UNIVERSITY OF INFORMATION TECHNOLOGY

Faculty of Information Systems

Chapter 1

Introduction to Systems Analysis and Design

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LEARNING OBJECTIVES

1. Understand basic concepts of systems analysis and design.
2. Understand the need for systems analysis and design in organizations.
3. Realize what the many roles of the systems analyst are.
4. Comprehend the fundamentals of three development methodologies:
   a. Systems Development Life Cycle (SDLC)
   b. Object-oriented systems analysis and design
   c. The agile approach

CONTENT

1. Basic concepts
2. Types of information systems
3. Roles of system analyst
4. System development methods

BASIC CONCEPTS

Basic concept

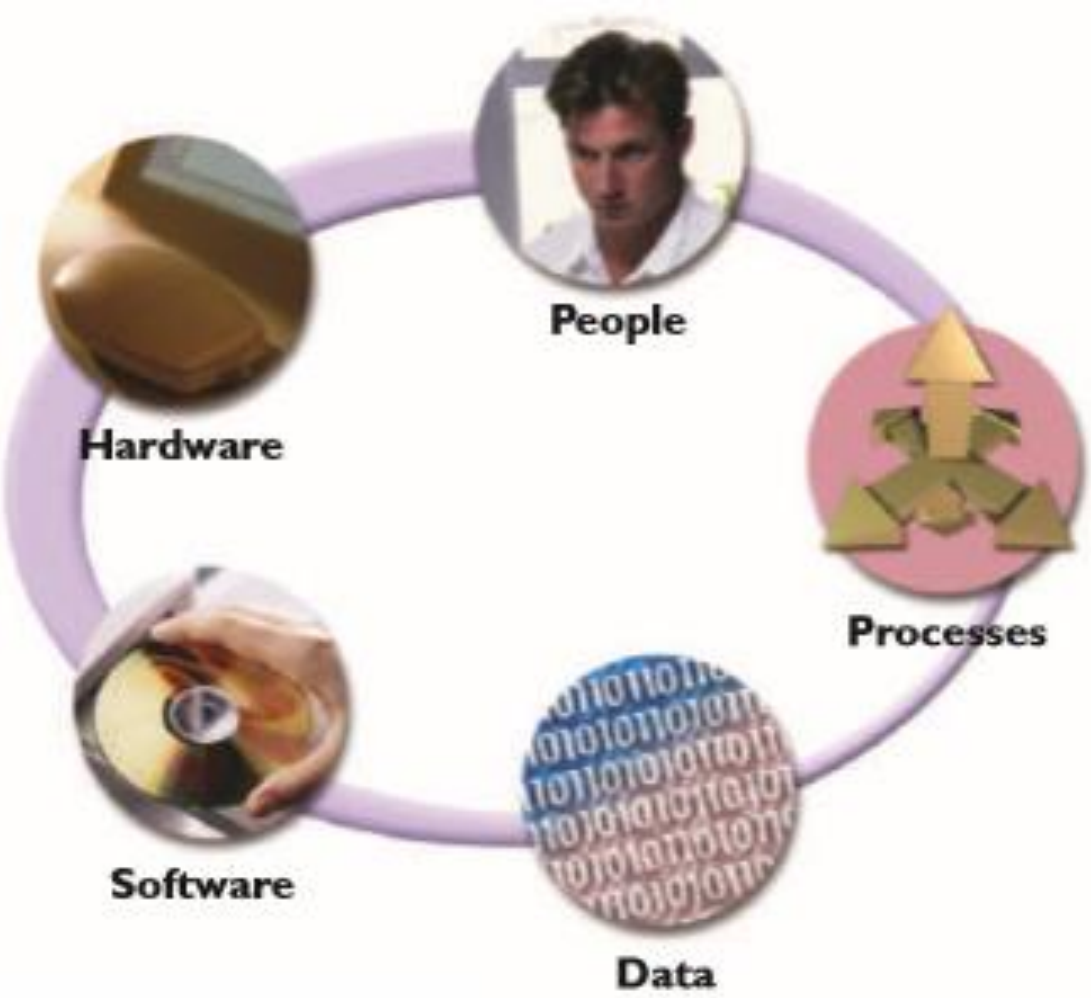
1. Information systems
2. Data, Process, Information, and Knowledge

Information System

- Information systems are combinations of hardware, software, and telecommunications networks that people build and use to collect, create, and distribute useful data, typically in organizational settings [*Information Systems Today - Managing in the Digital World*, fourth edition. Prentice-Hall, 2010]

Information System

- 5 key components of an Information system



Data, Process, Information, and Knowledge

- Process uses data to create meaningful information by calculation, comparison, and decision taken by computer
- Knowledge: hidden information from our data

Information—A Key Resource

- Fuels business and can be the critical factor in determining the success or failure of a business
- Needs to be managed correctly
- Managing computer-generated information differs from handling manually produced data

Some reasons to develop IS of an organization

1. Adding functions / services
2. Better performance: big database, old Information systems
3. More information
4. Better control
5. Use new technology
6. Reduce cost

TYPES OF INFORMATION SYSTEMS

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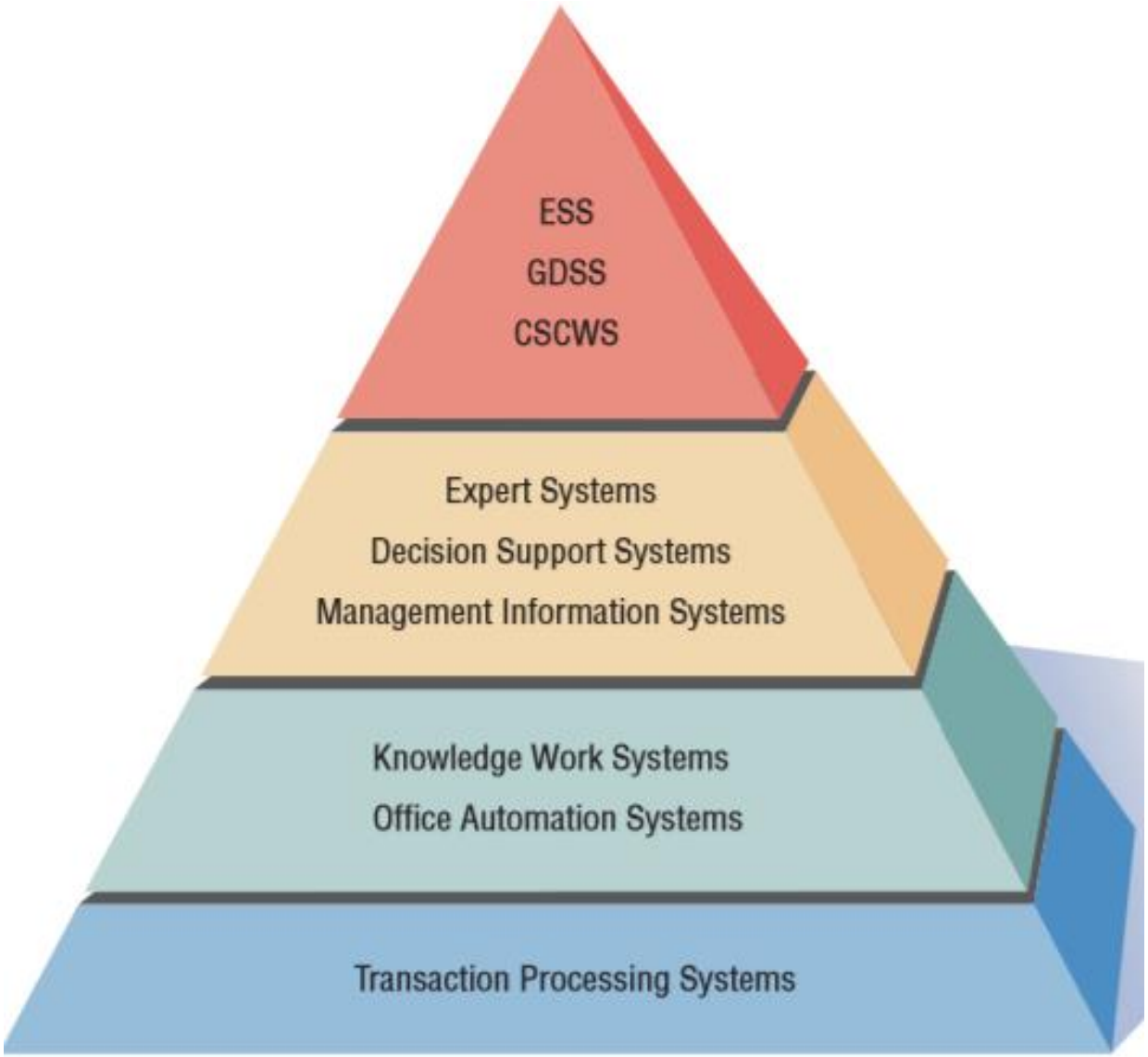


TYPES OF INFORMATION SYSTEMS

- Transaction Processing Systems (TPS)
- Office Automation Systems (OAS) and Knowledge Work Systems (KWS)
- Management Information Systems (MIS)
- Decision Support Systems (DSS)
- Artificial Intelligence and Expert Systems
- Group Decision Support Systems (GDSS) and Computer-Supported Collaborative Work Systems (CSCWS)
- Executive Support Systems (ESS)

ROLES OF SYSTEM ANALYST

Roles of the Systems Analyst

- The analyst must be able to work with people of all descriptions and be experienced in working with computers

Qualities of the Systems Analyst

- Problem solver
- Communicator
- Strong personal and professional ethics
- Self-disciplined and self-motivated

SYSTEM DEVELOPMENT METHODOLOGIES

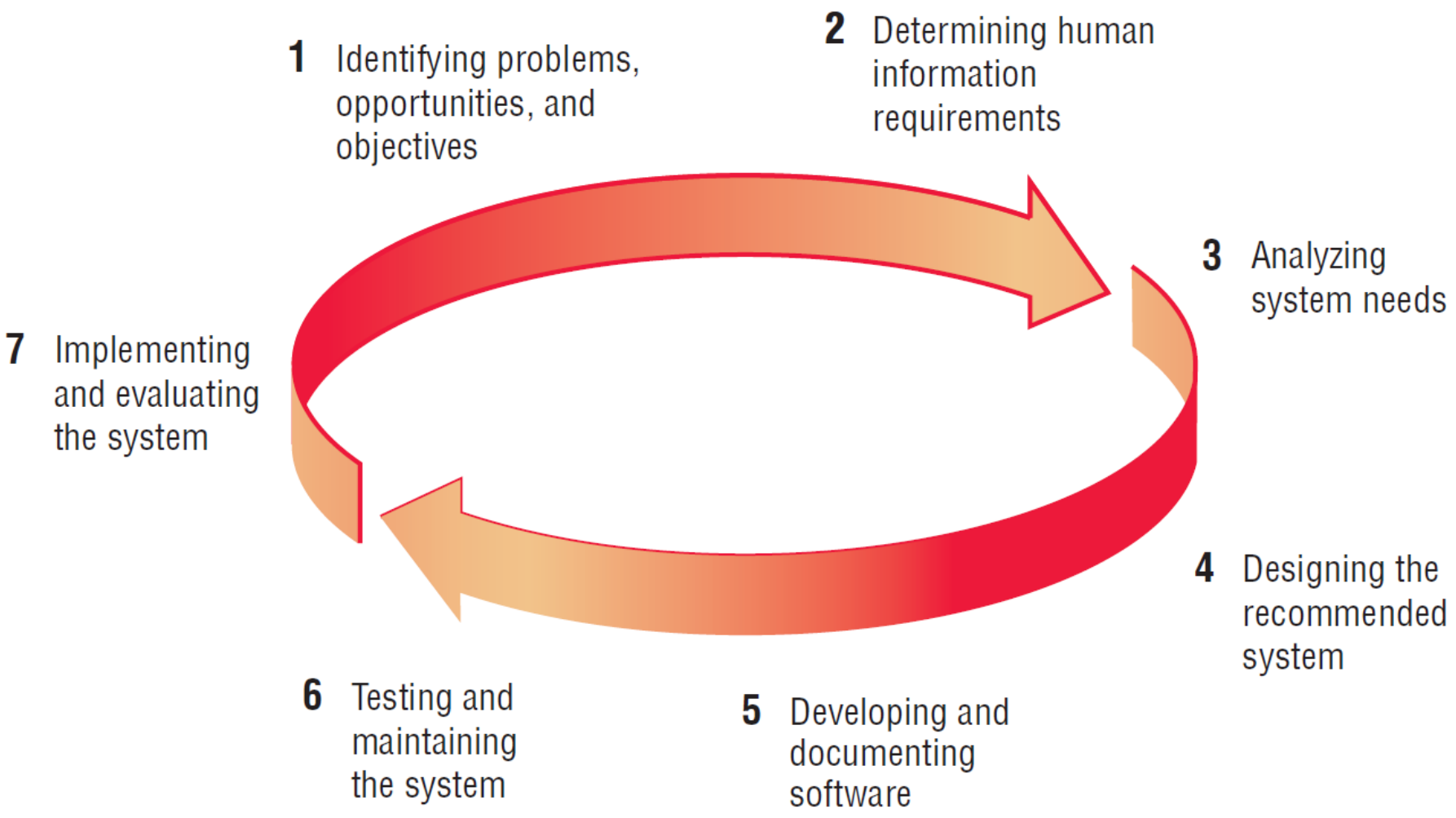
System development methods

1. Systems Development Life Cycle (SDLC)
2. Object-oriented systems analysis and design
3. The agile approach

Systems Development Life Cycle (SDLC)

- The systems development life cycle is a phased approach to solving business problems
- Developed through the use of a specific cycle of analyst and user activities

The Seven Phases of the Systems Development Life Cycle (Figure 1.1)



Systems Development Life Cycle

1. Identifying Problems, Opportunities, and Objectives
2. Determining Human Information Requirements
3. Analyzing System Needs
4. Designing the Recommended System
5. Developing and Documenting Software
6. Testing and Maintaining the System
7. Implementing and Evaluating the System

1. Identifying Problems, Opportunities, and Objectives

- Activity:
  - Interviewing user management
  - Summarizing the knowledge obtained
  - Estimating the scope of the project
  - Documenting the results
- Output:
  - Feasibility report containing problem definition and objective summaries from which management can make a decision on whether to proceed with the proposed project

2. Determining Human Information Requirements

- Activity:
  - Interviewing
  - Sampling and investing hard data
  - Questionnaires
  - Observe the decision maker's behavior and environment
  - Prototyping
  - Learn the who, what, where, when, how, and why of the current system

2. Determining Human Information Requirements

- Output:
  - The analyst understands how users accomplish their work when interacting with a computer
  - Begin to know how to make the new system more useful and usable
  - Know the business functions
  - Have complete information on the: People, Goals, Data, and Procedure involved

3. Analyzing System Needs

- Activity:
  - Create data flow, activity, or sequence diagrams
  - Complete the data dictionary
  - Analyze the structured decisions made
  - Prepare and present the system proposal
- Output:
  - Recommendation on what, if anything, should be done

4. Designing the Recommended System

- Activity:
  - Design procedures for data entry
  - Design the human-computer interface
  - Design system controls
  - Design database and/or files
  - Design backup procedures
- Output
  - Model of the actual system

5. Developing and Documenting Software

- Activity:
  - System analyst works with programmers to develop software
  - Works with users to develop effective documentation
  - Programmers design, code, and remove syntactical errors from computer programs
  - Document software with help files, procedure manuals, and Web sites with Frequently Asked Questions
- Output:
  - Computer programs
  - System documentation

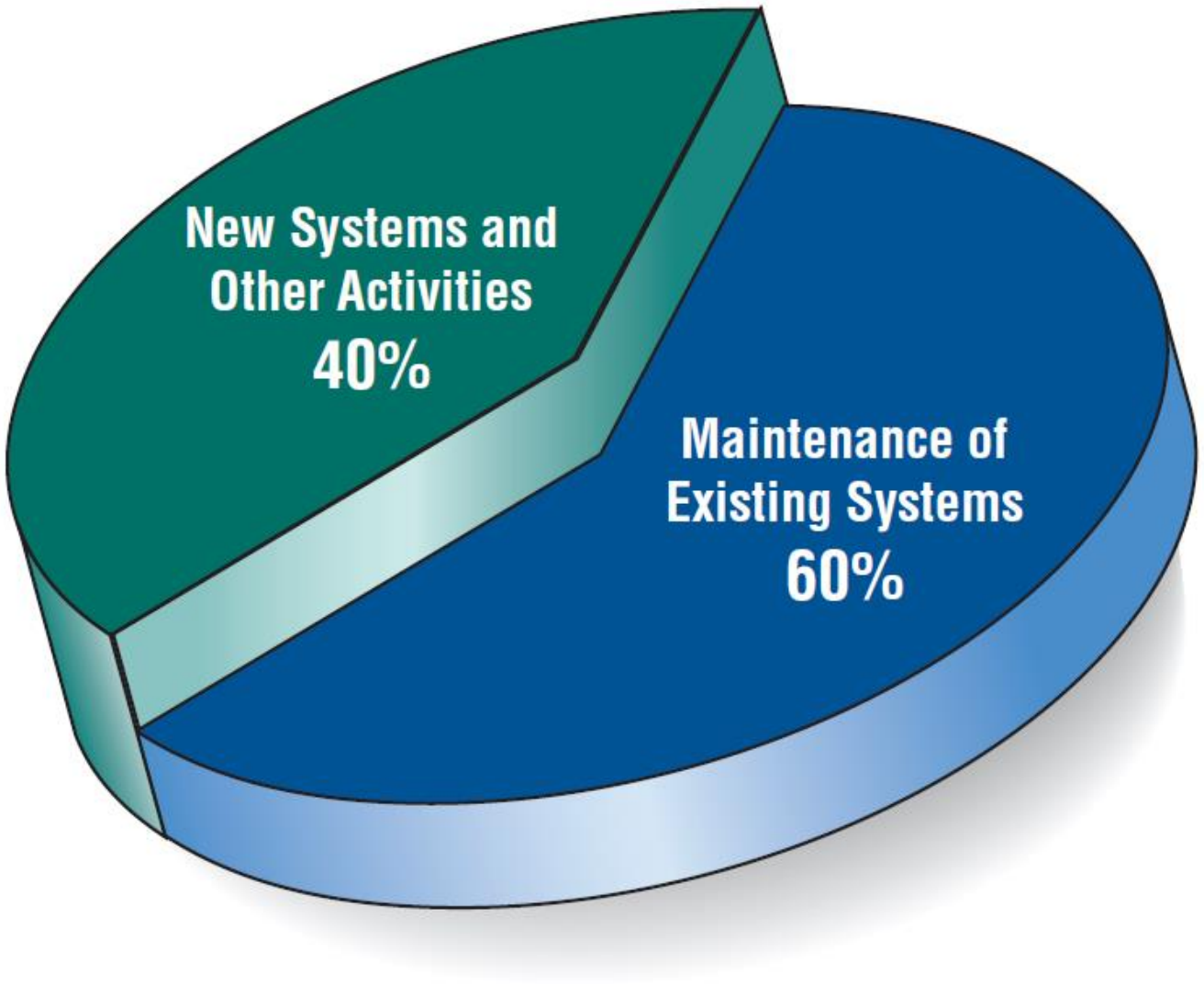
6. Testing and Maintaining the System

- Activity:
  - Test the information system
  - System maintenance
  - Maintenance documentation
- Output:
  - Problems, if any
  - Updated programs
  - Documentation

7. Implementing and Evaluating the System

- Activity:
  - Train users
  - Analyst plans smooth conversion from old system to new system
  - Review and evaluate system
- Output:
  - Trained personnel
  - Installed system

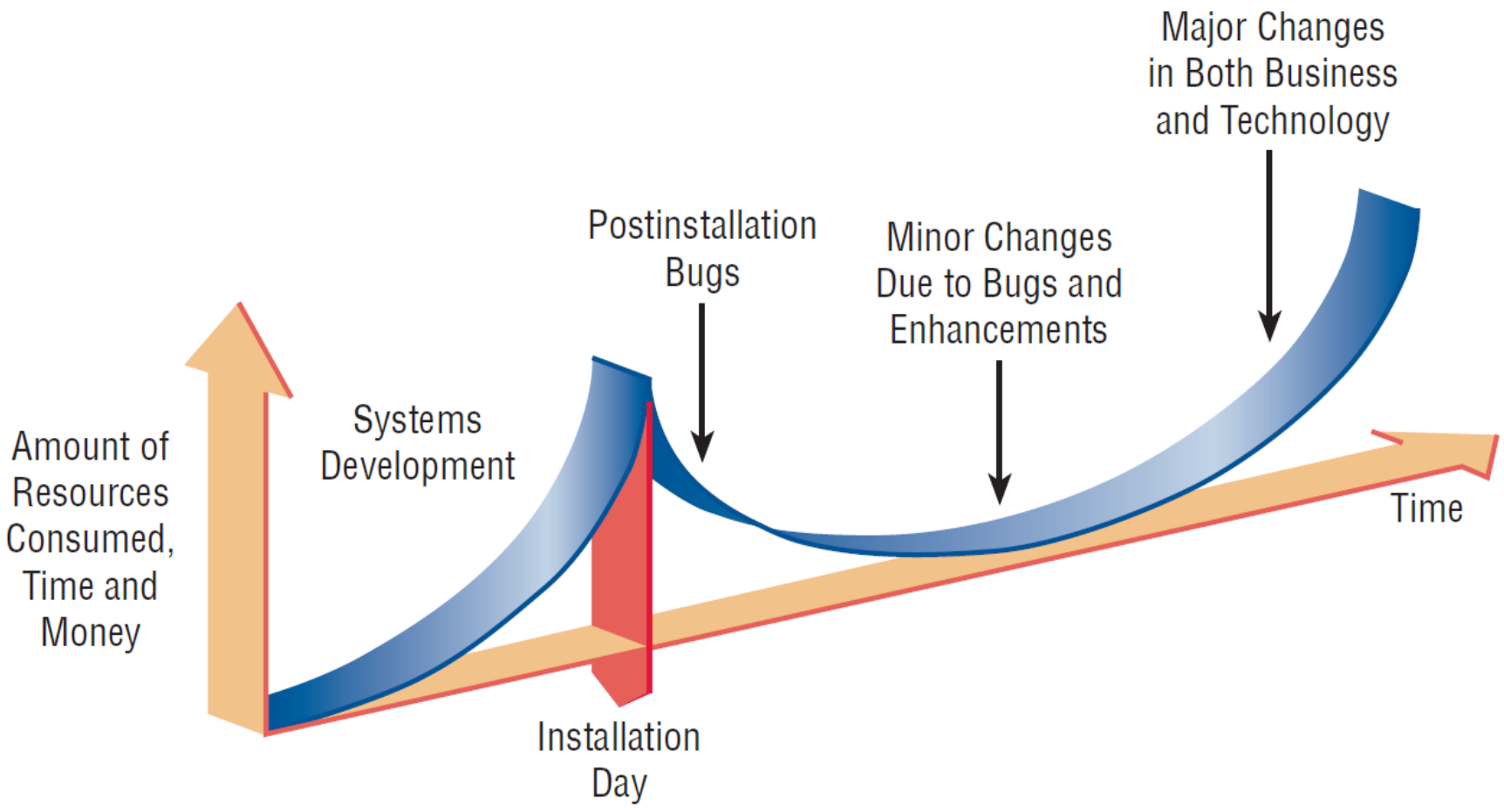
Some Researchers Estimate that the Amount of Time Spent on Systems Maintenance May Be as Much as 60 Percent of the Total Time Spent on Systems Projects (Figure 1.2)



The Impact of Maintenance

- Maintenance is performed for two reasons:
  - Removing software errors
  - Enhancing existing software
- Over time the cost of continued maintenance will be greater than that of creating an entirely new system. At that point it becomes more feasible to perform a new systems study.

Resource Consumption over the System Life (Figure 1.3)



Object-Oriented (O-O) Systems Analysis and Design

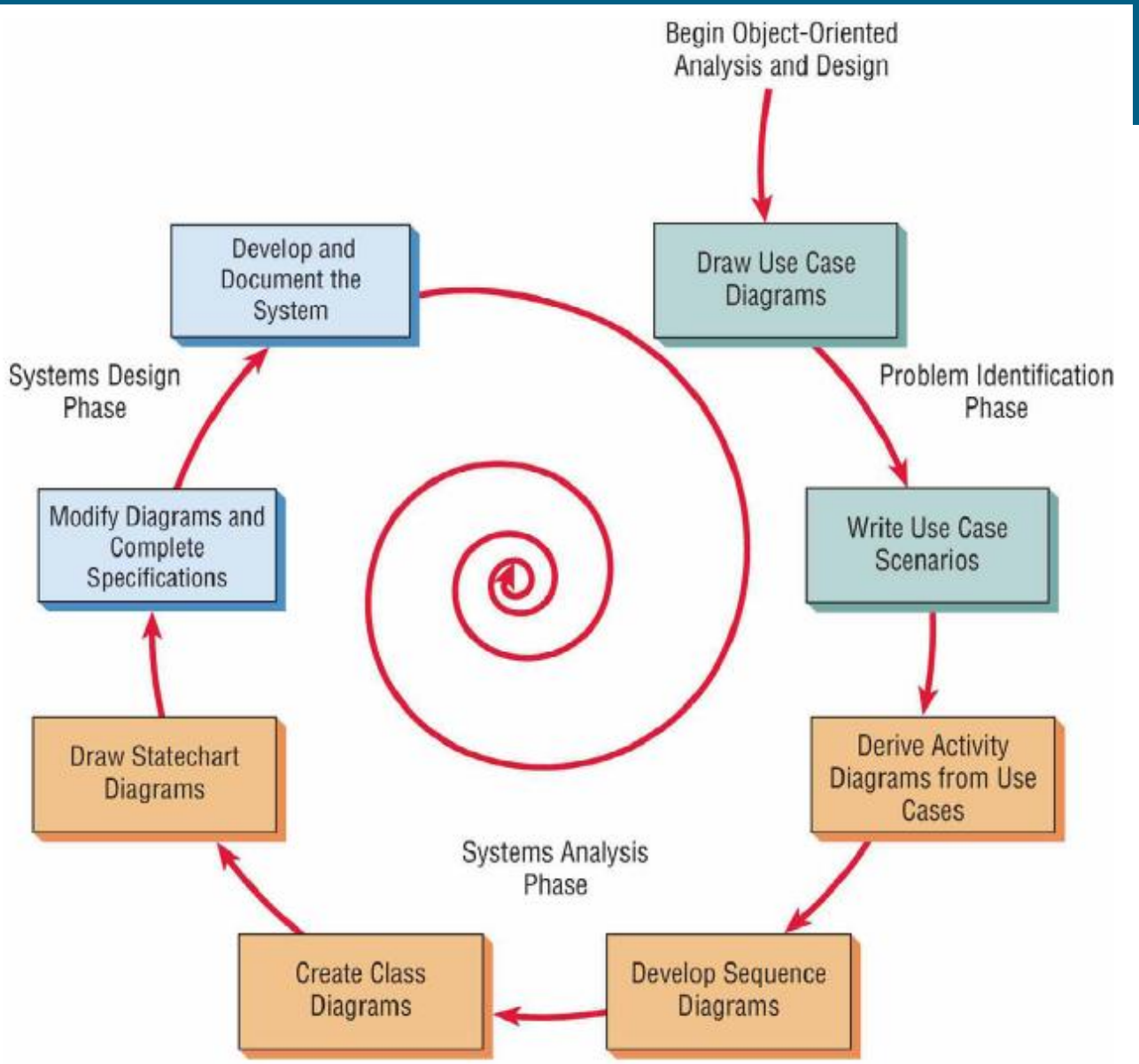
- Alternate approach to the structured approach of the SDLC that is intended to facilitate the development of systems that change rapidly in response to dynamic business environments
- Analysis is performed on a small part of the system followed by design and implementation

Object-Oriented (O-O) Systems Analysis and Design

- The cycle repeats with analysis, design, and implementation of the next part and this repeats until the project is complete
- Examines the objects of a system

Unified Modeling Language (UML) Phases

- Define the use case model:
  - Use case diagram
  - Use case scenarios
- Create UML diagrams
- Develop class diagrams
- Draw statechart diagrams
- Modify the UML diagrams
- Develop and document the system


Begin Object-Oriented Analysis and Design
Draw Use Case Diagrams
Problem Identification Phase
Write Use Case Scenarios
Derive Activity Diagrams from Use Cases
Develop Sequence Diagrams
Create Class Diagrams
Draw Statechart Diagrams
Modify Diagrams and Complete Specifications
Systems Design Phase
Develop and Document the System
Systems Analysis Phase

The Agile Approach

- Agile manifesto, 2001
  - Individuals and interactions over processes and tools
  - Working software over comprehensive documentation
  - Customer collaboration over contract negotiation
  - Responding to change over following a plan

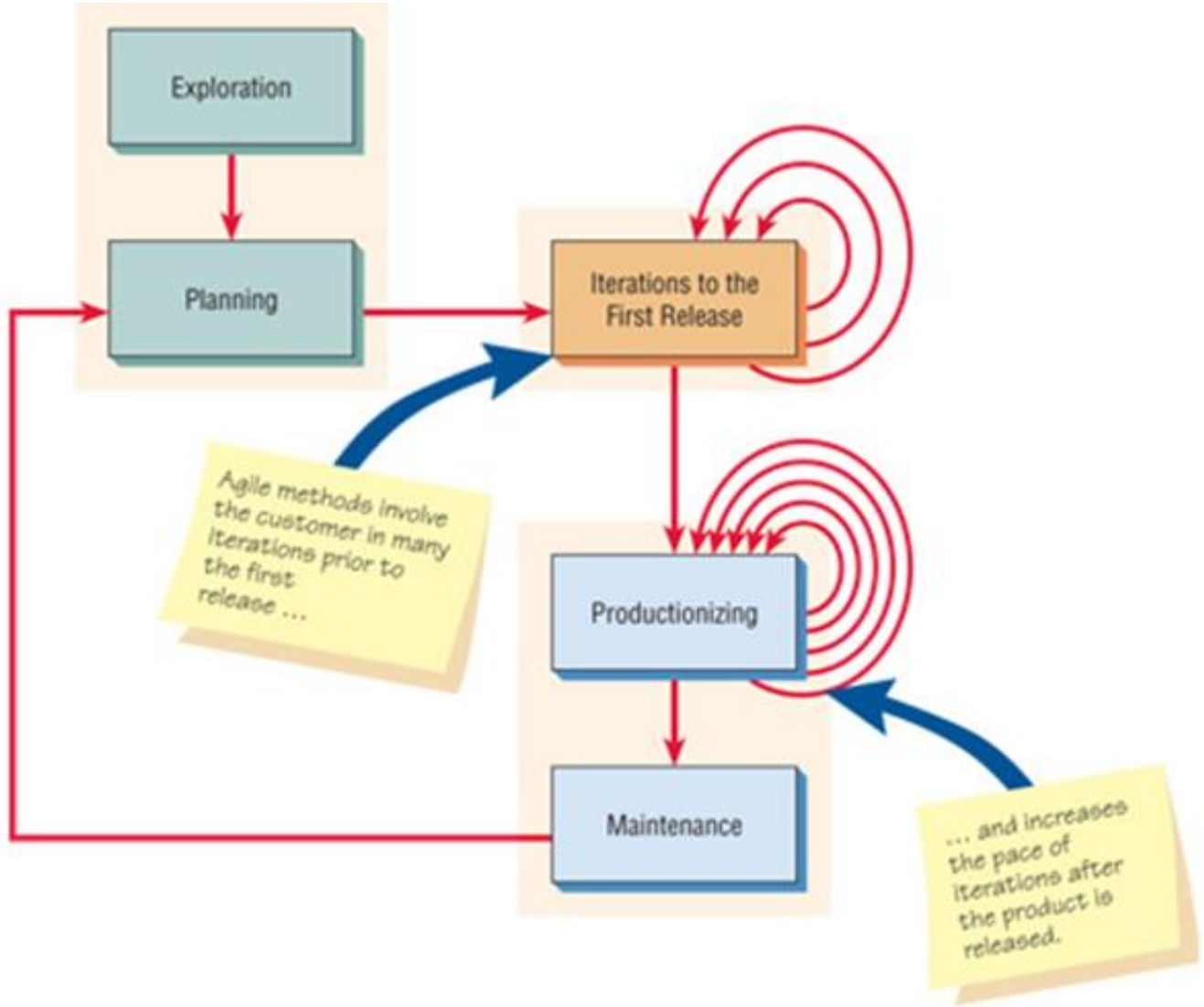
Four Agile Resources

- Resources are adjusted to ensure successful project completion
  - Time
  - Cost
  - Quality
  - Scope

Five Stages of Agile Development

- Exploration
- Planning
- Iterations to the first release
- Productionizing
- Maintenance

Agile Project Development Process (Figure 1.5)



Some methods of Agile Development

- Scrum
- Kanban
- XP-Extreme Programming
- …

Agile Project Development Process

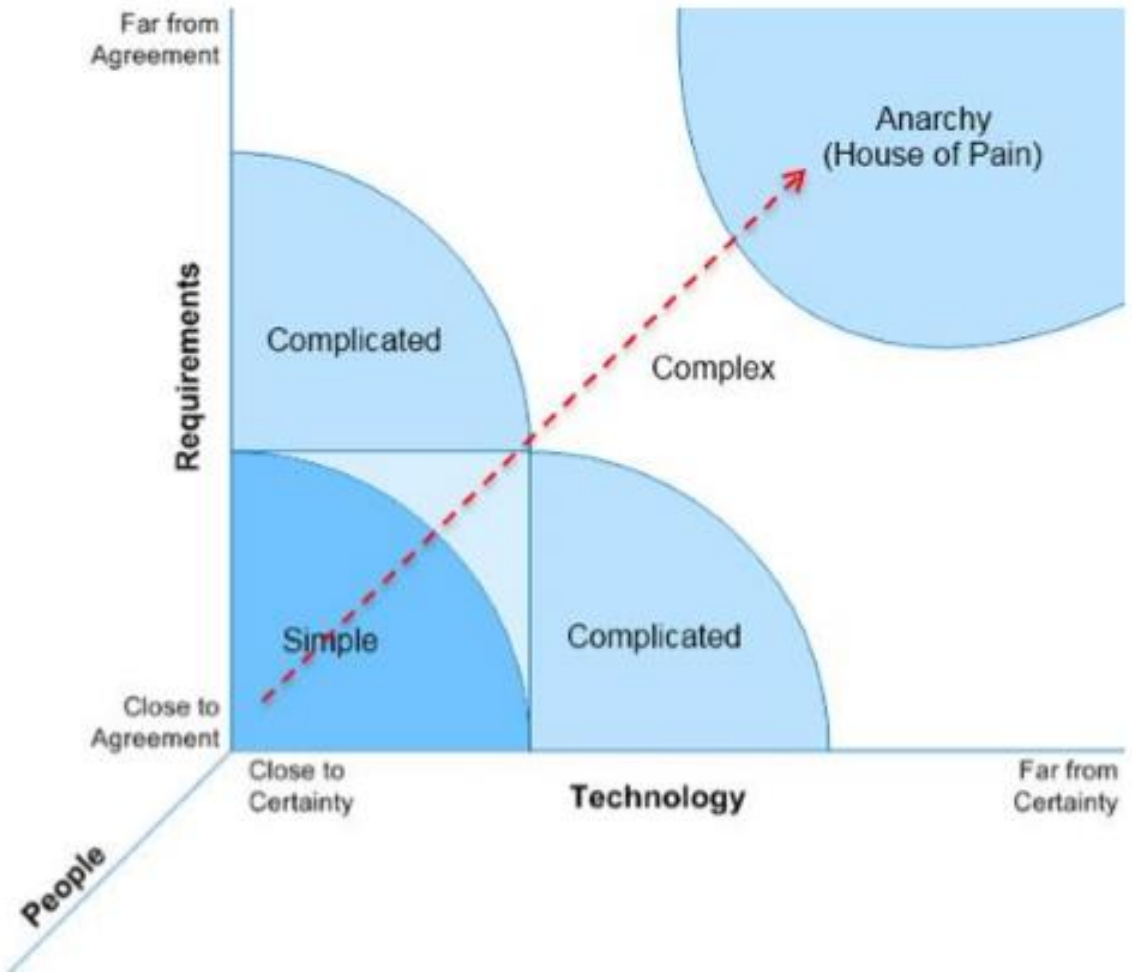
- Brief explanation of agile: https://www.youtube.com/watch?v=Tj-lavaMkxU

Choosing a Method

- Choose either:
  - SDLC
  - Agile
  - Object-oriented methodologies

Choosing a Method

- Stacey matric



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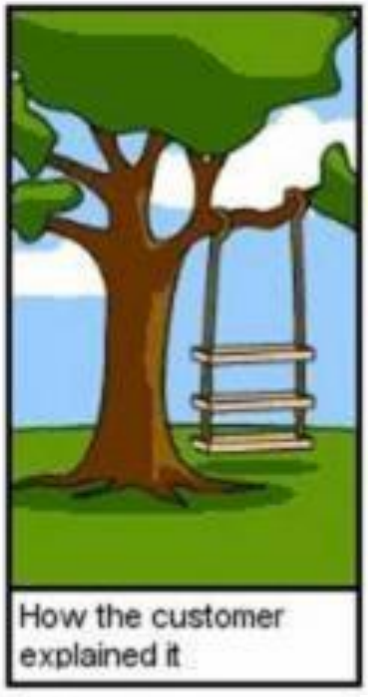
How the customer explained it


QUESTIONS
ANSWERS