

System Development



What is System Development?

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

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

An **ICT System** 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:

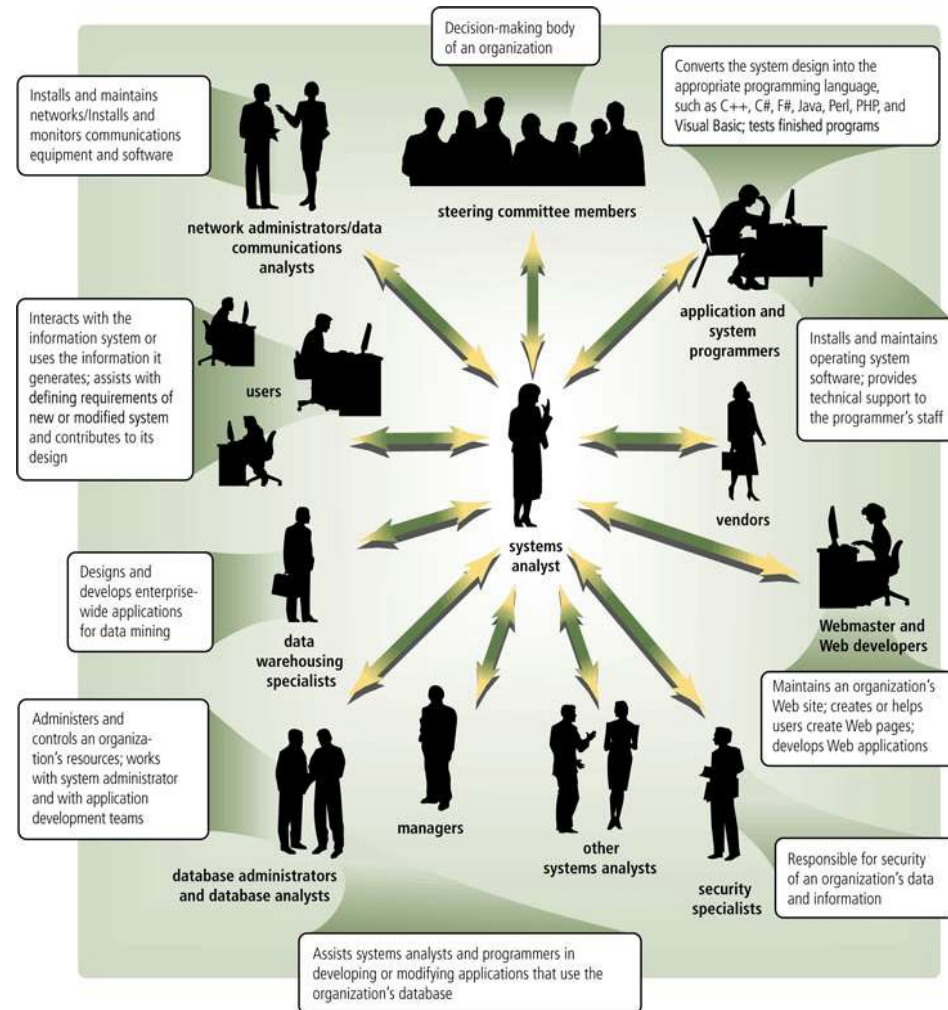
Group activities or tasks into

phases Involve users

Define standards

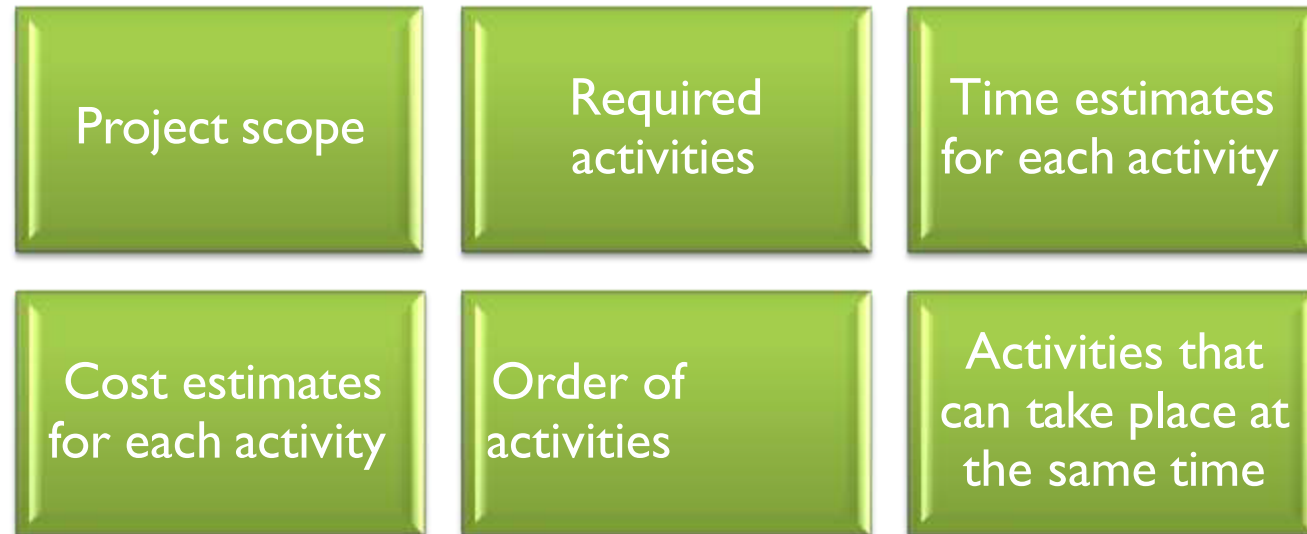
What is System Development?

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



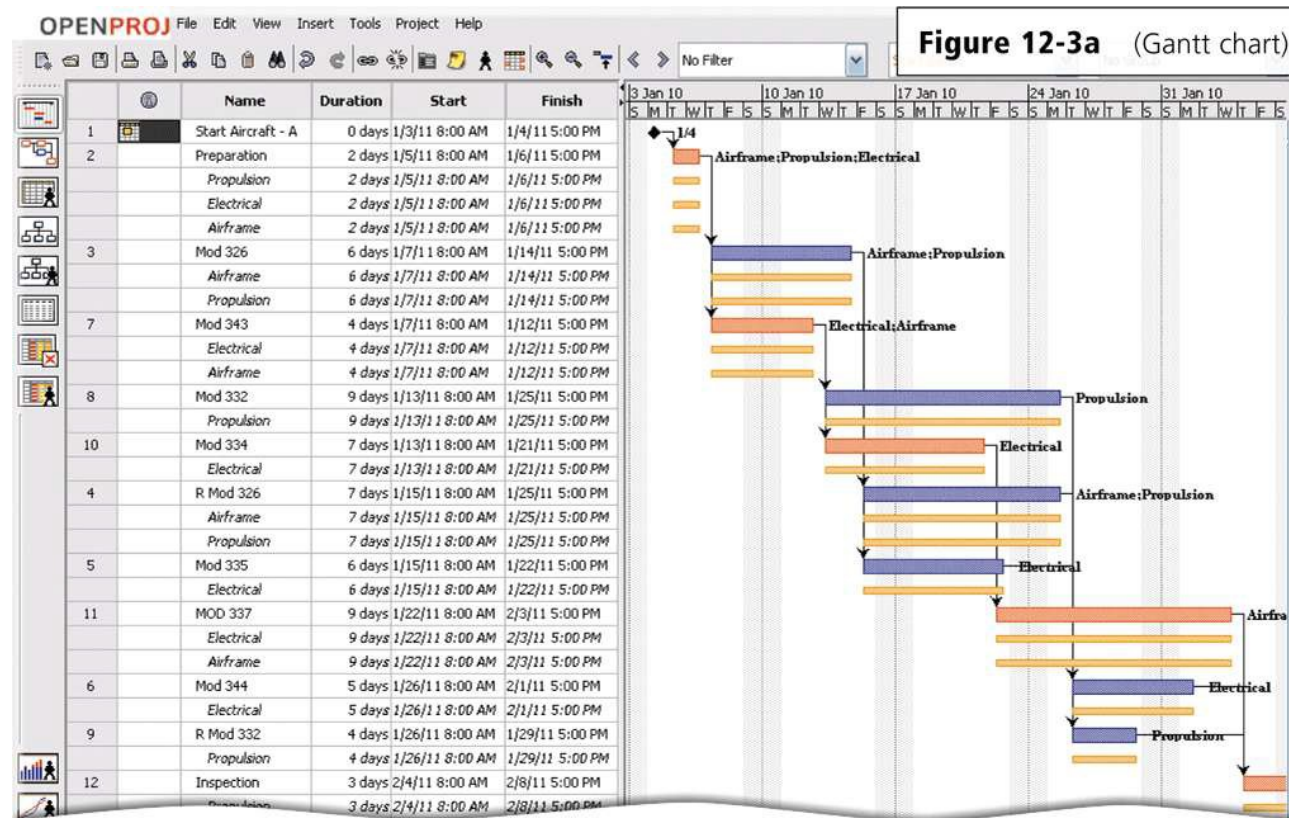
What is System Development?

- **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:



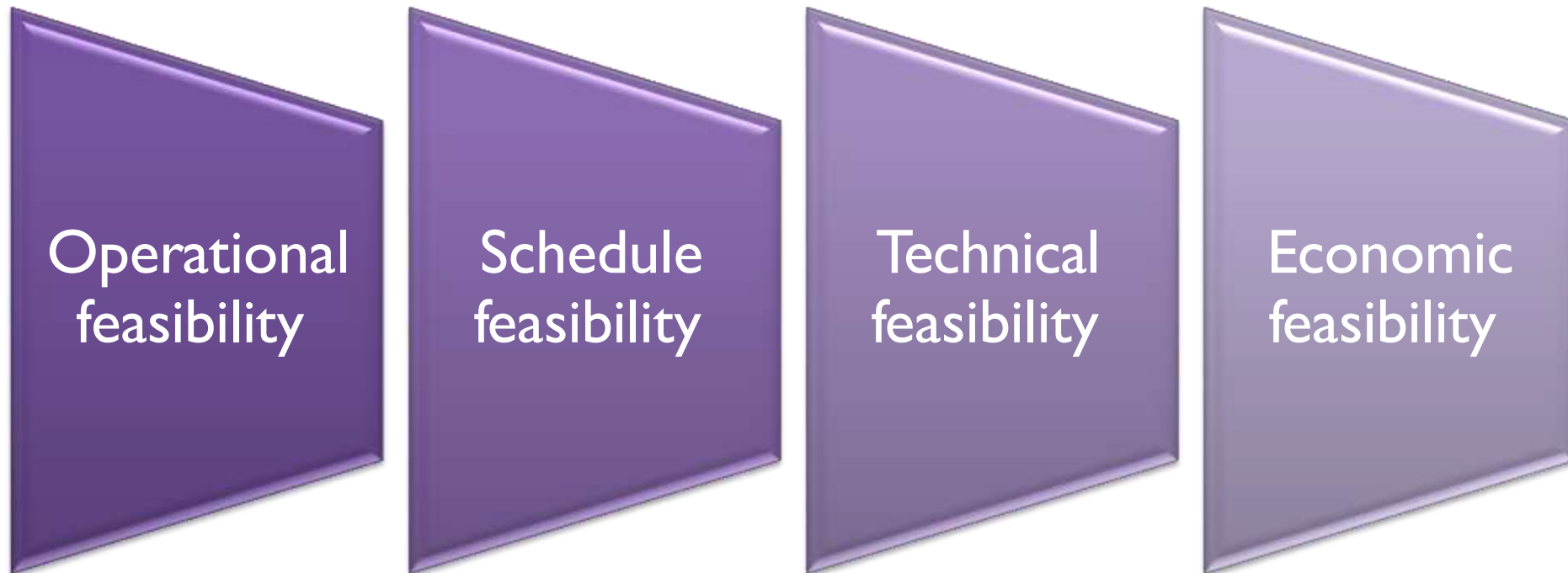
What is System Development?

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



What is System Development?

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



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

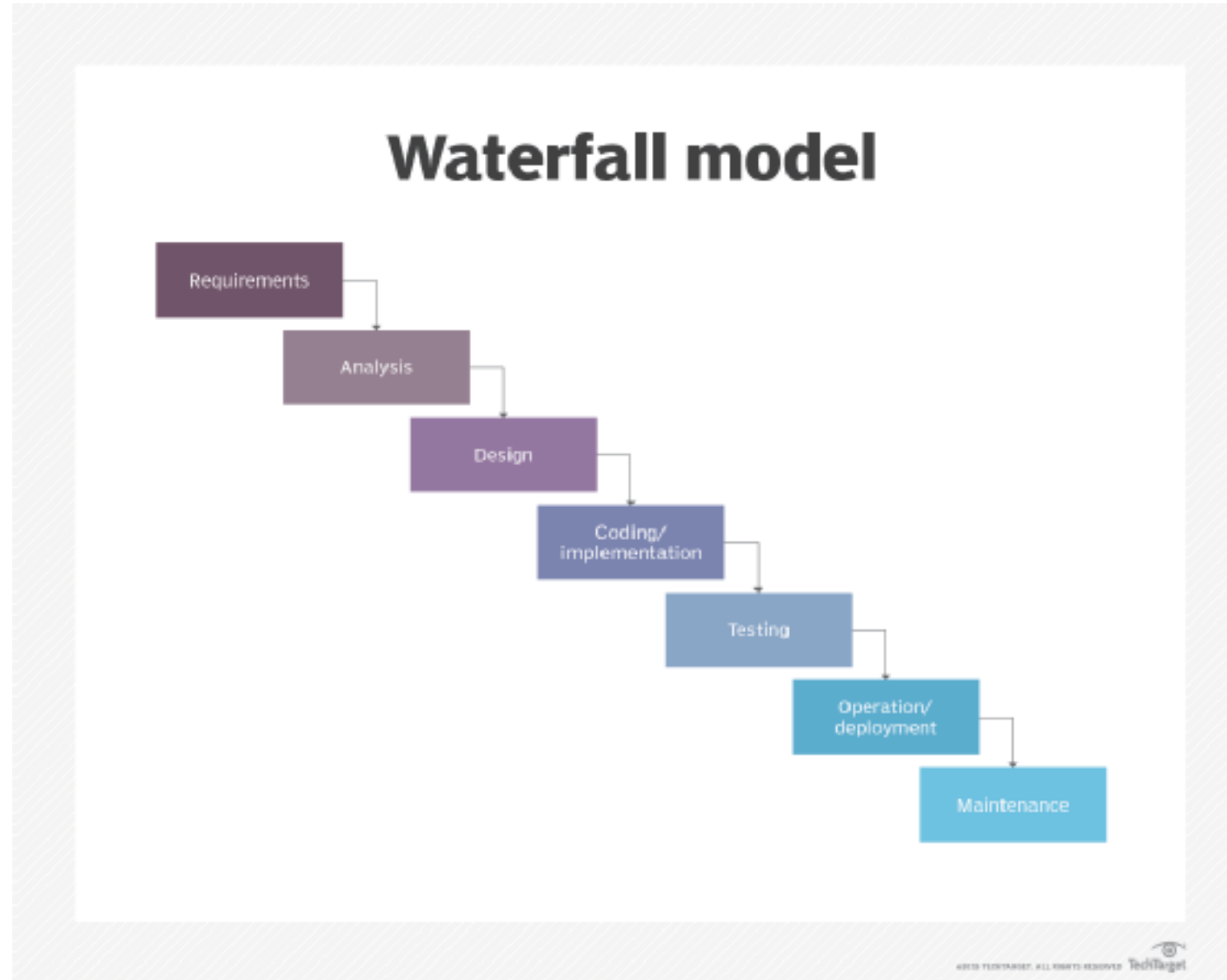
Interview

JAD Sessions

Research

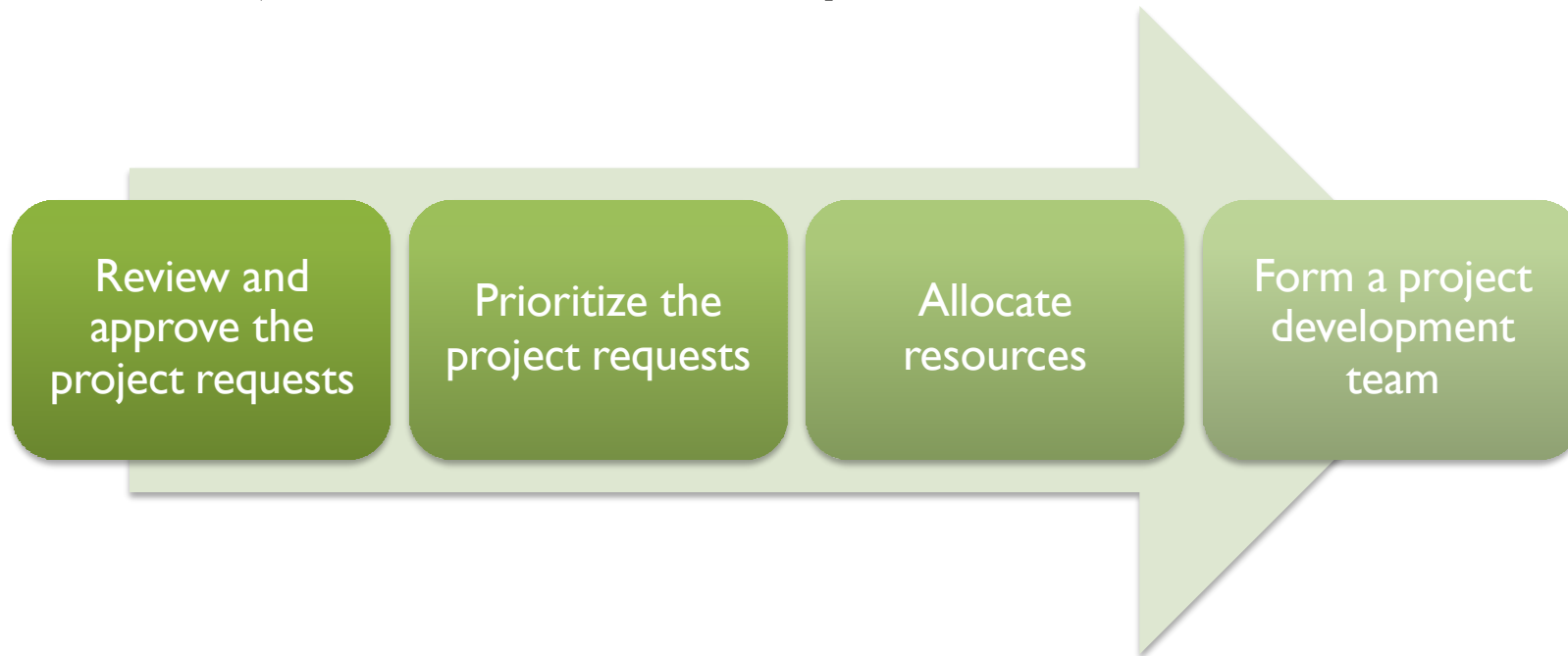


System Development Life Cycle



Planning Phase

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



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

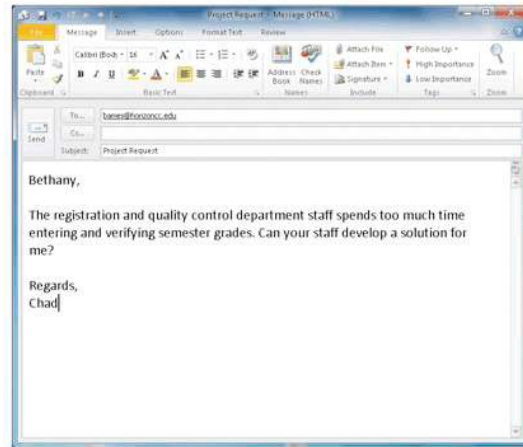
Situations beyond an organization's control might require a change

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)



(formal project request)

Horizon Community College
REQUEST FOR SYSTEM SERVICES
Form IT-102A

SUBMITTED BY: Chad Goldstein DATE: 12-15-2011

DEPARTMENT: Registration

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):

<input type="checkbox"/> Request Approved	Analyst Assigned: _____
<input type="checkbox"/> Request Delayed	Start Date: _____
<input type="checkbox"/> Request Rejected	Until: _____
	Reason: _____

Signature: _____ Date: _____

Analysis Phase

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

Conduct a preliminary investigation

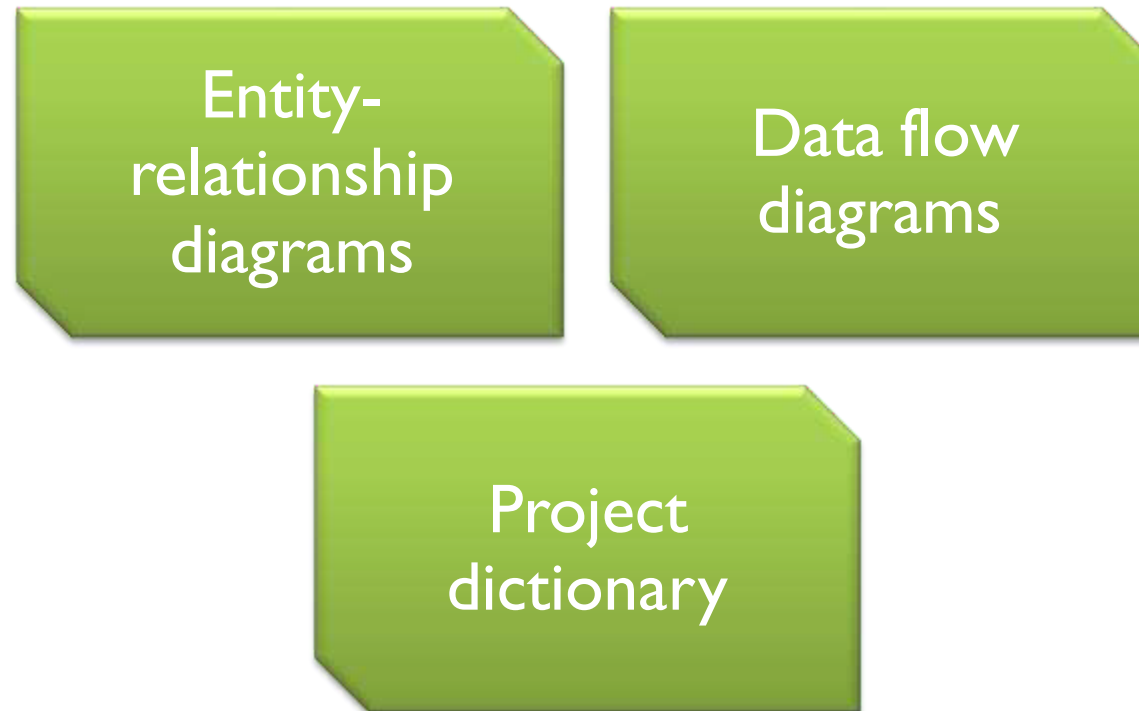
- Determines and defines the exact nature of the problem or improvement
- Interview the user who submitted the request

Perform detailed analysis

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

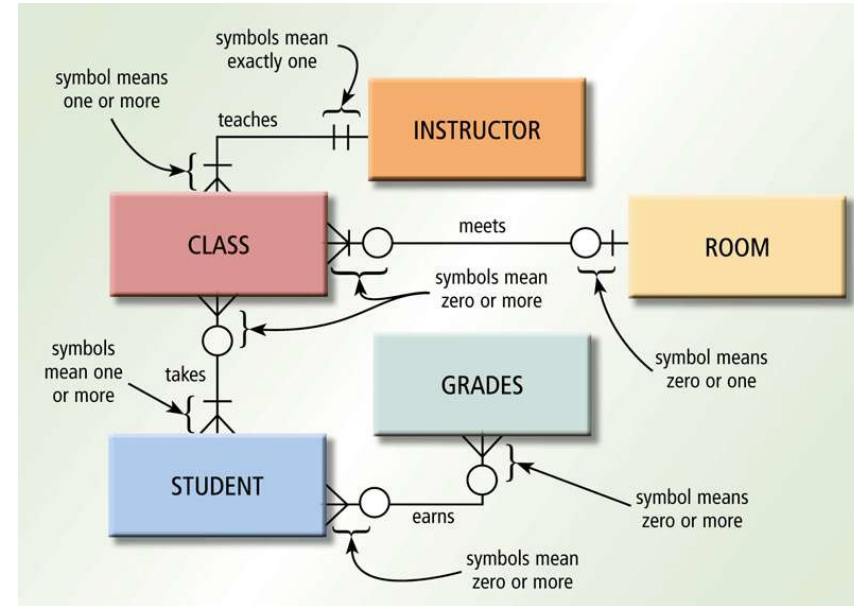
Analysis Phase

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

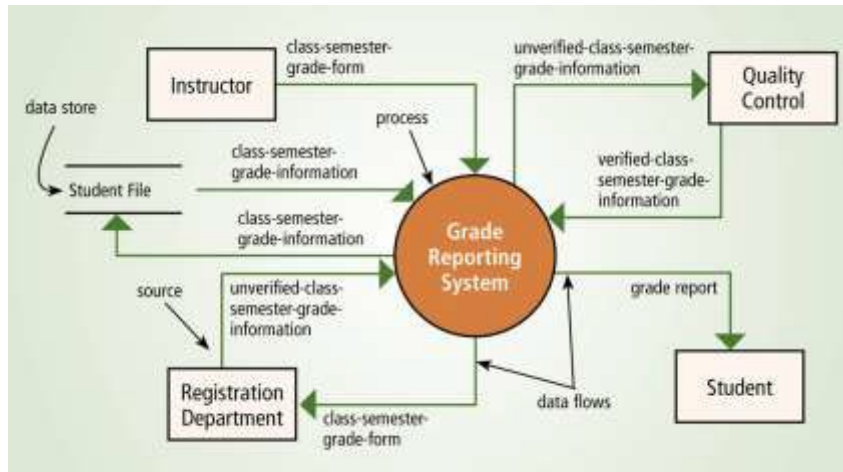


Analysis Phase

- 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



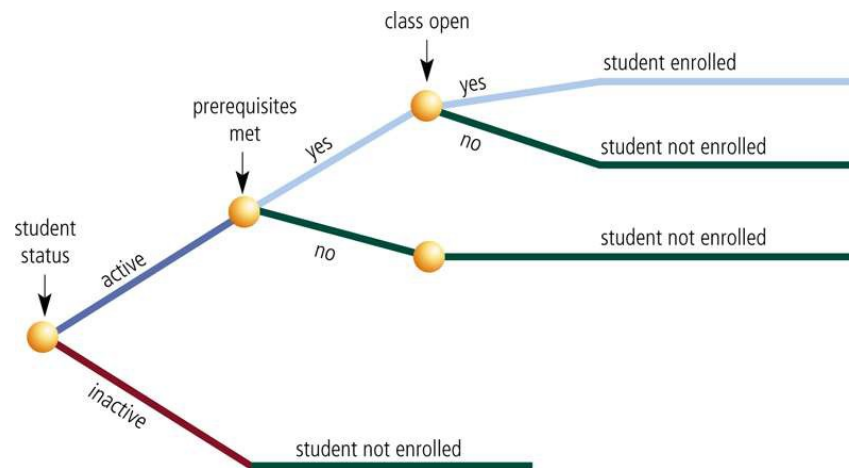
A decision tree also shows conditions and actions, but it shows them graphically

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

Date: 12/31/2011
Time: 10:36:28 AM

Project: HORIZON COMMUNITY COLLEGE

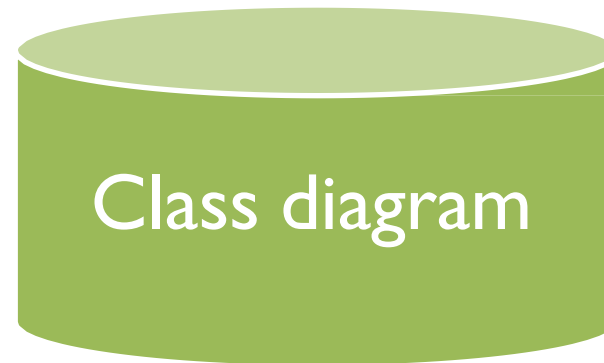
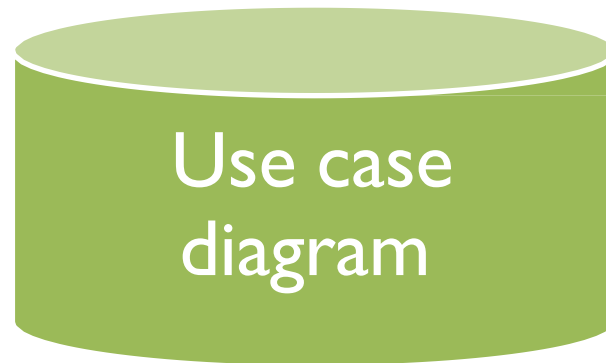
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Detailed Listing -- Alphabetically
All Entries--Data Flow Diagrams

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

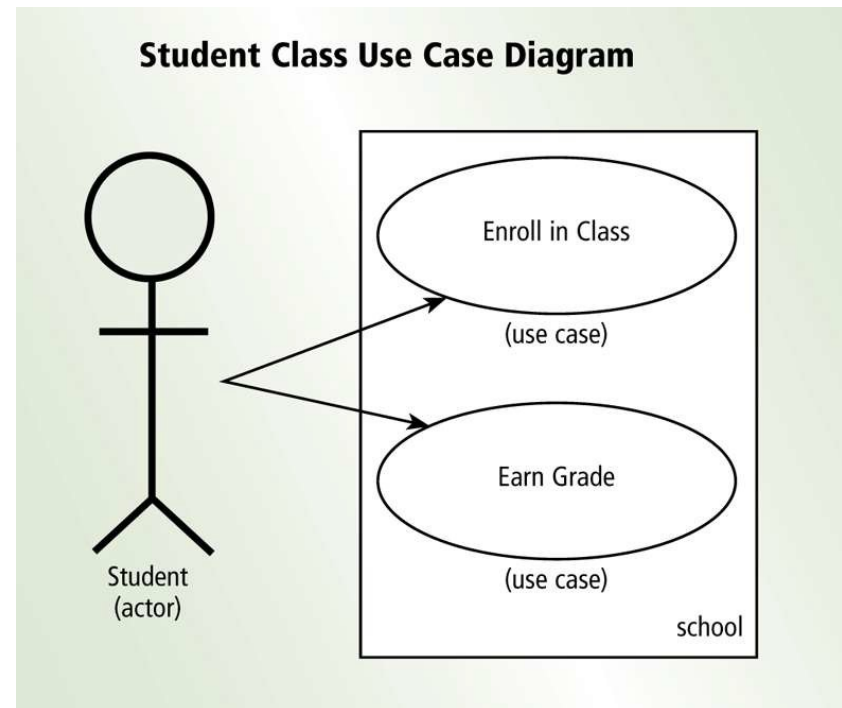
Analysis Phase

- **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:

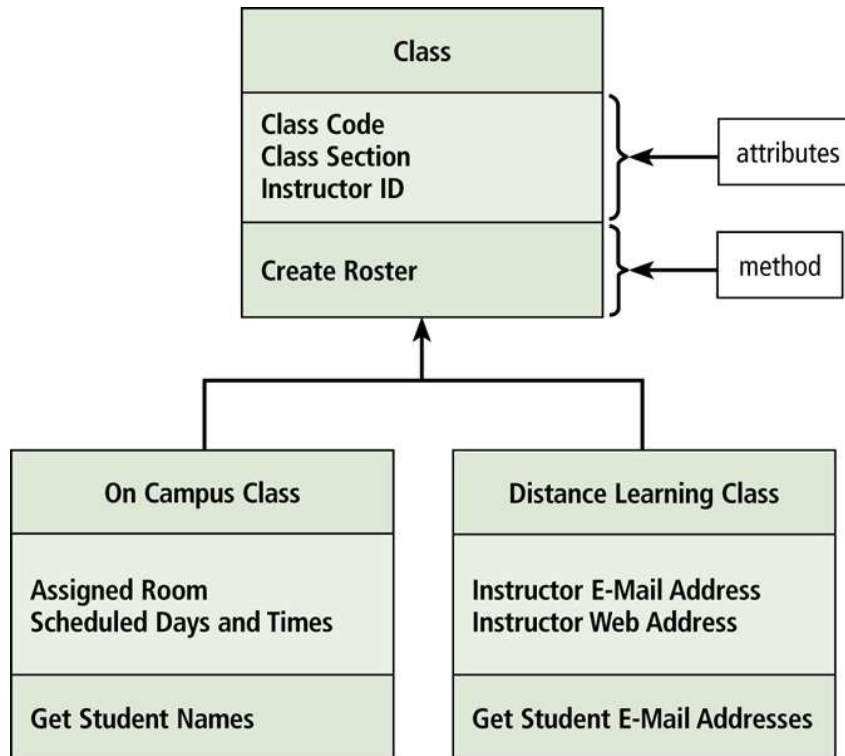


Analysis Phase

- 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



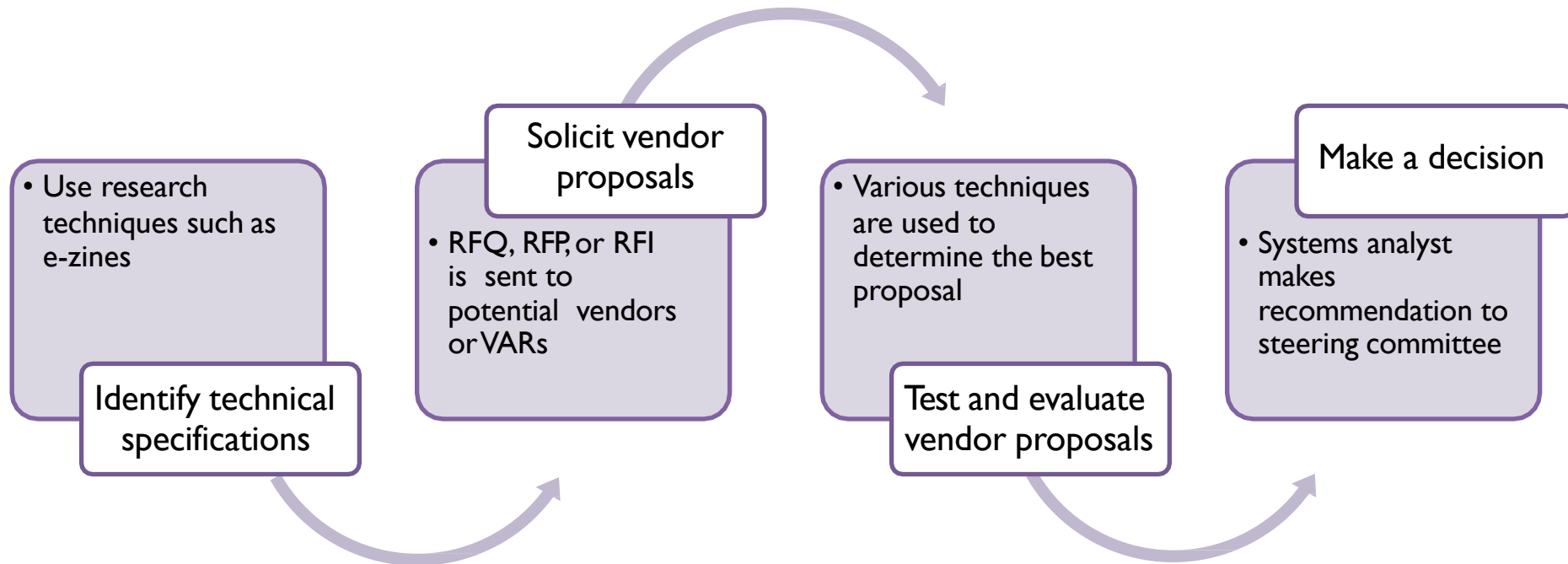
Acquire hardware
and software

The diagram consists of two green, horizontally-oriented ovals with a slight 3D effect. The left oval contains the text 'Acquire hardware and software' and the right oval contains the text 'Develop all of the details of the new or modified information system'. Both ovals are positioned below a bulleted list item that states 'The design phase consists of two major activities'.

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

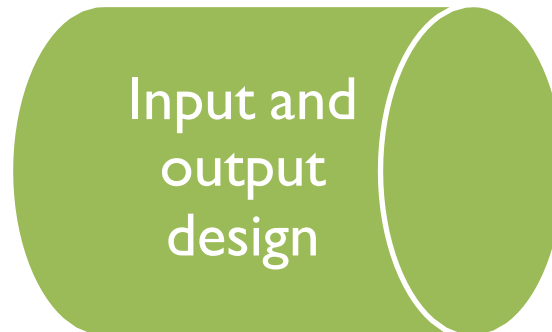
Design Phase

- To acquire the necessary hardware and software:



Design Phase

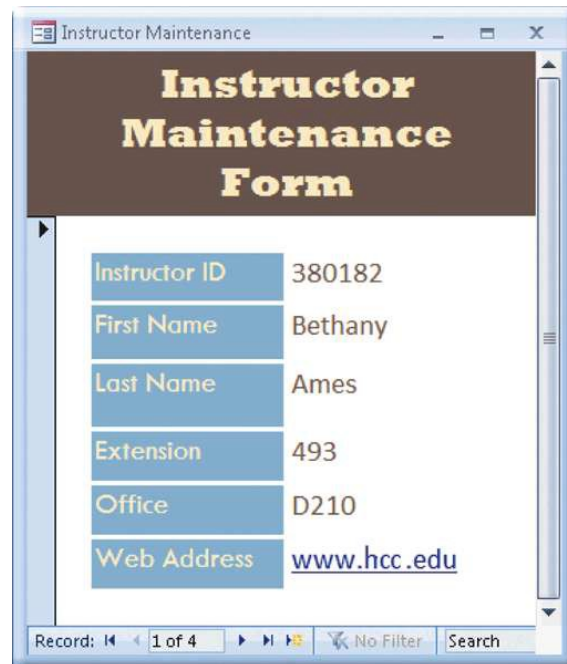
- The next step is to develop detailed design specifications
 - Sometimes called a physical design



Design Phase

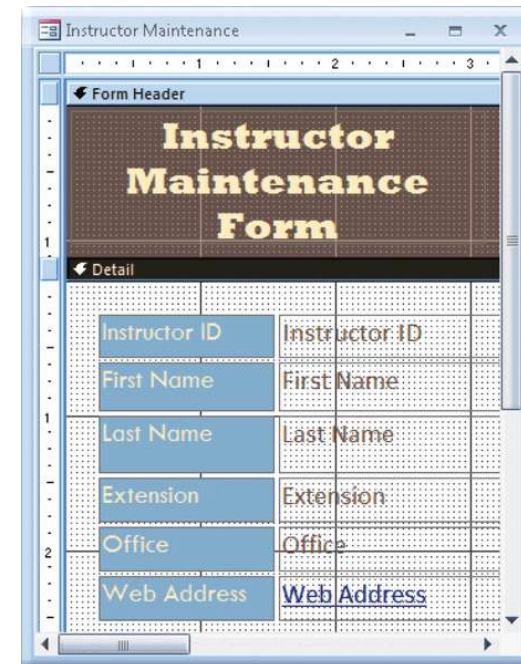
- Systems analysts typically develop two types of designs for each input and output

Mockup



A screenshot of a software window titled "Instructor Maintenance". The window contains a form with a dark brown header area with the text "Instructor Maintenance Form" in yellow. Below the header, there are several input fields with labels and values: "Instructor ID" (380182), "First Name" (Bethany), "Last Name" (Ames), "Extension" (493), "Office" (D210), and "Web Address" (www.hcc.edu). At the bottom of the window, there is a status bar with the text "Record: 1 of 4", "No Filter", and a "Search" button.

Layout chart



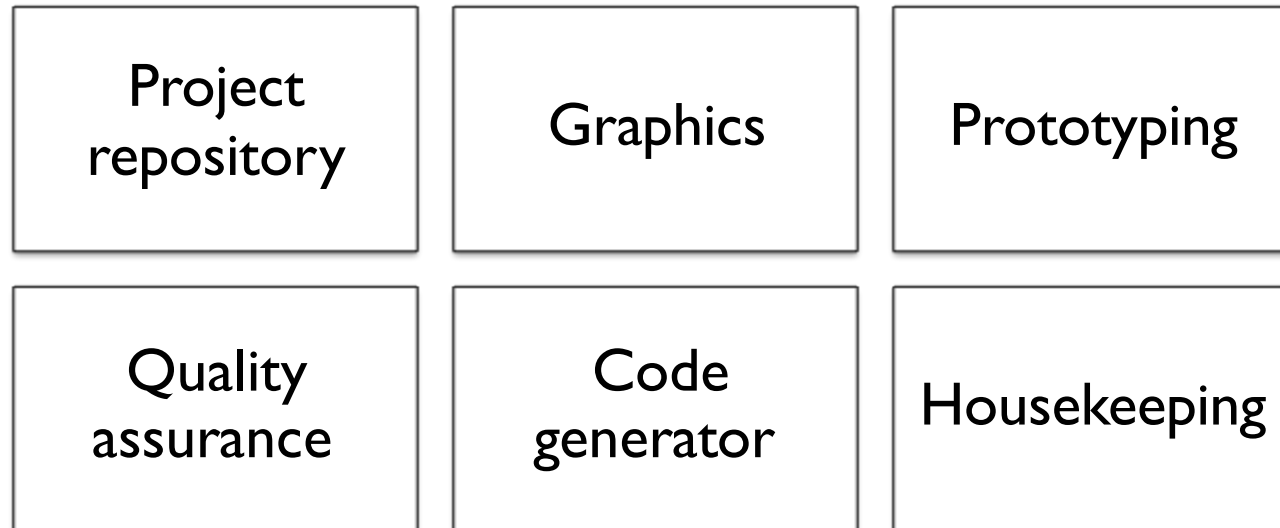
A screenshot of a software window titled "Instructor Maintenance" showing a layout chart. The window is divided into two main sections: "Form Header" and "Detail". The "Form Header" section contains the text "Instructor Maintenance Form". The "Detail" section contains a table with two columns and six rows. The first row is a header row with the text "Instructor ID". The subsequent rows contain the labels "First Name", "Last Name", "Extension", "Office", and "Web Address". The table is overlaid on a grid of dots. At the bottom of the window, there is a status bar with the text "Record: 1 of 4", "No Filter", and a "Search" button.

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:

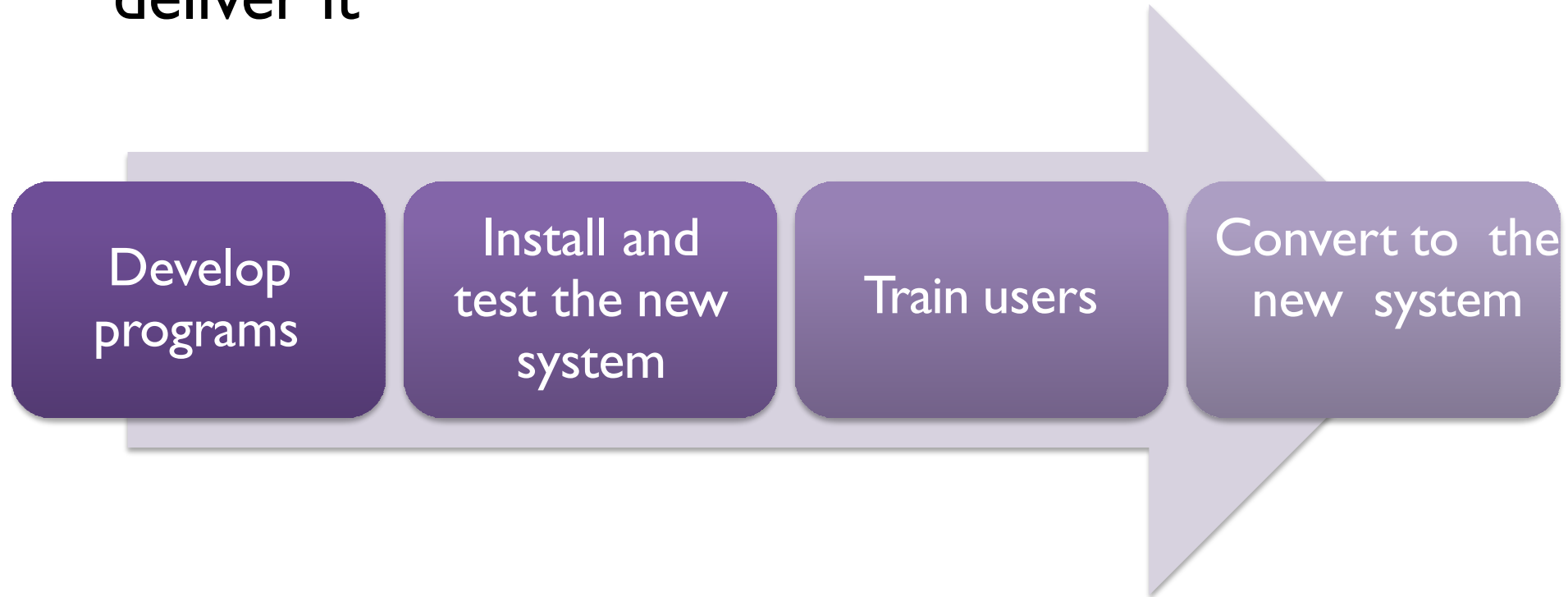


Design Phase

- 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

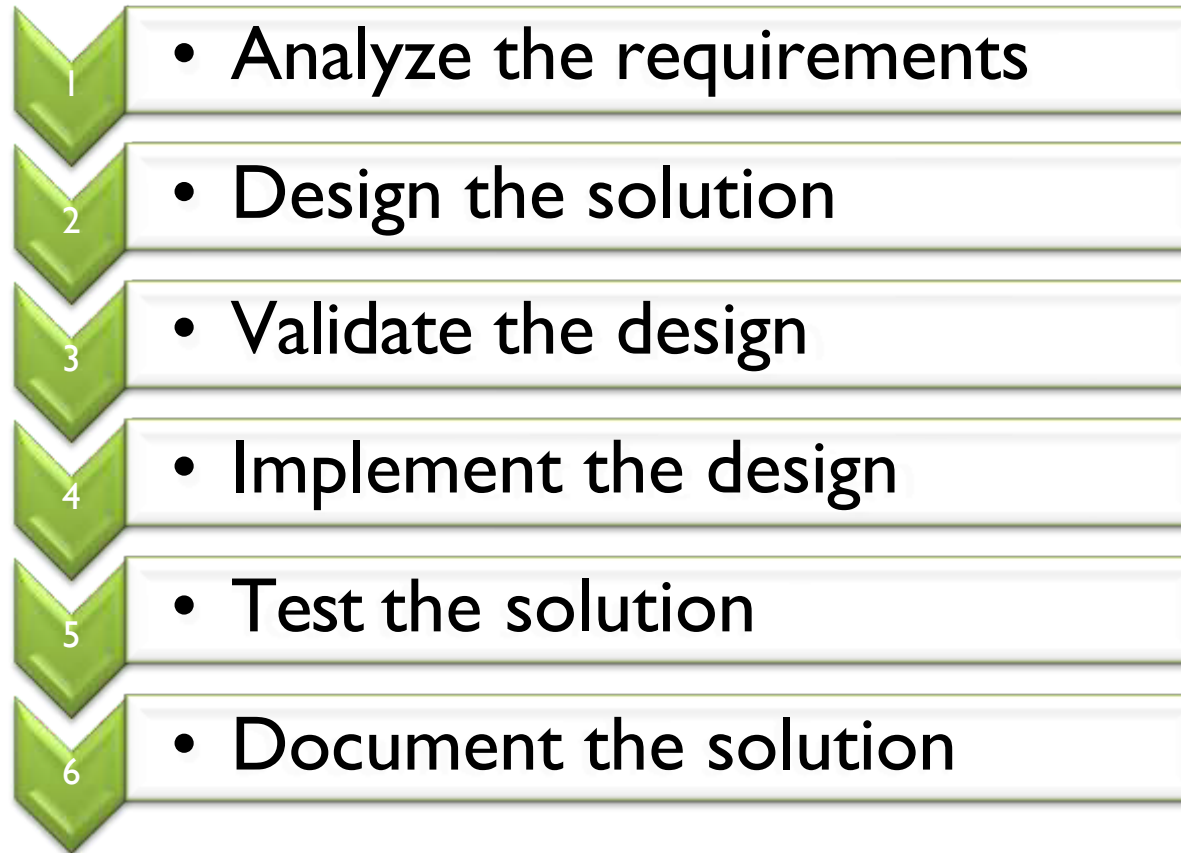
Implementation Phase

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



Implementation Phase

- The program development life cycle follows these steps:



Implementation Phase

- Various tests should be performed on the new system

Unit test	Systems test	Integration test	Acceptance test
<ul style="list-style-type: none">• Verifies that each individual program or object works by itself	<ul style="list-style-type: none">• Verifies that all programs in an application work together properly	<ul style="list-style-type: none">• Verifies that an application works with other applications	<ul style="list-style-type: none">• Checks the new system to ensure that it works with actual data

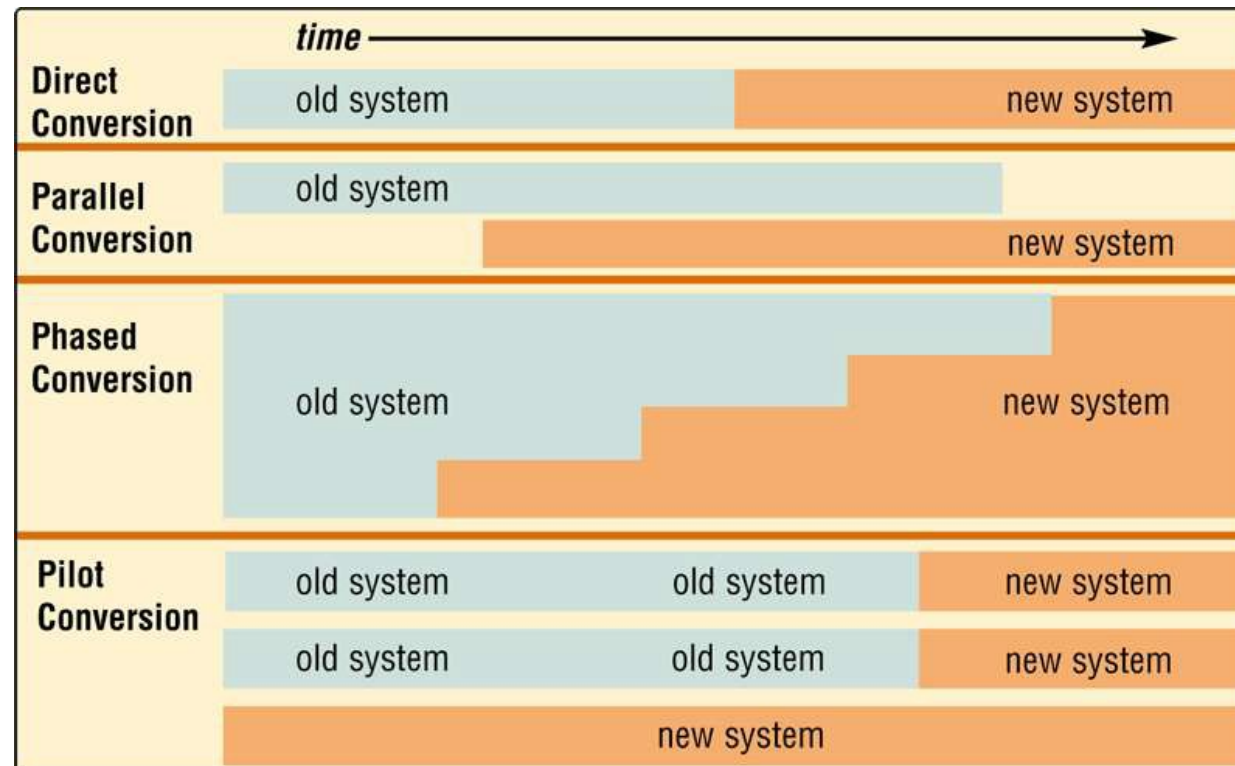
Implementation Phase

- **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

Agile Development

- Most current Systems Development Methodologies are based on Agile Development
- based on the idea that no one has a complete understanding of the system, not developers, users, designers, clients
- Plan needs to be able to deal with unanticipated challenges
 - be flexible
 - be agile