KSI - Pertemuan 8

Developing Business/IT Solutions

Learning Objectives

1. Use the systems development process outlined in this chapter and the model of IS components from Chapter 1 as problem-solving frameworks to help you propose information systems solutions to simple business problems.

2. Describe and give examples to illustrate how you might use each of the steps of the information systems development cycle to develop and implement a business information system.

Learning Objectives

3. Explain how prototyping can be used as an effective technique to improve the process of systems development for end users and IS specialists.

The Systems Approach

- A problem solving technique that uses a systems orientation to define problems and opportunities and develop appropriate and feasible solutions.
- Analyzing a problem and formulating a solution involves the following interrelated activities:
  1. Recognize and define a problem or opportunity using systems thinking
  2. Develop and evaluate alternative system solutions
  3. Select the system solution that best meets your requirements
  4. Design the selected system solution
  5. Implement and evaluate the success of the designed system

What is Systems Thinking?

- Seeing the forest *and* the trees in any situation by:
  - Seeing *interrelationships* among *systems* rather than linear cause-and-effect chains whenever events occur
  - Seeing *processes* of change among *systems* rather than discrete snapshots of change, whenever changes occur

- See the system in any situation:
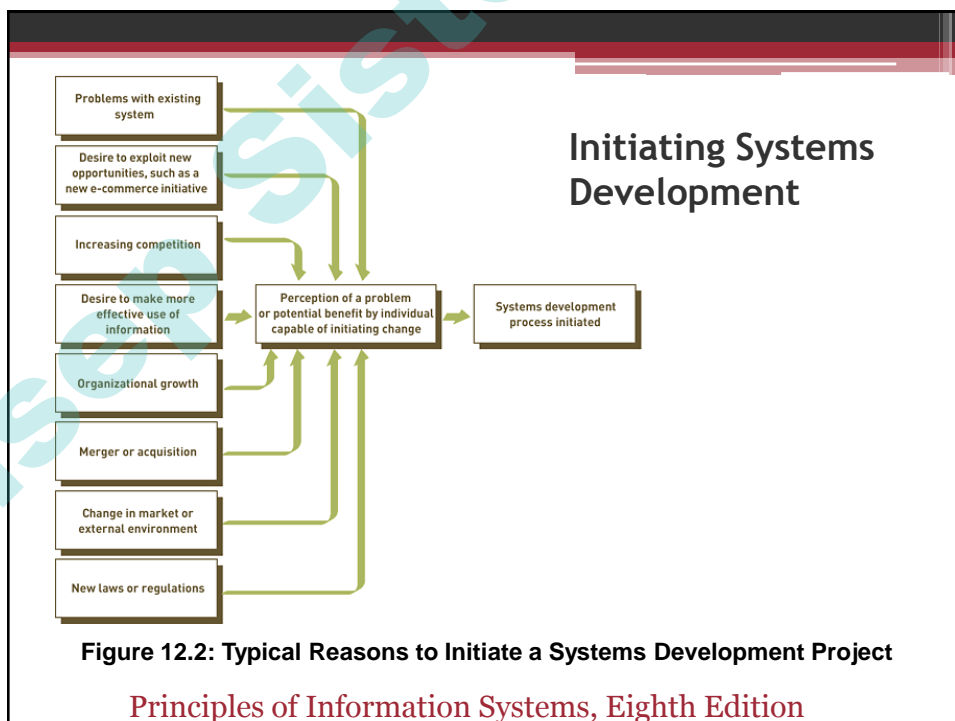 - Find the input, processing, output, feedback and control components

Systems Thinking Example
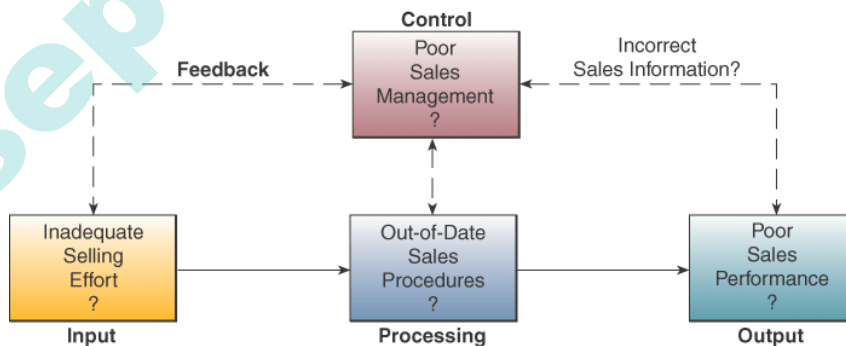
Initiating Systems Development

- Systems development initiatives
  - Arise from all levels of an organization
  - Can be planned or unplanned
- Number of reasons for initiating systems development projects
  - Infrastructure protection, mergers, acquisitions, federal regulations, etc.

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Initiating Systems Development

| Problems with existing system |
| Desire to exploit new opportunities, such as a new e-commerce initiative |
| Increasing competition |
| Desire to make more effective use of information |
| Organizational growth |
| Merger or acquisition |
| Change in market or external environment |
| New laws or regulations |

Perception of a problem or potential benefit by individual capable of initiating change → Systems development process initiated

Figure 12.2: Typical Reasons to Initiate a Systems Development Project

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Information Systems Planning and Aligning Corporate and IS Goals

- **Information systems planning:** translating strategic and organizational goals into systems development initiatives
- Aligning organizational goals and IS goals
  - Critical for successful systems development effort
- Developing a competitive advantage
  - Creative analysis
    - New approaches to existing problems
  - Critical analysis
    - Unbiased, careful questioning of relationship among system elements

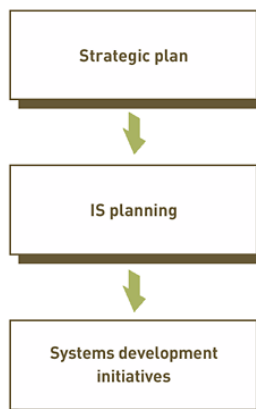## Information Systems Planning and Aligning Corporate and IS Goals

Figure 12.3: Information Systems Planning

Information Systems Planning and Aligning Corporate and IS Goals

```
Strategic plan
        │
        ▼
Develop overall objectives       Previously unplanned
        │                         systems projects
        │                              │
        └──────────┬───────────────────┘
                   ▼
            Identify IS projects
                   │
                   ▼
            Set priorities and
              select projects
                   │
                   ▼
            Analyze resource
              requirements
                   │
                   ▼
            Set schedules and
              deadlines
                   │
                   ▼
            Develop IS planning
                document
```
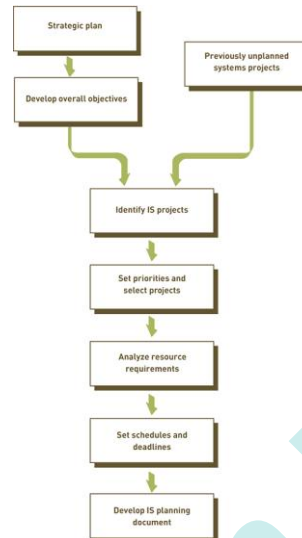
Figure 12.4: The Steps of IS Planning

Establishing Objectives for Systems Development

- Overall objective of systems development: achieve business goals, not technical goals
- **Mission-critical systems:** play pivotal role in organization's continued operations and goal attainment
- Goals defined for an organization also define objectives
- **Critical success factors (CSFs):** factors essential to success of a functional area of an organization

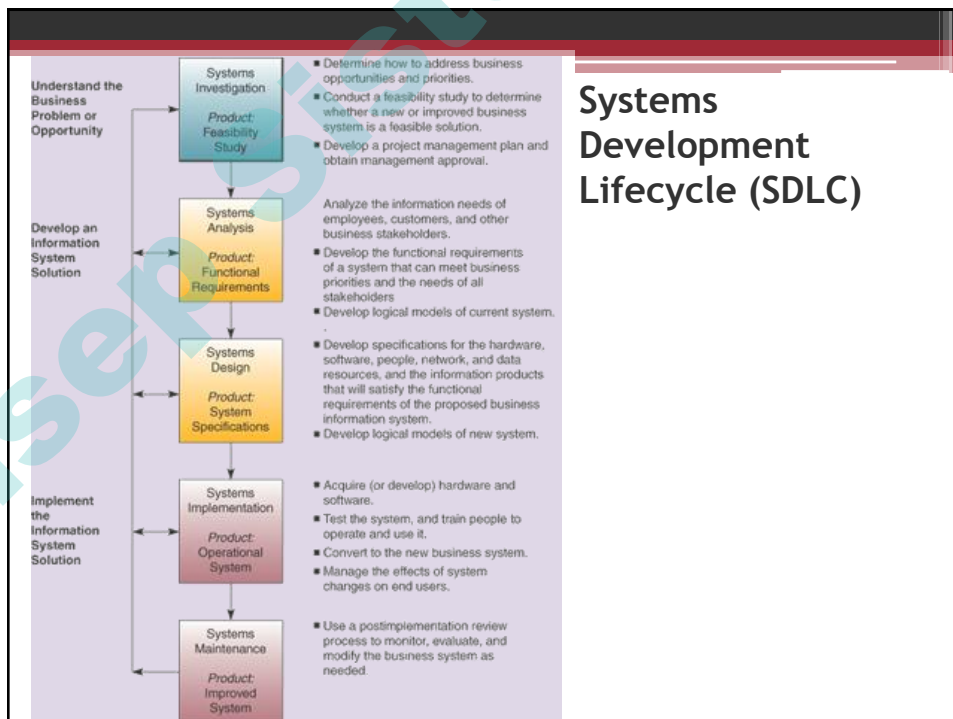## Establishing Objectives for Systems Development

- Performance objectives
  - Output quality or usefulness
  - Output accuracy
  - Output format quality or usefulness
  - Speed at which output is produced
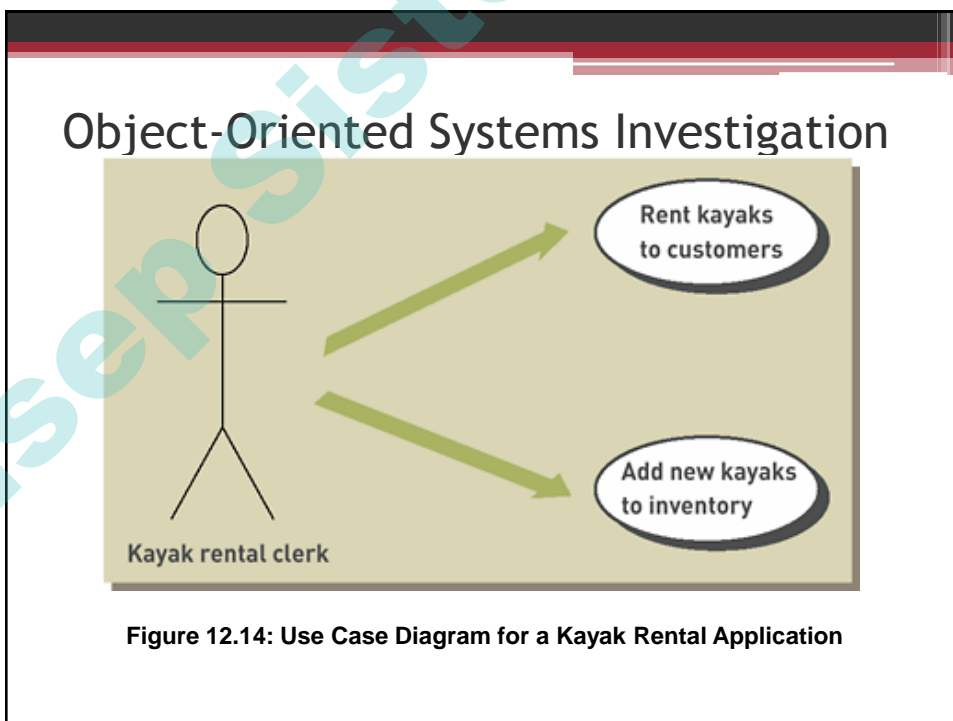 - Scalability of resulting system
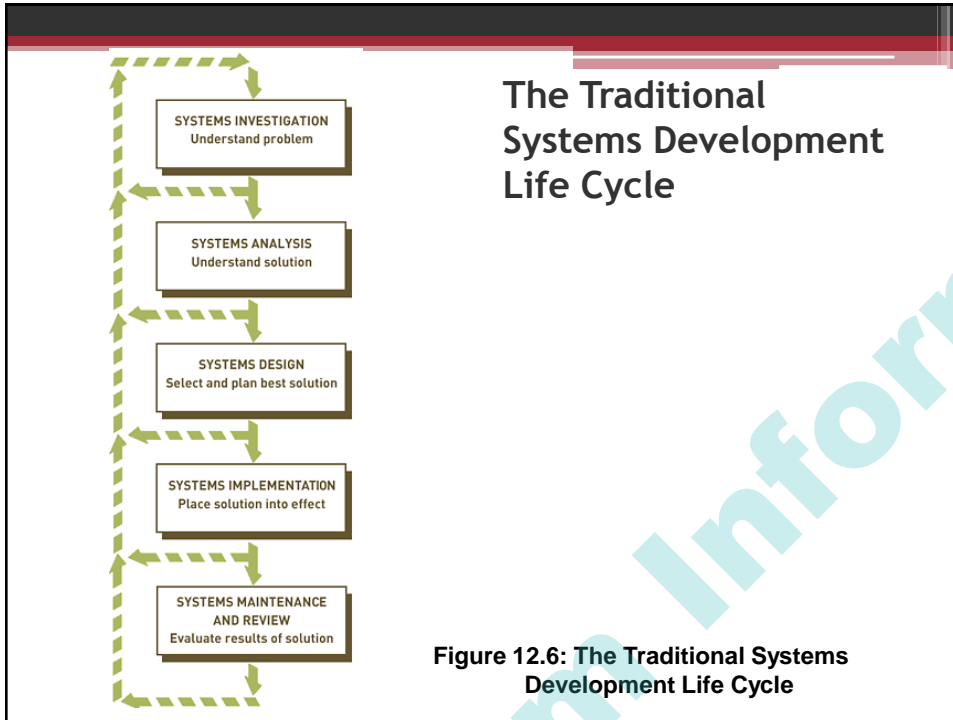 - Risk of the system

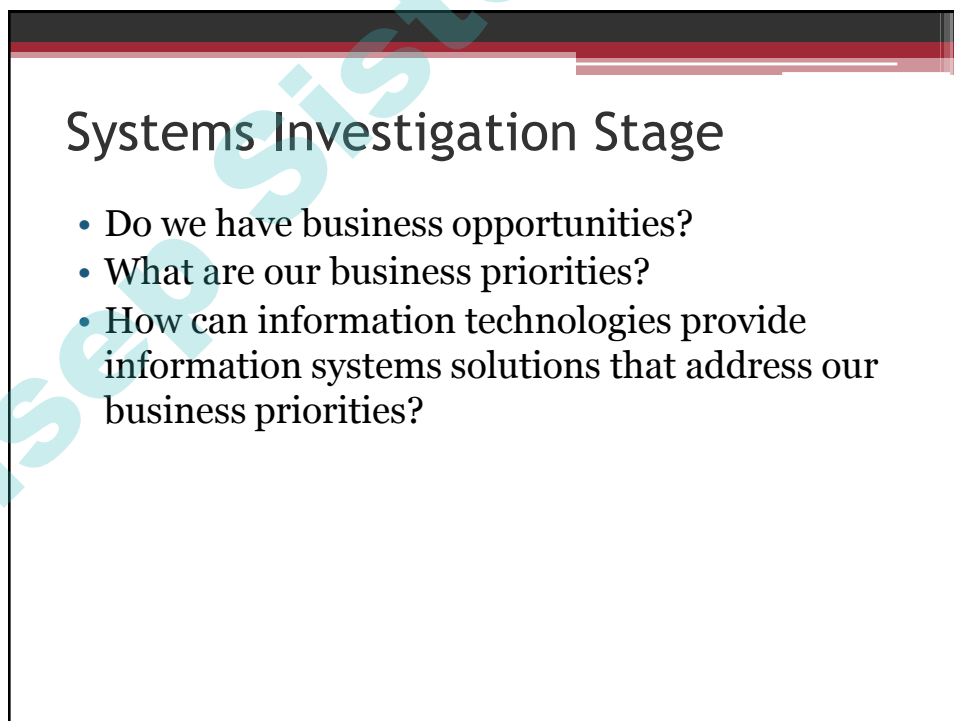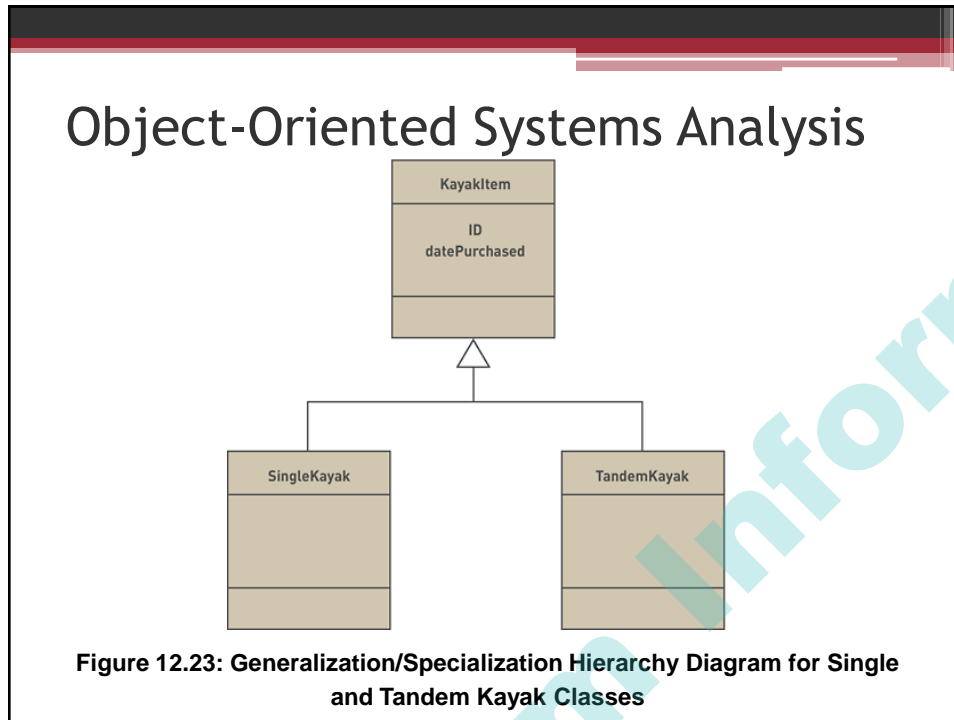## Establishing Objectives for Systems Development

- Cost objectives
  - Development costs
  - Costs of uniqueness of system application
  - Fixed investments in hardware and related equipment
  - Ongoing operating costs

Systems Analysis and Design

- SA & D
  - Overall process by which IS are designed and implemented within organizations
- Two most common approaches to SA & D
  - Object-oriented analysis and design
  - Systems Development Life Cycle

Systems Development Lifecycle (SDLC)

Stage	Product	Tasks
Understand the Business Problem or Opportunity	Systems Investigation — Product: Feasibility Study	■ Determine how to address business opportunities and priorities. ■ Conduct a feasibility study to determine whether a new or improved business system is a feasible solution. ■ Develop a project management plan and obtain management approval.
Develop an Information System Solution	Systems Analysis — Product: Functional Requirements	Analyze the information needs of employees, customers, and other business stakeholders. ■ Develop the functional requirements of a system that can meet business priorities and the needs of all stakeholders ■ Develop logical models of current system.
	Systems Design — Product: System Specifications	■ Develop specifications for the hardware, software, people, network, and data resources, and the information products that will satisfy the functional requirements of the proposed business information system. ■ Develop logical models of new system.
Implement the Information System Solution	Systems Implementation — Product: Operational System	■ Acquire (or develop) hardware and software. ■ Test the system, and train people to operate and use it. ■ Convert to the new business system. ■ Manage the effects of system changes on end users.
	Systems Maintenance — Product: Improved System	■ Use a postimplementation review process to monitor, evaluate, and modify the business system as needed.

The Traditional Systems Development Life Cycle

Figure 12.6: The Traditional Systems Development Life Cycle

Object-Oriented Systems Investigation

Figure 12.14: Use Case Diagram for a Kayak Rental Application

Object-Oriented Systems Analysis

```
        ┌──────────────────┐
        │     KayakItem     │
        ├──────────────────┤
        │        ID         │
        │  datePurchased    │
        ├──────────────────┤
        │                   │
        └──────────────────┘
                 △
        ┌────────┴────────┐
┌──────────────┐   ┌──────────────┐
│  SingleKayak  │   │  TandemKayak  │
├──────────────┤   ├──────────────┤
│               │   │               │
│               │   │               │
├──────────────┤   ├──────────────┤
│               │   │               │
└──────────────┘   └──────────────┘
```

Figure 12.23: Generalization/Specialization Hierarchy Diagram for Single and Tandem Kayak Classes

Systems Investigation Stage

- Do we have business opportunities?
- What are our business priorities?
- How can information technologies provide information systems solutions that address our business priorities?

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Feasibility Study

- A preliminary study where
  - the information needs of prospective users
  - the resource requirements, costs, benefits,
  - and feasibility of a proposed project
- are determined
- Macam-macam Studi Kelayakan
  - Operational Feasibility
  - Economic Feasibility
  - Technical Feasibility
  - Human Factors Feasibility
  - Legal/Political Feasibility

Operational Feasibility

- How well the proposed system
  - supports the business priorities of the organization.
  - solves the identified problem.
  - fits within the existing organizational structure.
- Schedule feasibility – can we solve the problem in a reasonable period

Economic Feasibility

- Assess:
  - Cost savings
  - Increased revenue
  - Decreased investment requirements
  - Increased profits
- Cost/benefit analysis

Cost/Benefit Analysis

- Costs versus Benefits
- Tangible costs and benefits can be quantified with a high degree of certainty
  - Example: decrease in operating costs
- Intangible costs and benefits are harder to estimate
  - Example: improved customer service

Technical Feasibility

- Determine if reliable hardware and software capable of meeting the needs of a proposed system can be acquired or developed by the business in the required time
  - Hardware
  - Software
  - Network

Human Factors Feasibility

- Assess
  - Employee, customer, supplier acceptance
  - Management support
  - The right people for the various new or revised roles

Legal/Political Feasibility

- Assess
  - Possible patent or copyright violations
  - Software licensing for developer side only
  - Governmental restrictions
  - Changes to existing reporting structure

Systems Analysis

- An in-depth study of end user information needs
- That produces functional requirements that are used as the basis for the design of a new information system
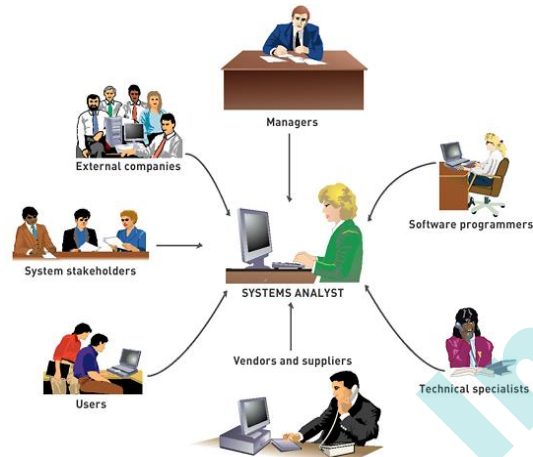
Participants in Systems Development

Figure 8.1: Role of the Systems Analyst

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Systems Analysis

- Detailed study of
  - The information needs of a company and end users.
  - The activities, resources, and products of one or more of the present information systems being used.
  - The information system capabilities required to meet information needs of users and stakeholders
- End users are important members of the development team

Organizational Analysis

- Study of the organization including:
  - Management Structure
  - People
  - Business Activities
  - Environmental Systems
  - Current Information Systems
    - Document input, processing, output, storage and control

Logical Analysis

- Construction of a logical model of the current system
- Logical model
  - A blueprint of what the current system does

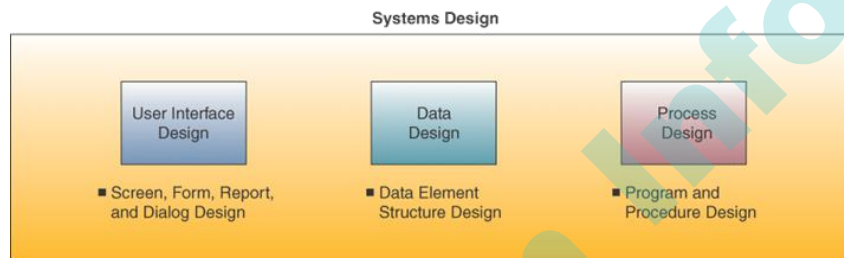## Functional Requirements Analysis and Determination

- Determine specific business information needs
  1. Determine what type of information each business activity requires.
  2. Determine the information processing each system activity is needed to meet these needs.

Functional Requirements

- End user information requirements that are not tied to the hardware, software, network, data, and people resources that end users presently use or might use in the new system
- *What* the system must do
- Functional Requirement categories
  - User Interface
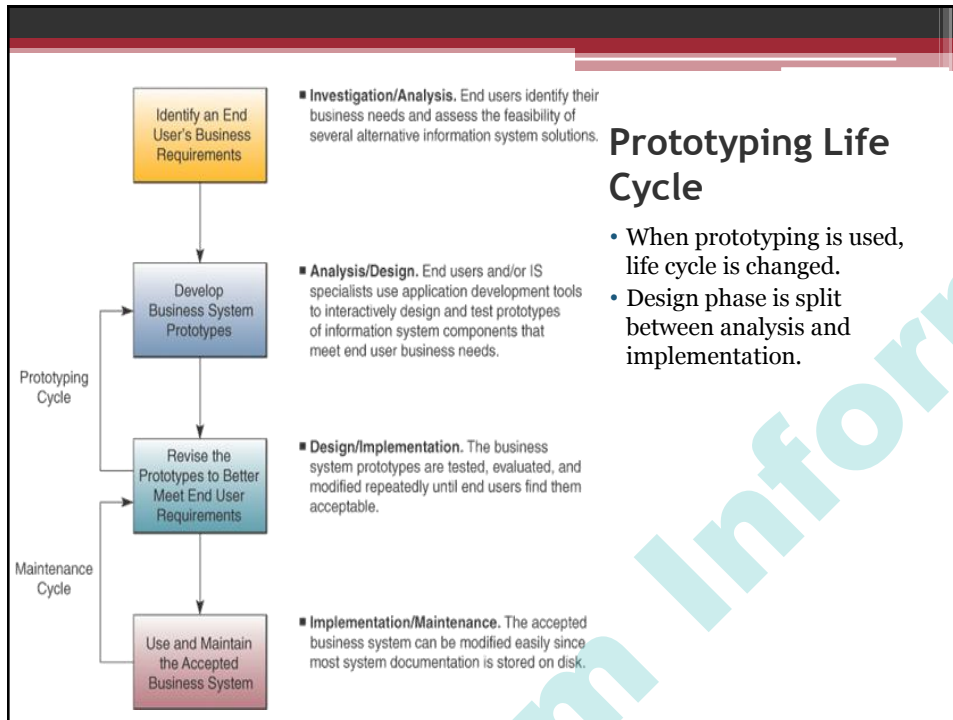 - Processing
  - Storage
  - Control

Systems Design

- Modify the logical model until it represents a blueprint for what the new system will do
- Physical design:
  - How the system will accomplish its objectives

Systems Design

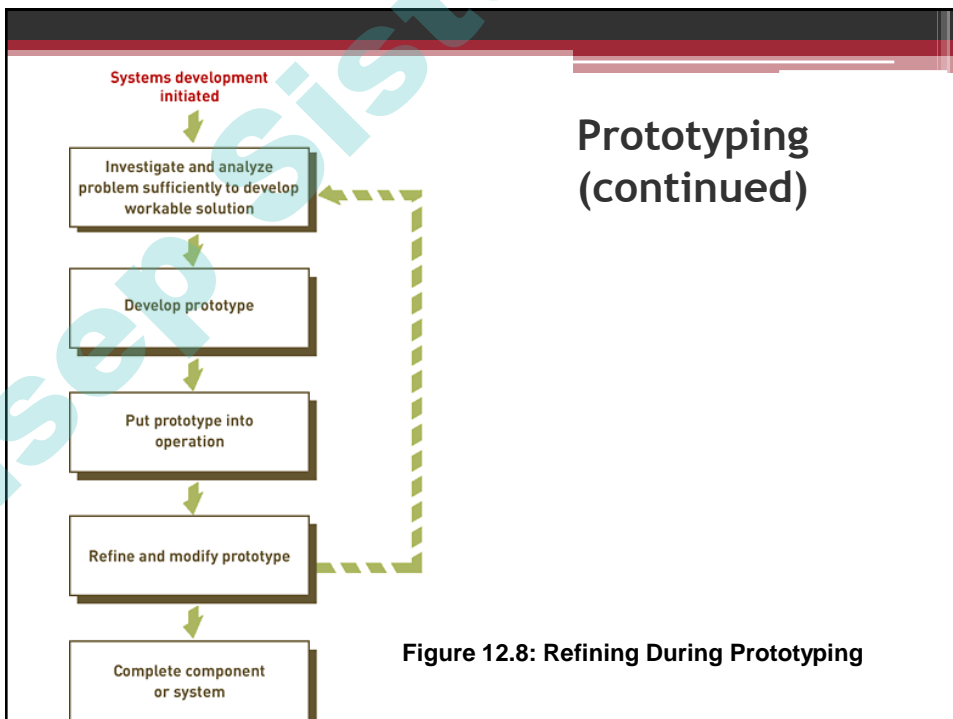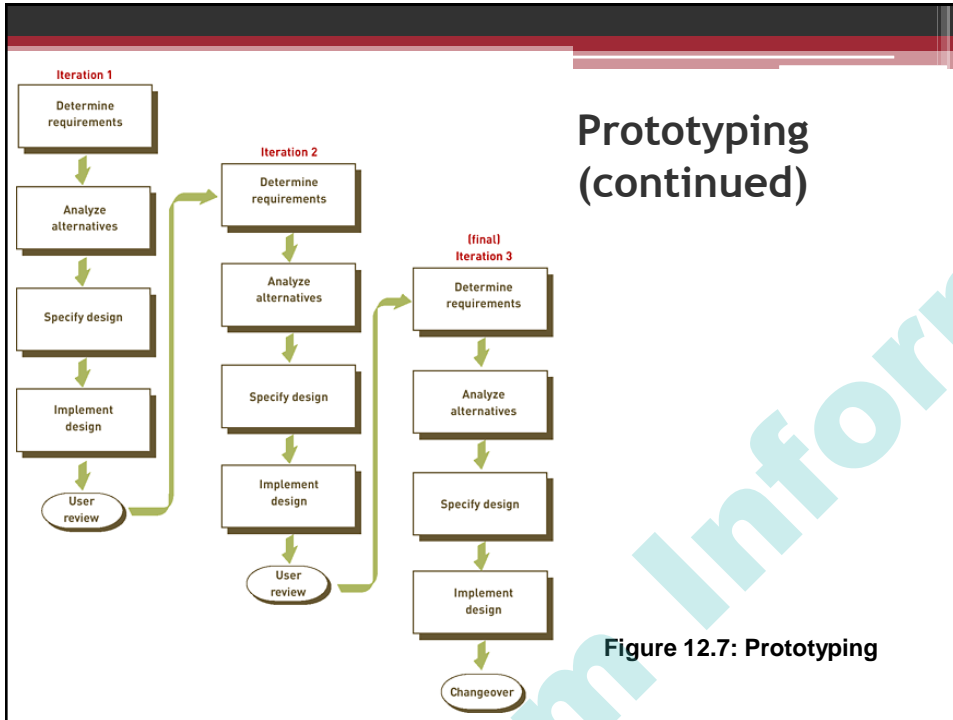| User Interface Design	Data Design	Process Design
■ Screen, Form, Report, and Dialog Design	■ Data Element Structure Design	■ Program and Procedure Design

Prototyping

- The rapid development and testing of working models
- Used in design phase
- Especially useful when end user requirements are hard to define

Prototyping Life Cycle

- When prototyping is used, life cycle is changed.
- Design phase is split between analysis and implementation.

Investigation/Analysis. End users identify their business needs and assess the feasibility of several alternative information system solutions.

Identify an End User's Business Requirements

Analysis/Design. End users and/or IS specialists use application development tools to interactively design and test prototypes of information system components that meet end user business needs.

Develop Business System Prototypes

Prototyping Cycle

Design/Implementation. The business system prototypes are tested, evaluated, and modified repeatedly until end users find them acceptable.

Revise the Prototypes to Better Meet End User Requirements

Maintenance Cycle

Implementation/Maintenance. The accepted business system can be modified easily since most system documentation is stored on disk.

Use and Maintain the Accepted Business System

Prototyping

- Can be used for small and large systems
  - But if system is large, usually prototype just parts
- Develop quickly
- Refine until acceptable

Prototyping (continued)

Figure 12.7: Prototyping

Iteration 1: Determine requirements → Analyze alternatives → Specify design → Implement design → User review

Iteration 2: Determine requirements → Analyze alternatives → Specify design → Implement design → User review

(final) Iteration 3: Determine requirements → Analyze alternatives → Specify design → Implement design → Changeover

Prototyping (continued)

Figure 12.8: Refining During Prototyping

Systems development initiated → Investigate and analyze problem sufficiently to develop workable solution → Develop prototype → Put prototype into operation → Refine and modify prototype → Complete component or system

User Interface Design

- Focuses on supporting the interactions between end users and their computer-based applications
- Frequently prototype the user interface

Checklist for Corporate Websites

- Remember the customer – successful websites are built solely for the customer, not to make company vice presidents happy
- Aesthetics – successful designs combine fast-loading graphics and simple color palettes for pages that are easy to read
- Broadband Content – the Web's coolest stuff can't be accessed by most Web surfers; don't make it the focus of a site

Checklist for Corporate Websites

- Easy to navigate – make sure it's easy to get from one part of site to another
- Searchability – make sure to have a useful search engine
- Incompatibilities – test site with target web browsers
- Registration forms – short registration forms are a useful way to gather customer data
- Dead links – be sure to keep links updated

System Specifications

- Formalize design of
  - User interface methods
  - Products
  - Database structures
  - Processing
  - Control procedures
- Specifications for hardware, software, network, data, and personnel
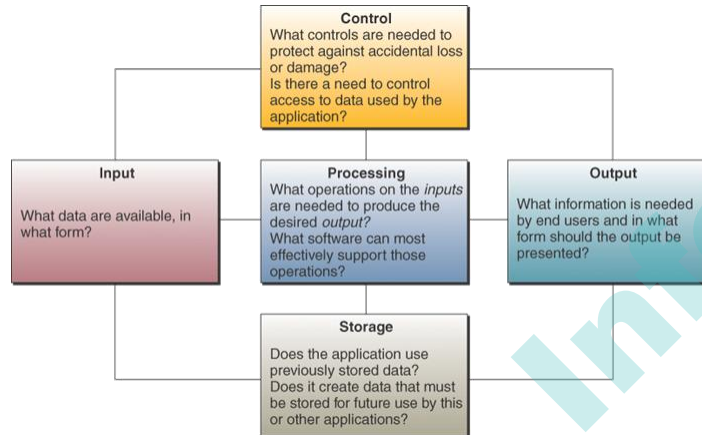
End User Development

- IS professional plays a consulting role
- End user does his/her own application development

- Contrast in traditional life cycle:
  - End user is customer
  - IS profession does development

The End-User Systems Development Life Cycle

- **End-user systems development:** primary effort is undertaken by a combination of business managers and users
- Can be structured as complementary to, rather than in conflict with, existing and emerging information systems

End User Development

Source: Adapted from James N. Morgan, *Application Cases in MIS*, 4th ed. (New York: Irwin/McGraw-Hill, 2002), p. 31.

Encouraging End User Web Development

- Look for tools that make sense
- Spur creativity
- Set some limits
- Give managers responsibility
- Make users comfortable

Systems Implementation

- Hardware and software acquisition
- Software development
- Testing of programs and procedures
- Conversion of data resources
- Conversion alternatives
- Education and training of end users and specialists who will operate a new system

Implementation Process