

Chapter Twelve

Information System Development

Discovering Computers 2012

Your Interactive Guide
to the Digital World



Objectives Overview

Define system development and list the system development phases

Identify the guidelines for system development

Discuss the importance of project management, feasibility assessment, documentation, and data and information gathering techniques

Explain the activities performed in the planning phase

Discuss the purpose of the activities performed in the analysis phase

Describe the various tools used in process modeling

Objectives Overview

Describe the various tools used in object modeling

Explain the activities performed in the design phase

Recognize the development programs activity is part of system development

Discuss the activities performed in the implementation phase

Discuss the purpose of the activities performed in the operation, support, and security phase

What is System Development?

System development is a set of activities used to build an information system

A **system** is a set of components that interact to achieve a common goal

An **information system (IS)** is a collection of hardware, software, data, people, and procedures that work together to produce quality information

System development activities are grouped into **phases**, collectively called the **system development life cycle (SDLC)**

What is System Development?



What is System Development?

- System development should follow three general guidelines:

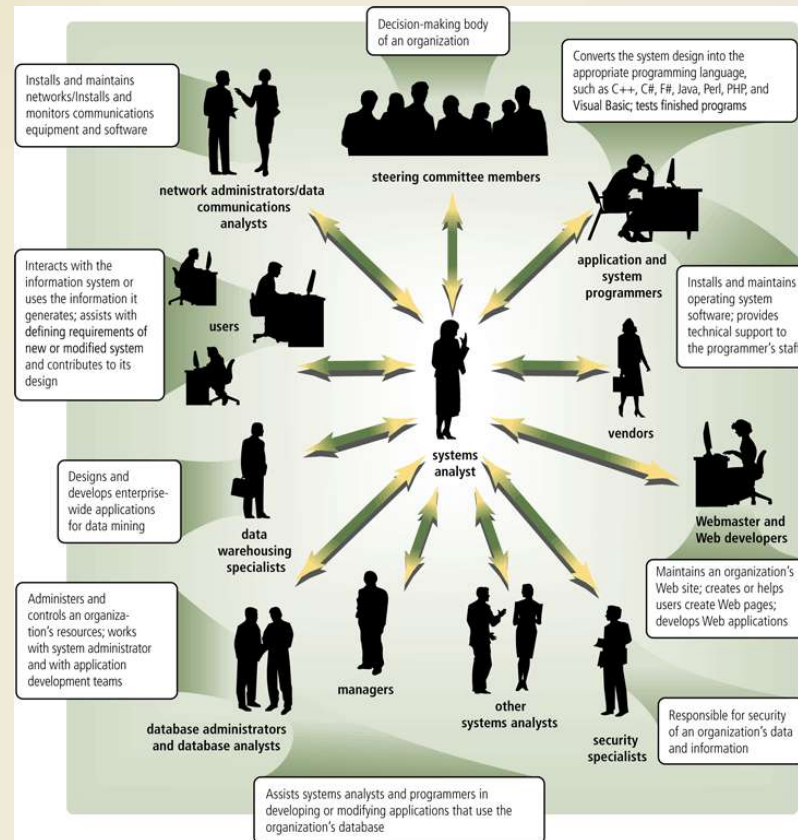
Group activities or tasks into phases

Involve users

Define standards

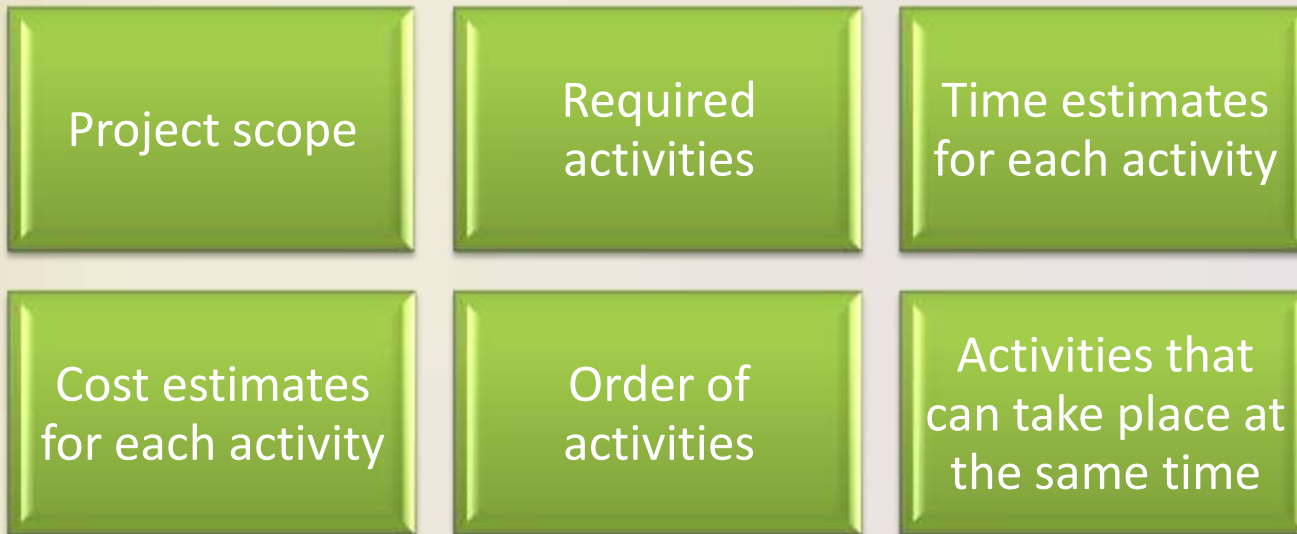
What is System Development?

- System development should involve representatives from each department in which the proposed system will be used



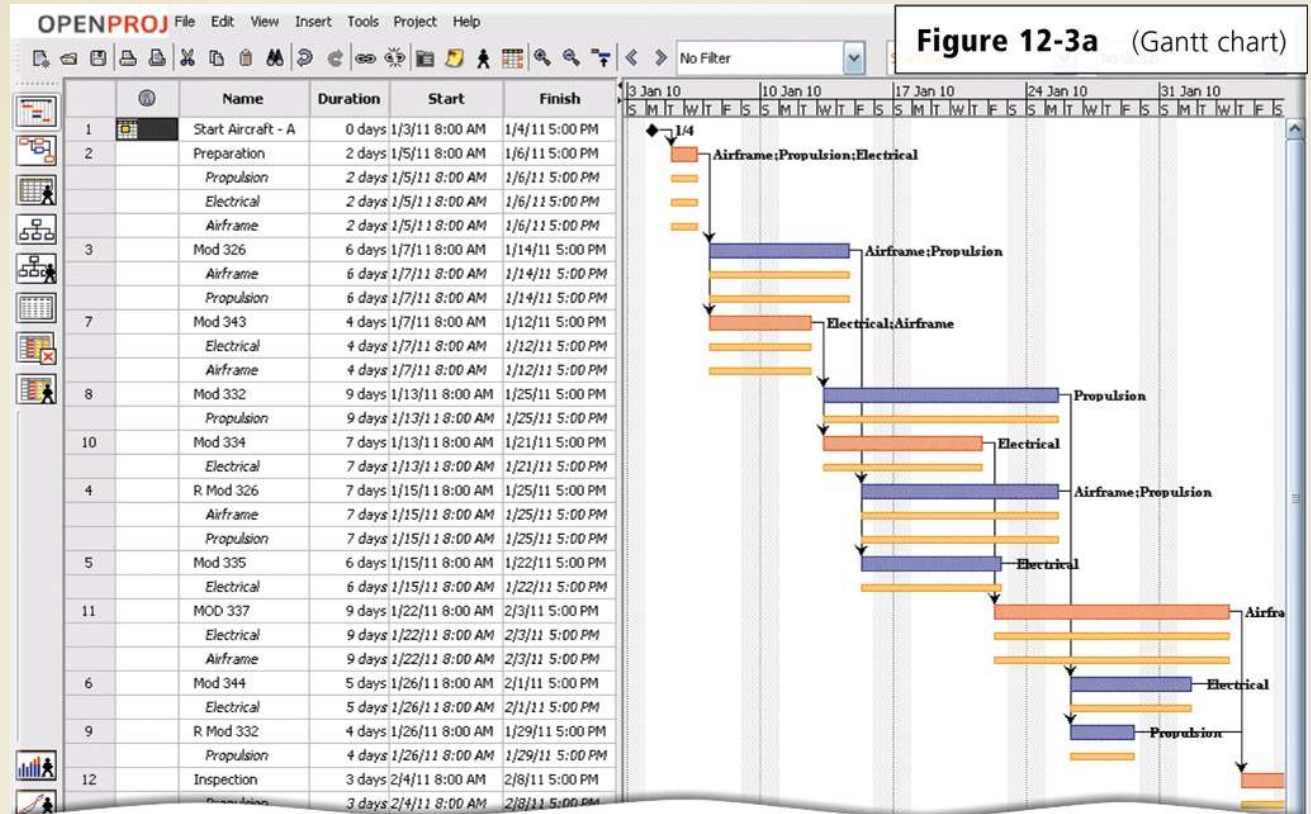
What is System Development?

- **Project management** is the process of planning, scheduling, and then controlling the activities during system development
- To plan and schedule a project efficiently, the project leader identifies:



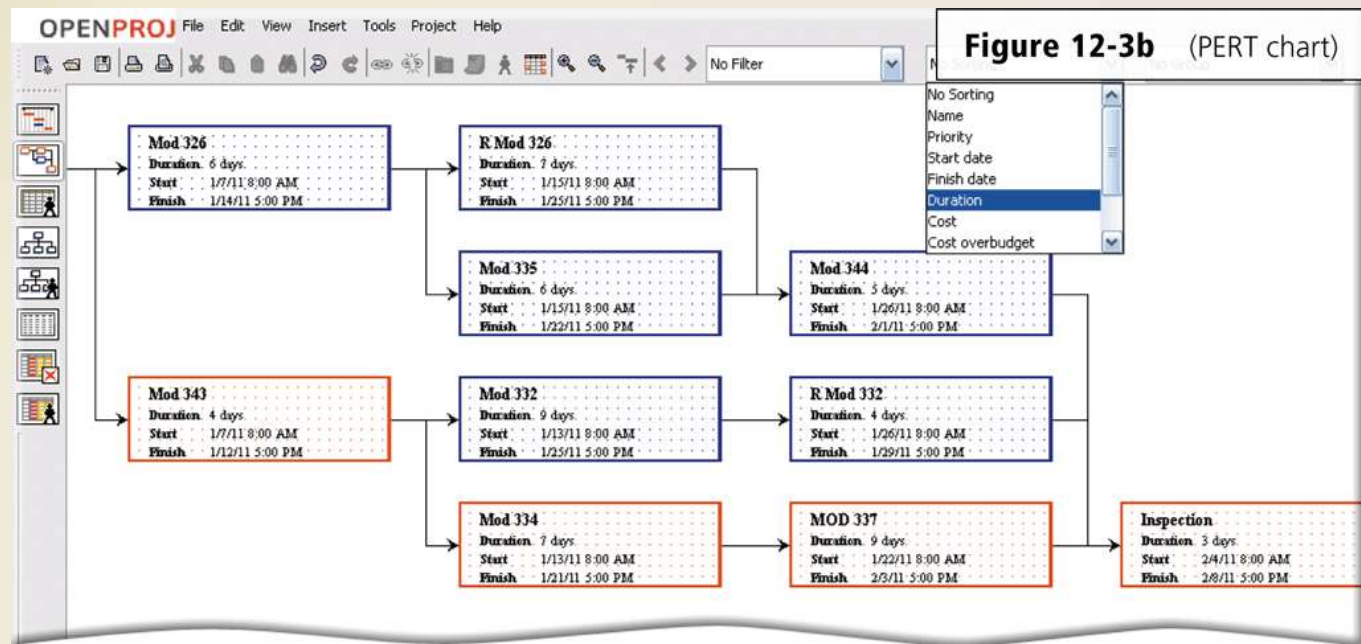
What is System Development?

A popular tool used to plan and schedule the time relationships among project activities is a Gantt chart



What is System Development?

A PERT chart also can be used for planning and scheduling time



What is System Development?

- **Feasibility** is a measure of how suitable the development of a system will be to the organization



Operational
feasibility

Schedule
feasibility

Technical
feasibility

Economic
feasibility

What is System Development?

- **Documentation** is the collection and summarization of data and information
 - A project notebook contains all documentation for a single project
- Users and IT professionals refer to existing documentation when working with and modifying current systems

What is System Development?

- During system development, members of the project team gather data and information using several techniques

Review
documentation

Observe

Survey

Interview

JAD Sessions

Research



Who Initiates a System Development Project?

A user may request a new or modified system

Organizations may want to improve hardware, software, or other technology

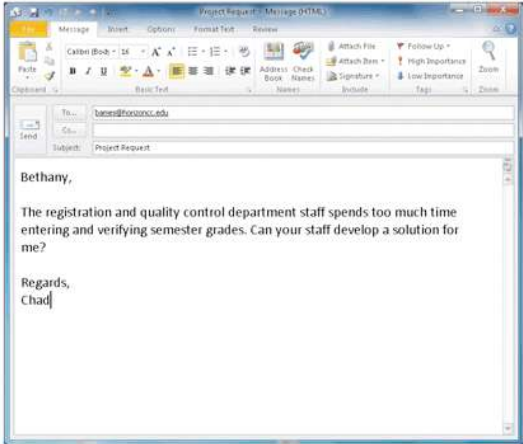
Situations beyond an organization's control might require a change

Management might mandate a change

A user may request a new or modified information system using a request for system services or a project request

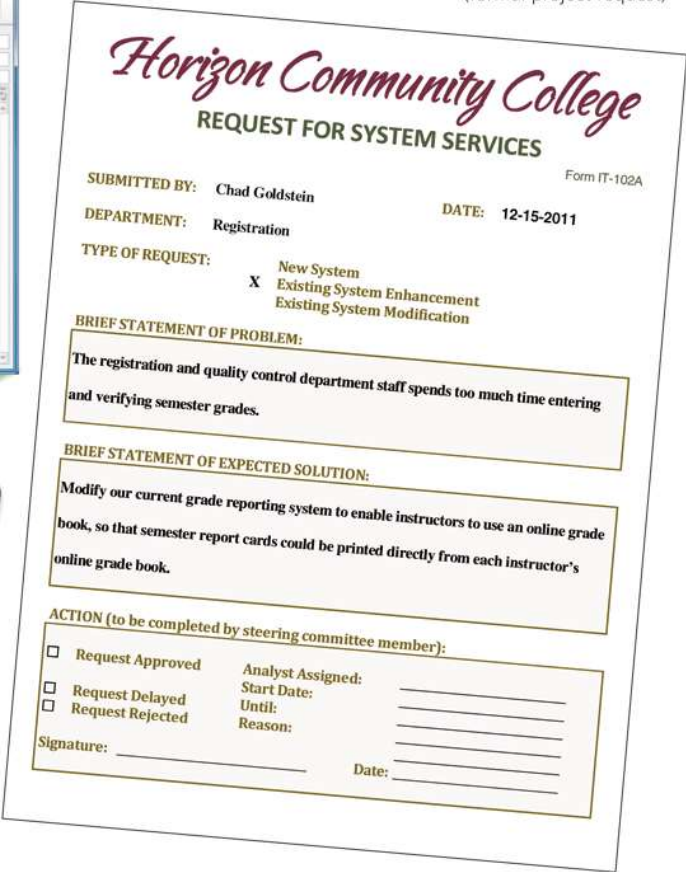
Who Initiates a System Development Project?

(informal project request)



The screenshot shows an email window titled "Project Request - Message (HTML)". The recipient is "tucers@horoccc.edu" and the subject is "Project Request". The body of the email reads: "Bethany, The registration and quality control department staff spends too much time entering and verifying semester grades. Can your staff develop a solution for me? Regards, Chad".

(formal project request)



The form is titled "Horizon Community College REQUEST FOR SYSTEM SERVICES" and is labeled "Form IT-102A". It contains the following information:

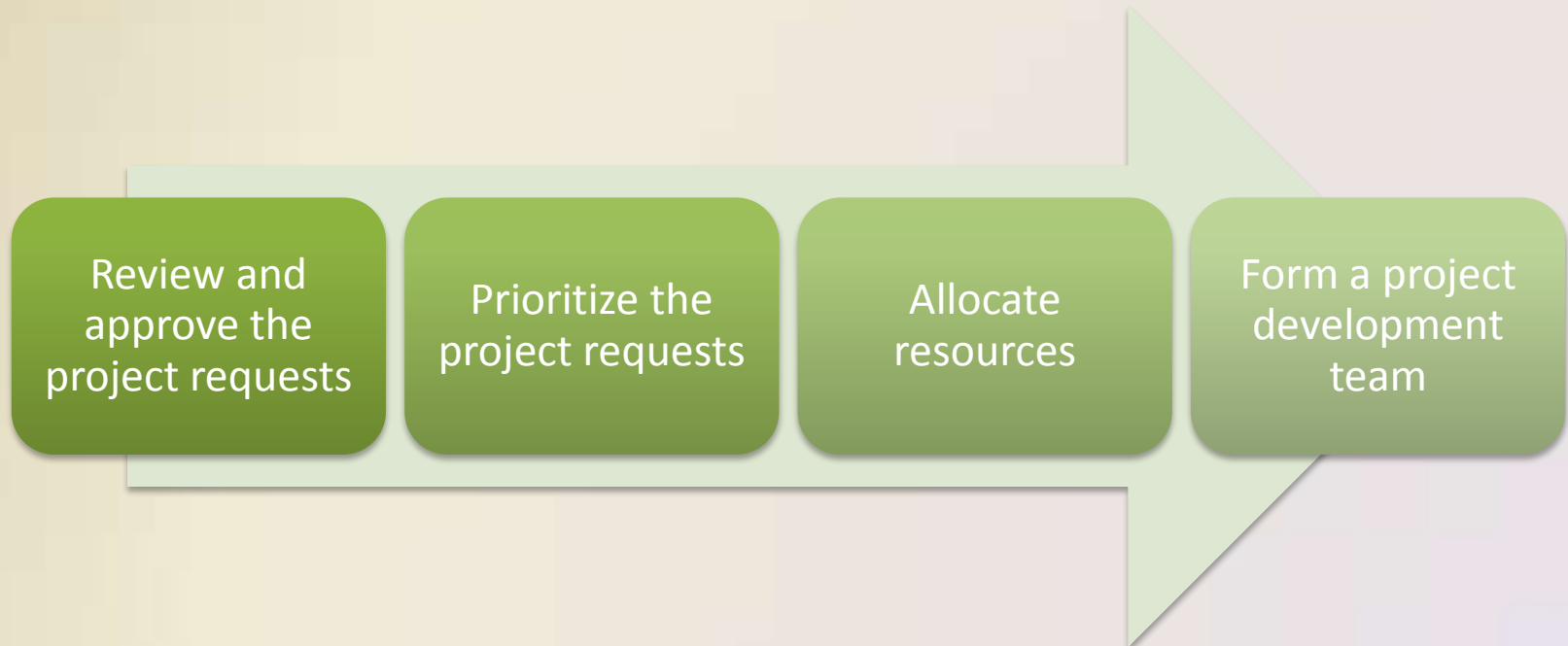
- SUBMITTED BY:** Chad Goldstein
- DEPARTMENT:** Registration
- DATE:** 12-15-2011
- TYPE OF REQUEST:**
 - New System
 - Existing System Enhancement
 - Existing System Modification
- BRIEF STATEMENT OF PROBLEM:** The registration and quality control department staff spends too much time entering and verifying semester grades.
- BRIEF STATEMENT OF EXPECTED SOLUTION:** Modify our current grade reporting system to enable instructors to use an online grade book, so that semester report cards could be printed directly from each instructor's online grade book.
- ACTION (to be completed by steering committee member):**
 - Request Approved
 - Request Delayed
 - Request Rejected

Analyst Assigned: _____
Start Date: _____
Until: _____
Reason: _____

Signature: _____ Date: _____

Planning Phase

- The **planning phase** for a project begins when the steering committee receives a project request
- Four major activities are performed:



Analysis Phase

- The **analysis phase** consists of two major activities:

Conduct a **preliminary investigation**

- Determines and defines the exact nature of the problem or improvement
- Interview the user who submitted the request

Perform detailed analysis

- Study how the current system works
- Determine the users' wants, needs, and requirements
- Recommend a solution

Analysis Phase

Horizon Community College
MEMORANDUM

To: Steering Committee
From: Karl Schmidt, Project Leader
Date: December 29, 2011
Subject: Feasibility Report of Grade Reporting System

Following is the feasibility report in response to the request for a modification to our Grade Reporting System. Your approval is necessary before the next phase of the project will begin.

Introduction

The purpose of this feasibility report is to determine whether it is beneficial for Horizon Community College to continue studying the Grade Reporting System. The registrar has indicated registration and quality control department staff spends too much time entering and verifying semester grades. This project would affect the registration department, quality control, and instructors. Students also will notice a change.

Existing System

Background

Currently, instructors use their own method for recording assignment grades and calculating semester grades. At semester end, the registration department distributes via e-mail a class semester grade form, which contains a list of all students in a class and an area for the instructor to record each student's final semester grade. As instructors send in their class semester grade forms, registration clerks enter each student's grade using the school's database. After grades are entered, the quality control group compares the original semester grade forms with the entered grades to check for any errors that may have occurred during the data entry process. Then, report cards are printed and mailed to students.

Problems

As the number of enrolled students continues to rise, the following problems have been identified with the current Grade Reporting System at Horizon Community College:

- Registration clerks and quality control spend too much time entering semester grades and verifying entered grades.
- Quality control has been finding an excessive number of data entry errors in part due to the increased workload on the registration clerks.

FEASIBILITY REPORT
Page 2

Benefits of a New or Modified System

Following is a list of benefits that could be realized if the Grade Reporting System at Horizon Community College were modified to enable instructors to use an online grade book, so that report cards could be printed directly from each instructor's grade book:

- Data entry errors of semester grades by registration clerks would be eliminated.
- Cost of supplies, such as paper and ink, would be reduced by 10 percent.
- Through a more efficient use of registration and quality control staff time, the college could achieve a 50 percent reduction in temporary clerks in the registration department.

Feasibility of a New or Modified System

Operational

A modified Grade Reporting System will require instructors enter all semester grades online. In addition to report cards being generated automatically from each instructor's grade book, students will be able to check their class progress throughout the semester.

Schedule

The established deadline for the Grade Reporting System is reasonable.

Technical

Horizon Community College already has a functional database and server. To handle the increased volume and usage of data, however, it will need to purchase a larger database server.

Economic

A detailed summary of the costs and benefits, including all assumptions, is available on our FTP server. The potential costs of the proposed solution could range from \$15,000 to \$20,000. The estimated savings in temporary clerks and supplies will exceed \$30,000.

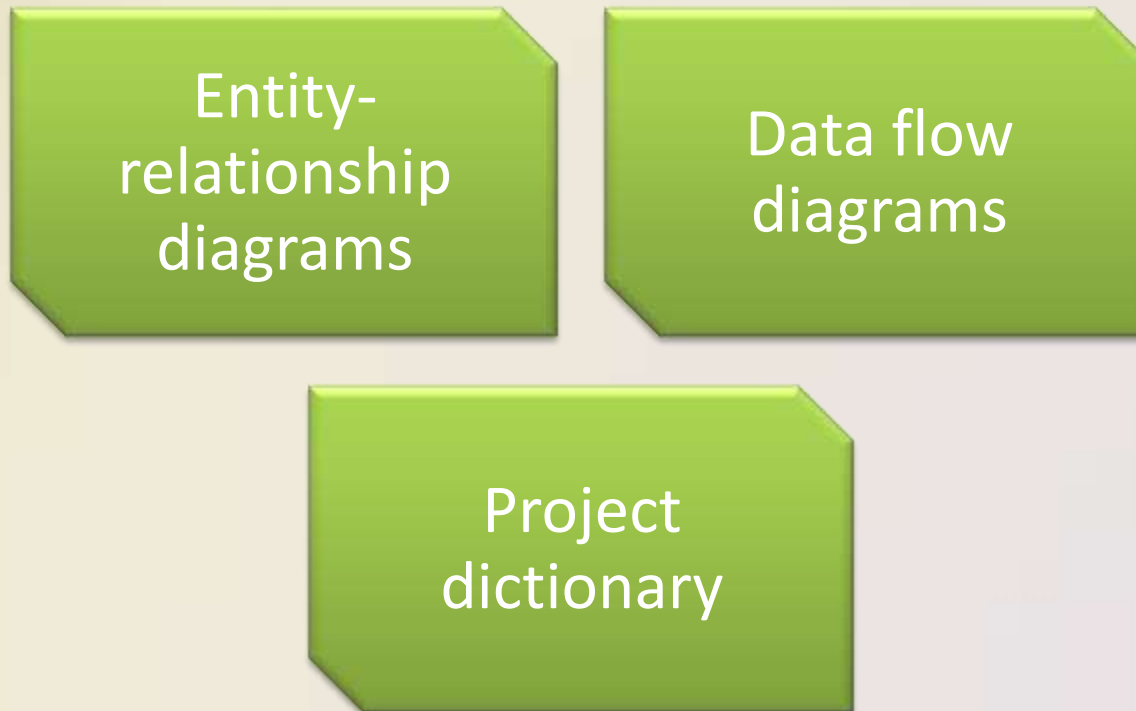
If you have any questions about the detailed cost/benefit summary or require further information, please contact me.

Recommendation

Based on the findings presented in this report, we recommend a continued study of the Grade Reporting System.

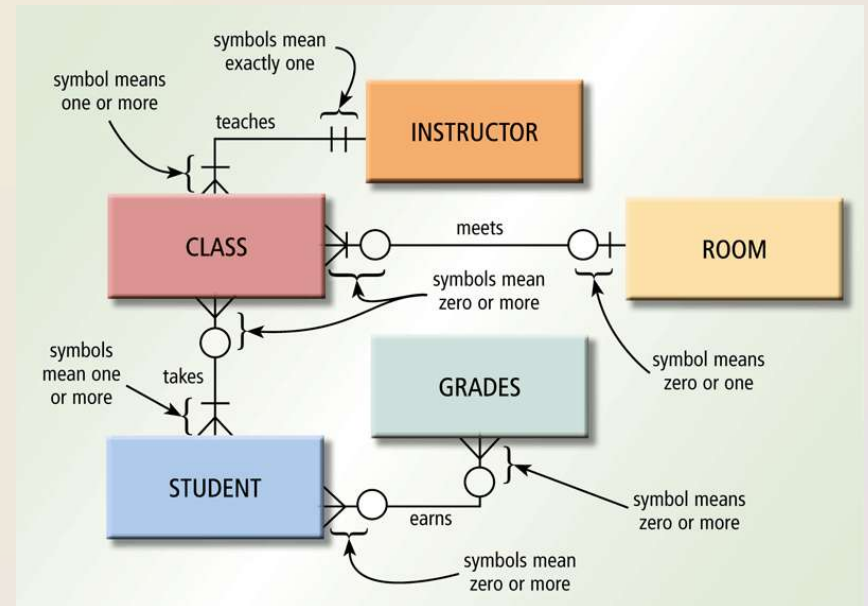
Analysis Phase

- **Process modeling** (structured analysis and design) is an analysis and design technique that describes processes that transform inputs into outputs



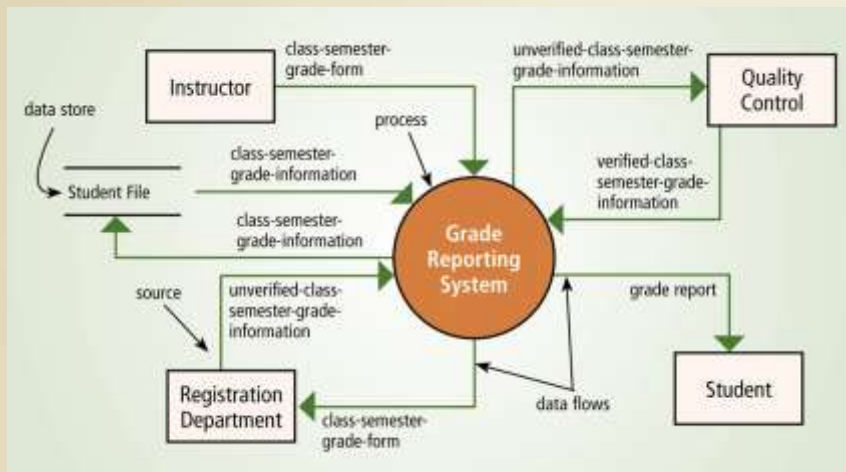
Analysis Phase

- An **entity-relationship diagram** (ERD) is a tool that graphically shows the connections among entities in a system
- Entities are objects in the system that have data



Analysis Phase

- A **data flow diagram** (DFD) is a tool that graphically shows the flow of data in a system



- Data flows
- Processes
- Data stores
- Sources

Analysis Phase

- The **project dictionary** contains all the documentation and deliverables of a project
- Structured English is a style of writing that describes the steps in a process

Entering Class Semester Grades

For each semester class, perform the following steps:

For each student, perform the following steps:

Enter the grade earned.

Verify the entered grade.

Print the semester class entered grades.

Create a cover sheet for quality control.

Analysis Phase



A **decision table** is a table that lists a variety of conditions and the actions that correspond to each condition



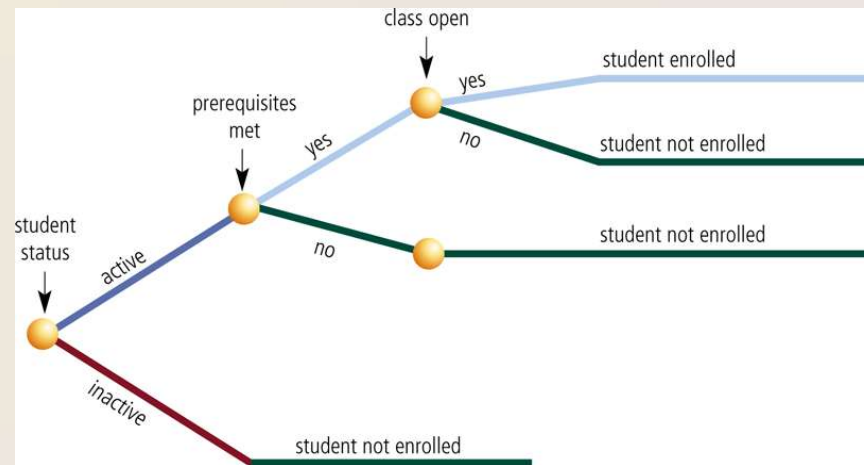
A decision tree also shows conditions and actions, but it shows them graphically

Analysis Phase

Decision table

		Rules							
		1	2	3	4	5	6	7	8
Conditions	Student status (A = Active, I = Inactive)	A	A	A	A	I	I	I	I
	Prerequisites met?	Y	Y	N	N	Y	Y	N	N
	Seats available?	Y	N	Y	N	Y	N	Y	N
Actions	Student enrolled	X							
	Student not enrolled		X	X	X	X	X	X	X

Decision tree



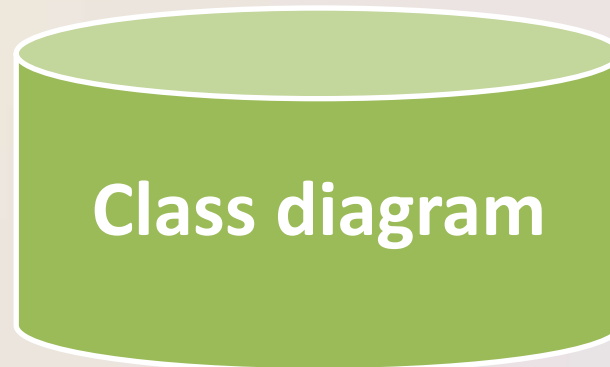
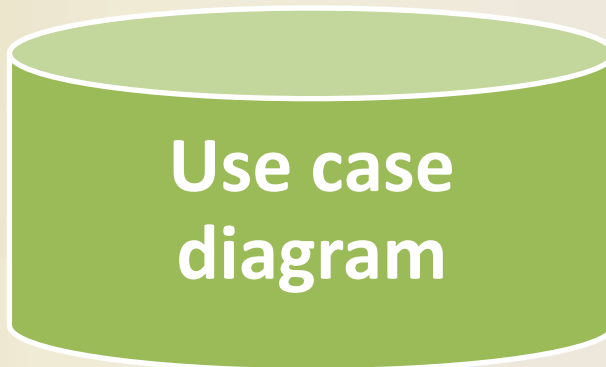
Analysis Phase

- The **data dictionary** stores the data item's name, description, and other details about each data item

<i>Date:</i> 12/31/2011 <i>Time:</i> 10:36:28 AM	<i>Project:</i> HORIZON COMMUNITY COLLEGE	<i>Page:</i> 11
Detailed Listing -- Alphabetically All Entries--Data Flow Diagrams		
<hr/>		
Student ID		Data Element
Student File::Student ID		
<i>Description:</i> A unique identification number assigned to each student.		
<i>Alias:</i> Student Code		
<i>Values & Meanings:</i> Required element Cannot be blank May not be duplicated		
<i>Data element attributes</i>		
Storage type: Char		
Length: 7		
Display Format: AAAAAAA		
Null Type: NotNull		
<i>Location:</i>		
File --> Student File		
<i>Date Last Altered:</i> 12/31/2011 <i>Date Created:</i> 12/31/2011		

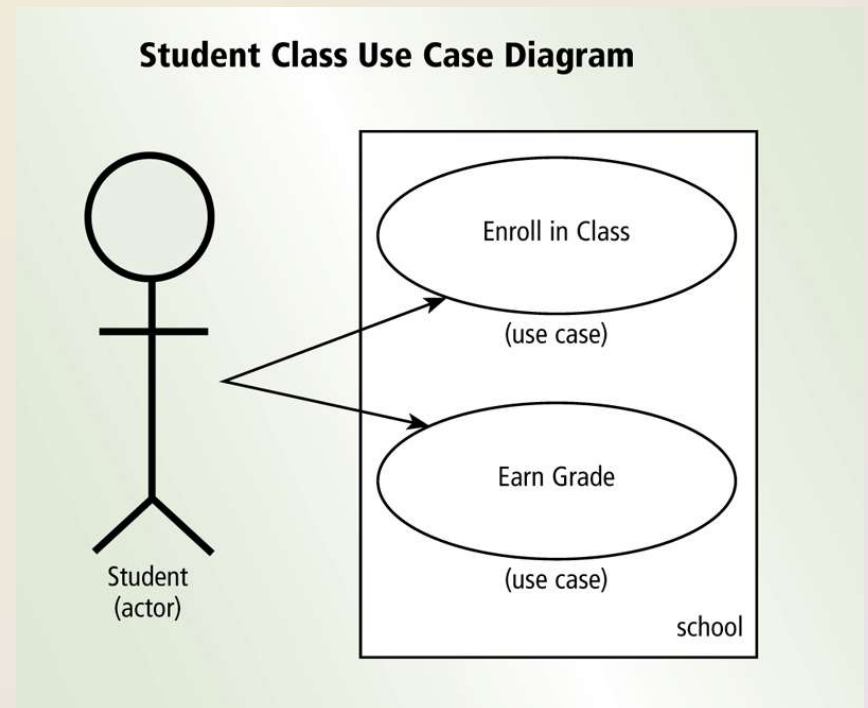
Analysis Phase

- **Object modeling** combines the data with the processes that act on that data into a single unit, called an **object**
- **UML** (Unified Modeling Language) has been adopted as a standard notation for object modeling and development
 - UML includes 13 different diagrams
 - Two diagrams include:

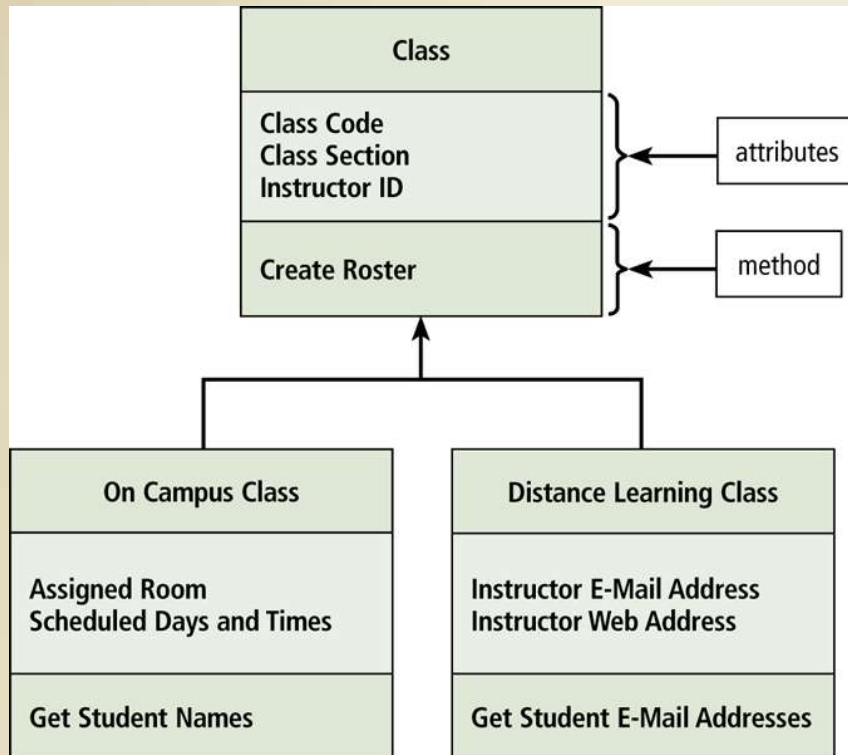


Analysis Phase

- A **use case diagram** graphically shows how actors (users) interact with the information system
- Diagrams are considered easy to understand



Analysis Phase



- A **class diagram** graphically shows classes and subclasses in a system
- Each class can have one or more subclasses
- Subclasses use inheritance to inherit methods and attributes of higher levels

Analysis Phase

- The system proposal assesses the feasibility of each alternative solution
- The steering committee discusses the system proposal and decides which alternative to pursue


**Packaged
software**

**Custom
software**

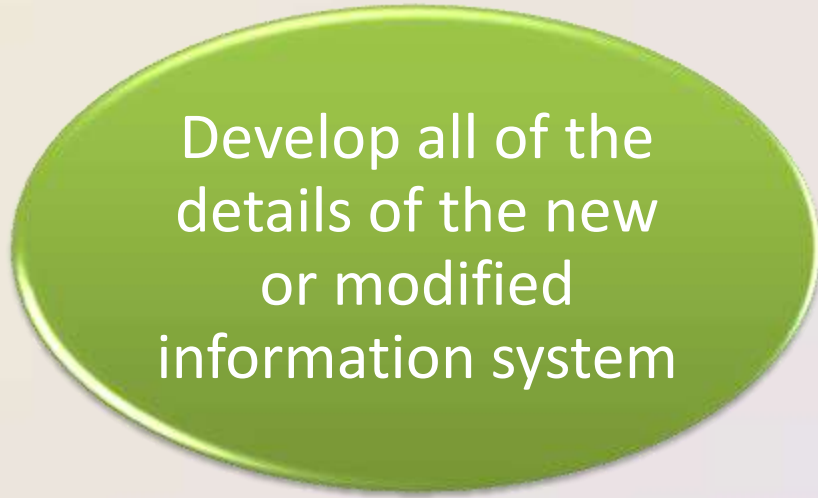
Outsourcing

Design Phase

- The **design phase** consists of two major activities



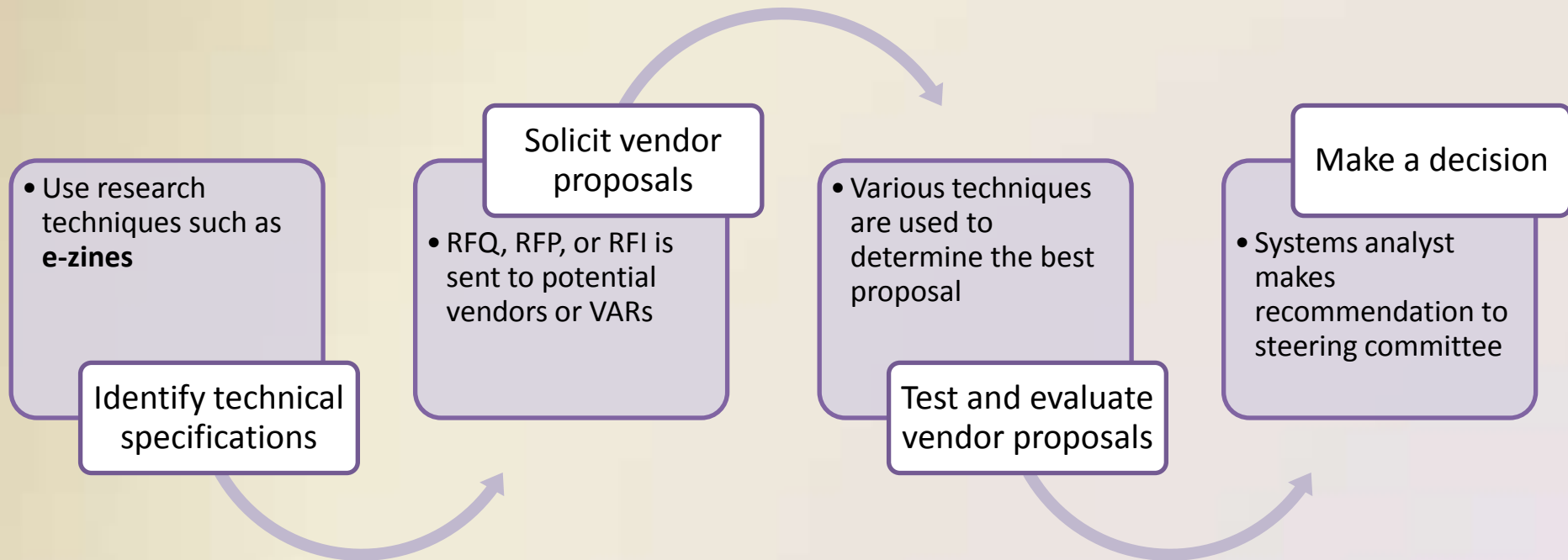
Acquire hardware
and software



Develop all of the
details of the new
or modified
information system

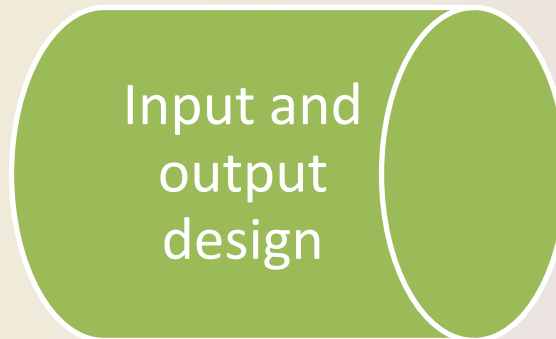
Design Phase

- To acquire the necessary hardware and software:



Design Phase

- The next step is to develop detailed design specifications
 - Sometimes called a physical design



Design Phase

- Systems analysts typically develop two types of designs for each input and output

Mockup

Instructor Maintenance

Instructor Maintenance Form

Instructor ID	380182
First Name	Bethany
Last Name	Ames
Extension	493
Office	D210
Web Address	www.hcc.edu

Record: 1 of 4 No Filter Search

Layout chart

Instructor Maintenance

Instructor Maintenance Form

Form Header

Detail

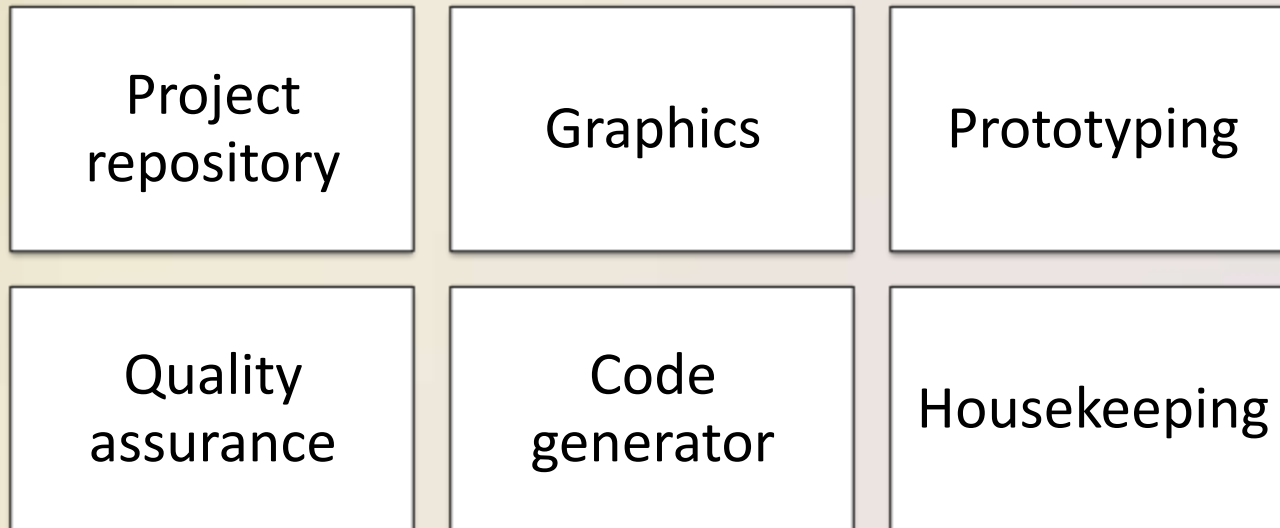
Instructor ID	Instructor ID
First Name	First Name
Last Name	Last Name
Extension	Extension
Office	Office
Web Address	Web Address

Design Phase

- A **prototype** (proof of concept) is a working model of the proposed system
 - Prototypes have inadequate or missing documentation
 - Users tend to embrace the prototype as a final system
 - Should not eliminate or replace activities

Design Phase

- Computer-aided software engineering (CASE) tools are designed to support one or more activities of system development
- CASE tools sometimes contain the following tools:



Design Phase

	What Data	How Function	Where Network	Who People	When Time	Why Motivation	
Scope Planner List of Things ENTITY = Class of Business Entities	Business Model Owner e.g., Semantic Model ENTITY = Business Entity RELATION = Business Relationship	System Model Designer e.g., Logical Data Model ENTITY = Data Entity RELATION = Data Relationship	Technology Model Builder e.g., Data Design ENTITY = Table/Segment/View RELATION = Key/Primary/Foreign	Detailed Representations Subcontractor e.g., Data Definition ENTITY = Field RELATION = Address	List of Processes PROCESS = Class of Business Processes	List of Locations NODE = Class of Business Locations	List of Organizations PEOPLE = Class of Business Organizations
	e.g., Business Process Model UP = Business Resource PROCESS = Business Process	e.g., Application Architecture UP = User Views PROCESS = Application Function	e.g., Logistics Network NODE = Business Location LINK = Business Linkage	e.g., Work Flow Model PEOPLE = Organization Unit WORK = Work Product	e.g., Master Schedule TIME = Business Event CYCLE = Business Cycle	e.g., Business Plan ENDS = Business Objective MEANS = Business Strategy	
	e.g., Distributed System Architecture NODE = IT Function LINK = Line Characteristics	e.g., Human Interface Architecture PEOPLE = Role WORK = Deliverable	e.g., Processing Structure TIME = System Event CYCLE = Processing Cycle	e.g., Business Rule Model ENDS = Structural Assertion MEANS = Action Assertion			
	e.g., System Design UP = Data Elements/Views PROCESS = Computer Function	e.g., Technology Architecture NODE = Hardware/System Software LINK = Line Specifications	e.g., Presentation Architecture PEOPLE = User WORK = Screen/Device Formats	e.g., Control Structure TIME = Event CYCLE = Component Cycle	e.g., Role Design ENDS = Condition MEANS = Action		
	e.g., Program UP = Control Block PROCESS = Language Statement	e.g., Network Architecture NODE = Address LINK = Protocols	e.g., Security Architecture PEOPLE = Identity WORK = Job	e.g., Timing Definition TIME = Interrupt CYCLE = Machine Cycle	e.g., Role Specification ENDS = Sub-condition MEANS = Step		

66% LIB

Design Phase

- Many people should review the detailed design specifications
- An inspection is a formal review of any system development deliverable
 - A team examines the deliverables to identify errors

Implementation Phase

- The purpose of the **implementation phase** is to construct the new or modified system and then deliver it

Develop programs

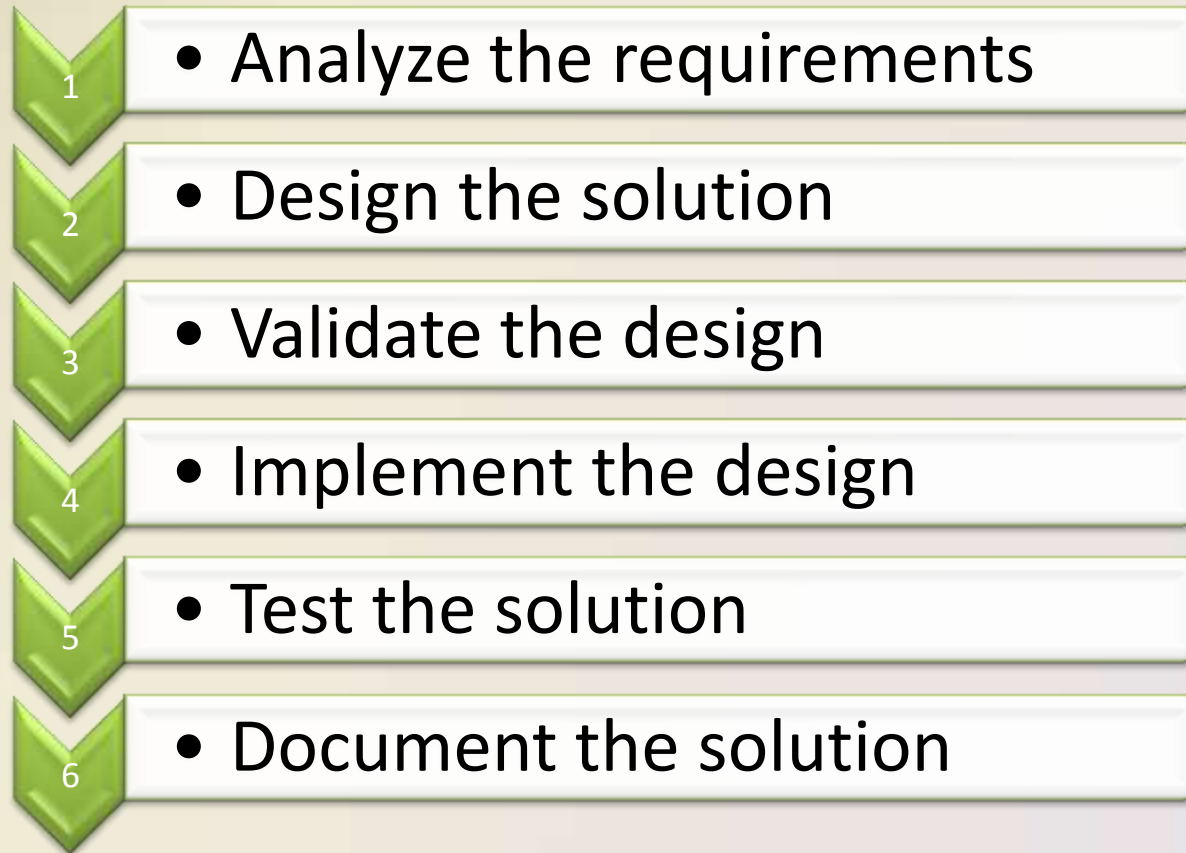
Install and test the new system

Train users

Convert to the new system

Implementation Phase

- The program development life cycle follows these steps:



Implementation Phase

- Various tests should be performed on the new system

Unit test

- Verifies that each individual program or object works by itself

Systems test

- Verifies that all programs in an application work together properly

Integration test

- Verifies that an application works with other applications

Acceptance test

- Checks the new system to ensure that it works with actual data

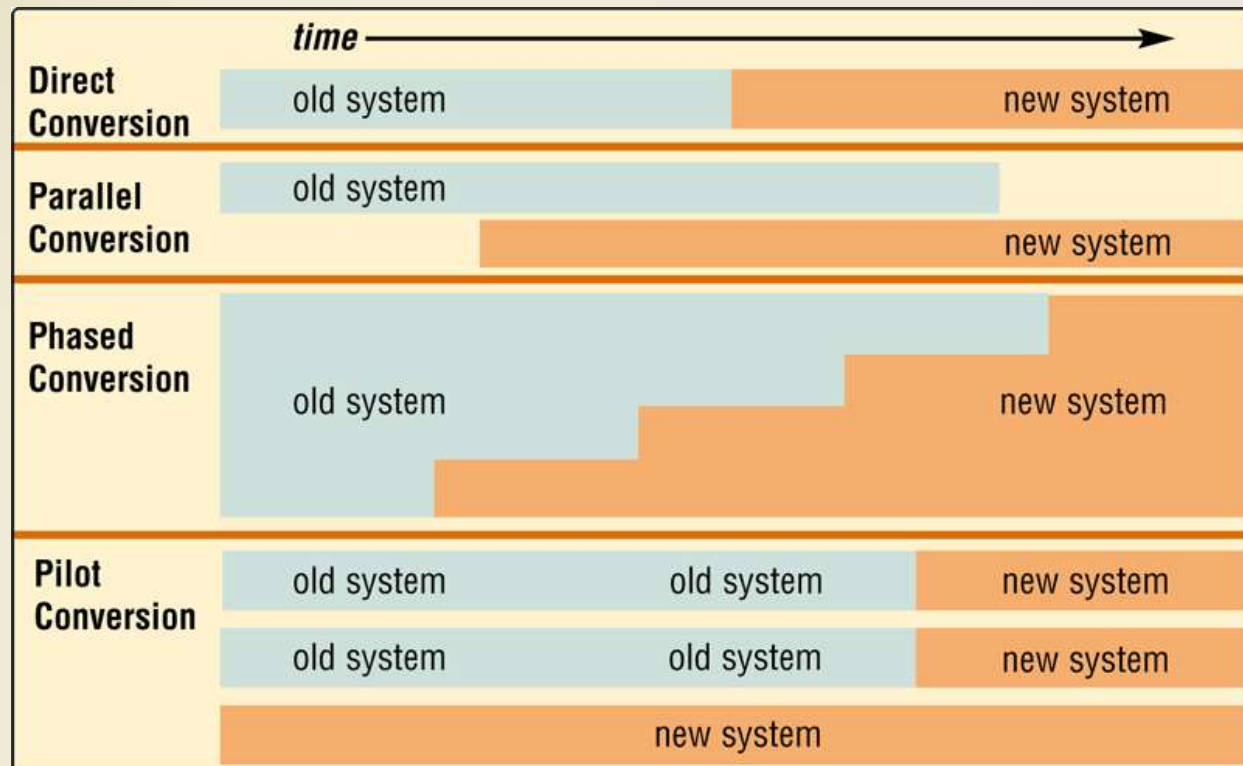
Implementation Phase

- **Training** involves showing users exactly how they will use the new hardware and software in the system
 - One-on-one sessions
 - Classroom-style lectures
 - Web-based training



Implementation Phase

- One or more of four conversion strategies can be used to change from the old system to the new system



Operation, Support, and Security Phase

- The purpose of the **operation, support, and security phase** is to provide ongoing assistance for an information system and its users after the system is implemented



Operation, Support, and Security Phase

- A **computer security plan** should do the following:

Identify all information assets of an organization

Identify all security risks that may cause an information asset loss

For each risk, identify the safeguards that exist to detect, prevent, and recover from a loss

Summary

System
development
phases

Guidelines for
system
development

Activities that occur
during system
development

Activities
performed during
each system
development phase

Chapter Twelve

Information System Development

Discovering Computers 2012

**Your Interactive Guide
to the Digital World**

Chapter 12 Complete

