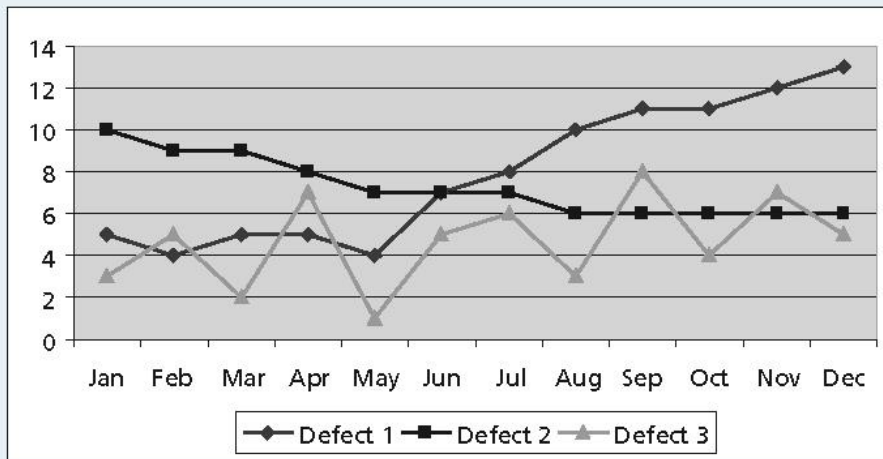




## Pareto Charts

A **Pareto chart** is a histogram that can help you identify and prioritize problem areas

# Run Chart

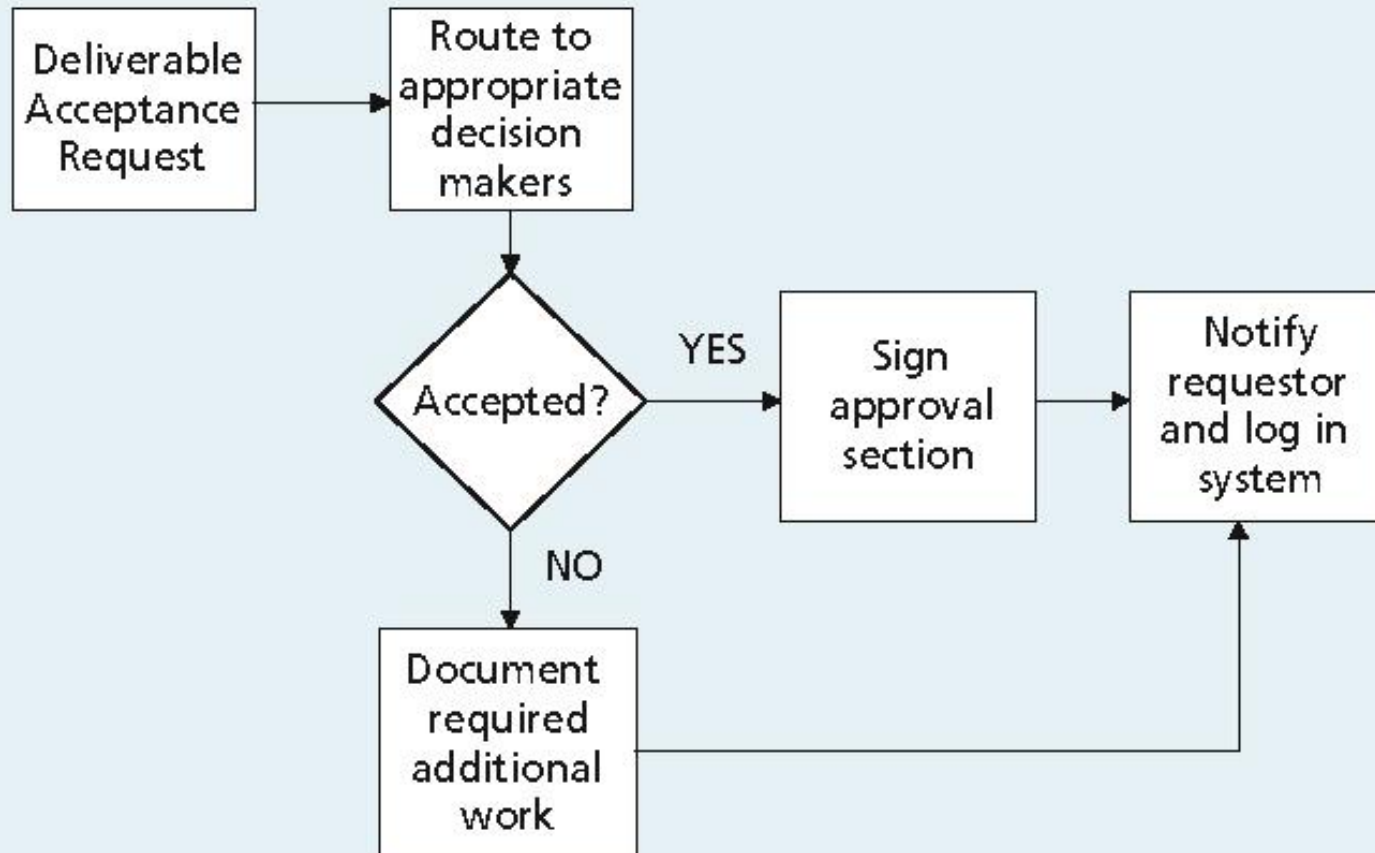


- ▶ A run chart displays the history and pattern of variation of a process over time
- ▶ It is a line chart that shows data points plotted in the order in which they occur
- ▶ **Can be used to perform trend analysis to forecast future outcomes** based on historical patterns

# 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

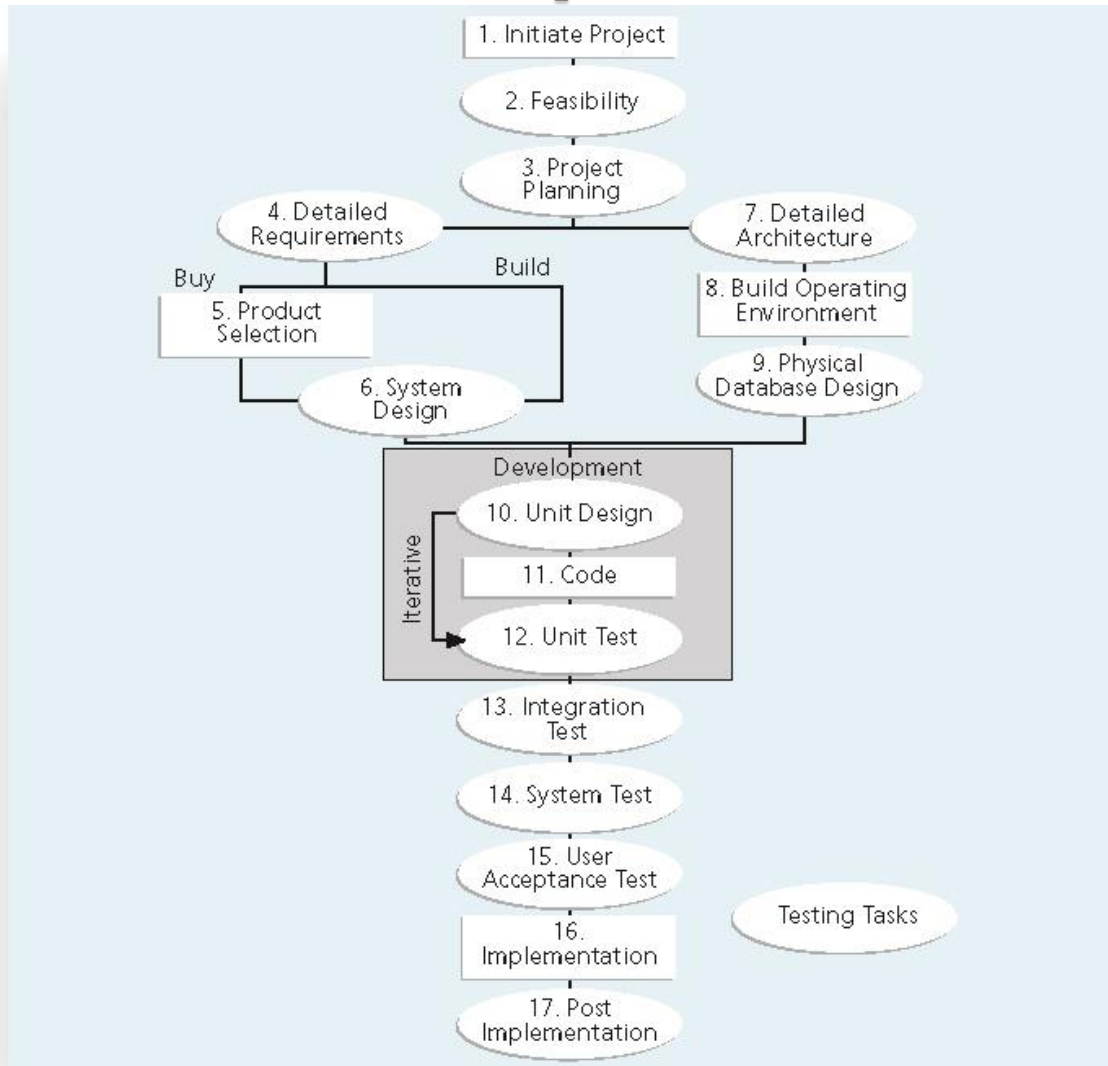


# Testing

- ▶ 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 8-10. 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

# Improving Information Technology Project Quality

- ▶ 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

# 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 that **one third of the bugs could be eliminated by an improved testing infrastructure**

# 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
- ▶ **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/after delivery to the customer
- ▶ **Measurement and test equipment costs:** capital cost of equipment used to perform prevention and appraisal

# 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