SWA261

The Analysis Phase:
# Requirements Determination

Outcomes

Students should understand the following outcomes, upon successful completion of this module:

- Explain the Analysis Phase of the SDLC.
- Describe the requirements definition.
- Classify requirements correctly as business, user, functional, or nonfunctional requirements.
- Employ the requirement elicitation techniques of interviews, JAD sessions, questionnaires, document analysis, and observation.
- Define the role that each requirement elicitation technique plays in determining requirements.
- Describe several analysis strategies that can help the analyst discover requirements.

Introduction

The *Analysis Phase* comes in-between the Planning and the Design phases of the SDLC.

During the analysis phase, the analyst determines the *functional requirements* for the new system.
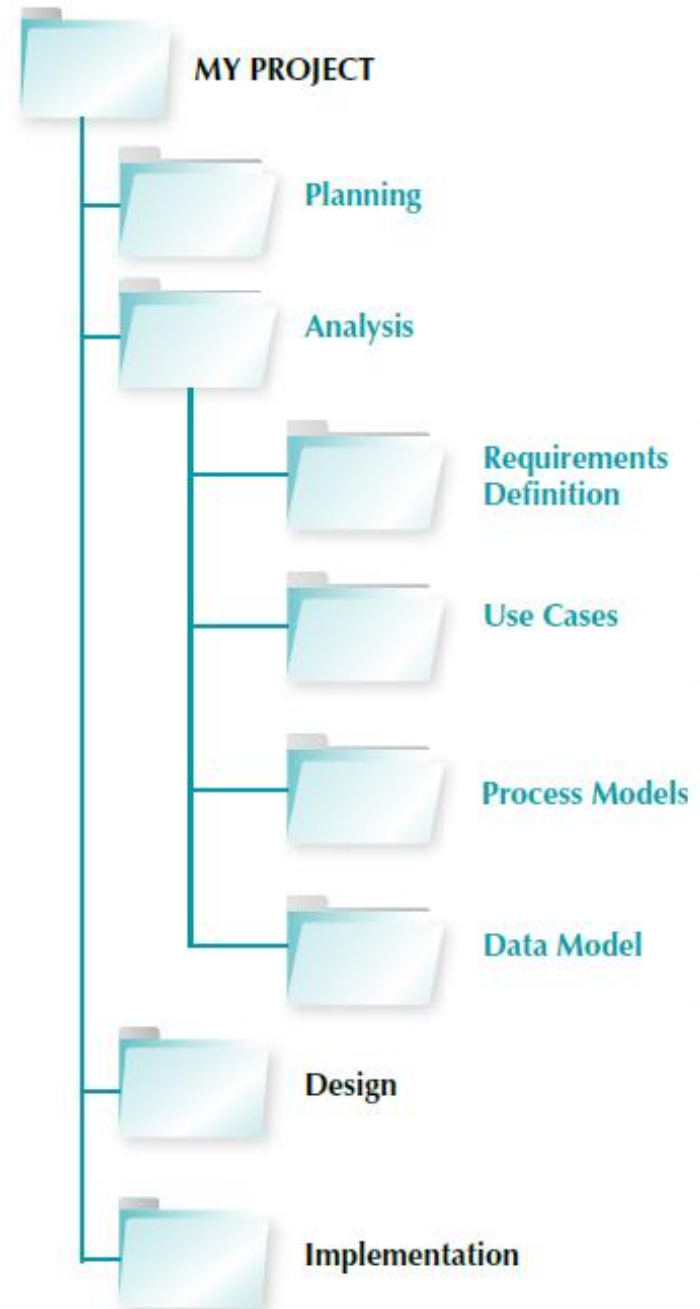
Defining the Analysis Phase

The *Analysis Phase* is used by the project team to answer the questions of:

1. *who* will use the system,
2. *what* the system will do, and,
3. *where* & *when* it will be used

The term analysis refers to breaking a whole into its parts with the intent of understanding the parts' nature, function, and interrelationships.

During this phase, the project team will learn about the system, and the deliverables after the analysis phase will be:

a) *Requirements Specification document*
b) *Use Case Analysis (through Use Case diagrams)*
c) *Process Modelling (through Data Flow diagrams)*
d) *Data Modelling (through Entity Relationship Diagrams)*

The Analysis Phase

SDLC is the process by which the organization moves from the current system (called as-is system) to the new system (called the to-be system).

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AS-IS ➡ PROCESS ➡ TO-BE
         SDLC
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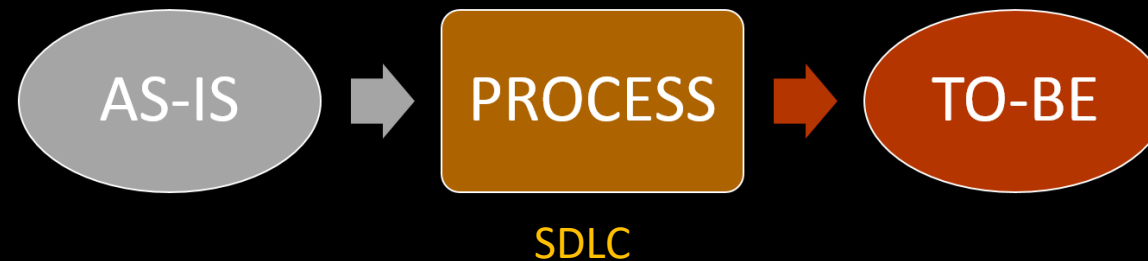
In the analysis phase, the systems analyst works extensively with the business users of the new system to understand their needs from the new system.

The basic process of analysis involves three steps:

- Understand the existing situation (the as-is system).
- Identify improvements.
- Define requirements for the new system (the to-be system).

Requirements Determination

What is a Requirement?

A requirement is simply a statement of what the system *must do* or what characteristic it must have.

During *analysis*, requirements are written from the perspective of the business person, and they focus on the "*what*" of the system.

During a systems development project, requirements are created that provide different perspectives.

For example, we may describe:

- what the business needs (*business requirements*);
- what the users need to do (*user requirements*);
- what the software should do (*functional requirements*);
- characteristics the system should have (*nonfunctional requirements*); and,
- how the system should be built (*system requirements*).

Types of Requirements

1. *Business Requirements:*

These are high-level objectives or needs of the organization that the project aims to address. They are expressed in non-technical terms and focus on the business goals. Business requirements serve as the foundation for the project and guide the development process.

2. *User Requirements:*

These are specific needs and expectations of the end users or stakeholders who will interact with the system. They provide detailed descriptions of what users need the system to do in order to accomplish their tasks effectively. User requirements help ensure that the system meets the usability and functionality expectations of its intended users.

Types of Requirements

3. Functional Requirements:

These describe the specific functions or capabilities that the system must perform to meet the business and user requirements. Functional requirements define what the system should do in terms of inputs, processes, and outputs. They are often detailed in use cases, user stories, or functional specifications.

4. Nonfunctional Requirements:

These specify the quality attributes or constraints that the system must satisfy, beyond its core functionality. Nonfunctional requirements address aspects such as performance, security, reliability, usability, and scalability. They are critical for ensuring that the system meets the desired levels of performance, security, and user experience.

Requirements Determination

5. *System Requirements:*

These are the technical specifications and constraints that define how the system will be designed, built, and deployed. System requirements encompass hardware, software, networking, and other infrastructure components. They serve as the basis for system design, development, testing, and implementation.
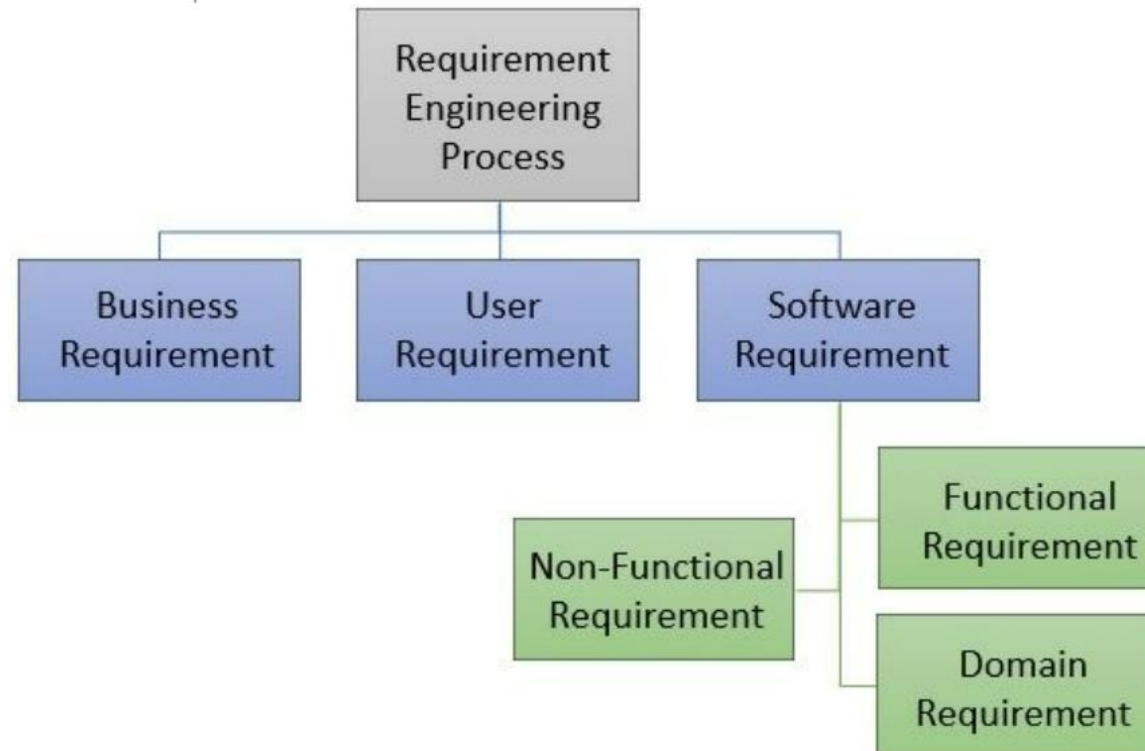
Requirements Determination: Class Exercise

Business Rules:

As an IT project manager, you are tasked with designing a Ticket Reservation System for a movie theater. The system should streamline the ticket booking process, increase customer satisfaction, and maximize ticket sales revenue by providing an easy-to-use platform for customers to reserve seats for movie screenings. Customers should be able to search for movies, view showtimes, select seats, and make online payments for ticket reservations. Theater staff should be able to manage movie listings, update seating availability, and view reservation details. The system must be web based and mobile apps should work on android and iOS devices. The system should also be cloud based, running from a server on the cloud.

1. What are the business needs for the Ticket Reservation System?
2. What do the users (customers and theater staff) need to do with the Ticket Reservation System?
3. What specific functionalities should the Ticket Reservation System have to meet the user and business requirements?
4. What characteristics should the Ticket Reservation System exhibit to ensure optimal performance, security, and user experience?
5. How should the Ticket Reservation System be built and deployed to meet the functional and nonfunctional requirements?

Requirements Definition Report

- The ***requirements definition report*** — usually just called the ***requirements definition*** — is a straightforward text report that simply lists the *functional* and *nonfunctional* requirements in an outline format.

- Purposes of the requirements definition include:

  a) to provide a clear statement of what the new system should do in order to achieve the system vision described in the system request.

  b) to define the scope of the system.

  c) describes to the analysts exactly what the final system needs to do.

  d) it serves to establish the users' expectations for the system.

  e) if and when discrepancies or misunderstandings arise, the document serves as a resource for clarification.

Creating the Requirements Definition

Creating the requirements definition is an iterative and ongoing process whereby the analyst collects information with *requirements-gathering techniques*.

The best analysts will thoroughly search for requirements using a variety of techniques and make sure that the current business processes and the needs for the new system are well understood before moving into design.

Examples of *requirements-gathering techniques* include:

a) Interviews

b) Document Analysis

c) Observation

d) Joint Application Development (JAD)

Requirements-gathering Techniques

a) Interviews

The interview is the most commonly used requirements elicitation technique.

Interviews are conducted one on one (one interviewer and one interviewee), but sometimes, due to time constraints, several people are interviewed at the same time.

There are five basic steps to the interview process:

     i.   selecting interviewees,
    ii.   designing interview questions,
   iii. preparing for the interview,
   iv. conducting the interview, and,
    v.   post interview follow-up.

Requirements-gathering Techniques

b) Document Analysis

- Project teams often use document analysis to understand the as-is system.

- Under ideal circumstances, the project team that developed the existing system will have produced documentation, which was then updated by all subsequent projects.

- In this case, the project team can start by reviewing the documentation and examining the system itself.

The customer made a mistake. This should be labeled **Owner's Name** to prevent confusion.

The staff had to add additional information about the type of animal and the animal's date of birth and gender. This information should be added to the new form in the to-be system.

CENTRAL VETERINARY CLINIC
Patient Information Card

Name: ~~Buffy~~ Pat Smith

Pet's Name: Buffy   Collie 7/6/17   Male

Address: 100 Central Court. Apartment 10

Toronto, Ontario K7L 3N6

Phone Number: 416- 555-3400   Cell: 416-567-1369

Do you have insurance: yes

Insurance Company: Pet's Mutual

Policy Number: KA-5493243

The customer did not include area code in the phone number. This should be made more clear.

The form does not allow for this fact. It should be added to the to-be system.
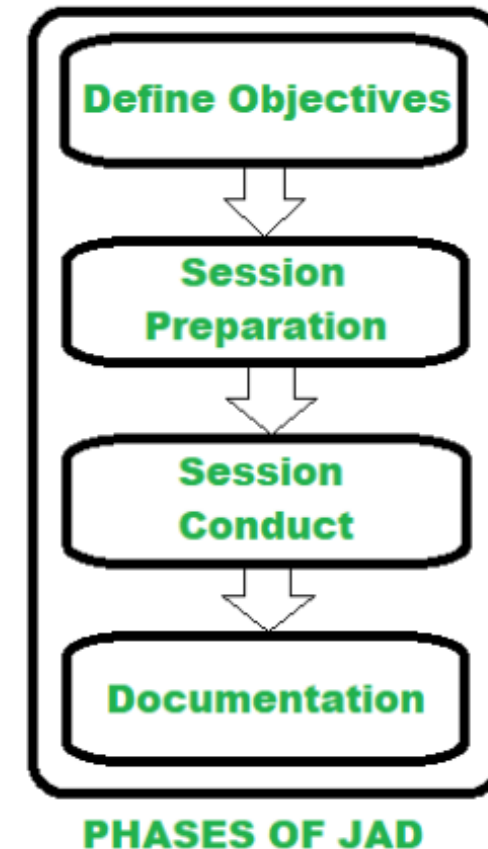
Requirements-gathering Techniques

c) Observation

- Observation, the act of watching processes being performed, is a powerful tool to gain insight into the as-is system.

- Observation enables the analyst to see the reality of a situation, rather than listening to others describe it in interviews.

- Observation is often used to supplement interview information.

Requirements-gathering Techniques

d) Joint Application Development (JAD)

- Application Development (JAD) is an information gathering technique that allows the project team, users, and management to work together to identify requirements for the system.

- IBM developed the JAD technique in the late 1970s.

- JAD is a structured process in which 10–20 users meet under the direction of a facilitator skilled in JAD techniques.

  - JAD process has a few phases including:

Define Objectives

Session Preparation

Session Conduct

Documentation

PHASES OF JAD

Exercise: Discuss the phases of JAD

Requirements-gathering Techniques

d) Joint Application Development (JAD)

- The facilitator is a person who sets the meeting agenda and guides the discussion, but does not join in the discussion as a participant.

- He or she does not provide ideas or opinions on the topics under discussion and remains neutral during the session.

- The facilitator must be an expert in both group process techniques and systems analysis and design techniques. Ideally, the facilitator will have experience with the business under discussion.

- In many cases, the JAD facilitator is an outside consultant.

Requirements-gathering Techniques

e) Questionnaires

- A questionnaire is a set of written questions for obtaining information from individuals.

- Questionnaires often are used when there is a large number of people from whom information and opinions are needed.

- Questionnaires are commonly used for systems intended for use outside of the organization (e.g., by customers or vendors) or for systems with business users spread across many geographic locations.

- Today, most questionnaires are being distributed in electronic form, either via e-mail or on the Web.

Requirements-gathering Techniques

- The depth of information refers to how rich and detailed the information is that the technique usually produces and the extent to which the technique is useful at obtaining not only facts and opinions, but also an understanding of why those facts and opinions exist.

- Comparison of requirements elicitation techniques:

	Interviews	Joint Application Design	Questionnaires	Document Analysis	Observation
Type of information	As-is, improvements, to-be	As-is, improvements, to-be	As-is, improvements	As-is	As-is
Depth of information	High	High	Medium	Low	Low
Breadth of information	Low	Medium	High	High	Low
Integration of information	Low	High	Low	Low	Low
User involvement	Medium	High	Low	Low	Low
Cost	Medium	Low–Medium	Low	Low	Low–Medium

Requirements Analysis Strategies

Three kinds of techniques have become popular to help analysts do this:

I.   Business Process Automation (BPA) : a way for organizations to streamline their operations through technology.

II. Business Process Improvement (BPI) : analyze, redesign, implement, and optimize their existing processes.

III. Business Process Reengineering (BPR) : recreating a core business process with the goal of improving product output, quality, or reducing costs.

These techniques are tools that analysts can use when they need to guide the users in explaining what is wanted from a system.

Business process automation (BPA)

- BPA means leaving the basic way in which the organization operates unchanged, and using computer technology to do some of the work.

- BPA can make the organization more *efficient* but has the least impact on the business.

- BPA projects spend a significant time understanding the current *as-is system* before moving on to improvements and *to-be system* requirements.

- *Problem analysis* and *Root Cause Analysis* are two popular *BPA techniques*.

    a) Problem Analysis: means asking the users and managers to identify problems with the as-is system and to describe how to solve them in the to-be system.

    ✓ The ideas produced by problem analysis will be *solutions* to *problems.*

Requirements Analysis Strategies

b) Root Cause Analysis: focuses on problems, not solutions.

✓ The analyst asks users to generate a *list of problems* with the *current* system, and then *prioritize* the problems in *order of importance*.

✓ Then *starting* with the *most important*, the users and/or the analysts generate all the possible *root causes* for the *problems*.

✓ Each possible root cause is *investigated* (starting with the most likely or easiest to check) until the *true root cause(s)* are *identified*.

✓ If any possible root cause(s) are identified for several problems, those should be investigated first, because there is a good chance they are the real root causes influencing the problems.

Business Process Improvement (BPI)

- BPI means making moderate changes to the way in which the organization operates to take advantage of new opportunities offered by technology or to copy what competitors are doing.

- BPI can improve efficiency (*i.e., doing things right*) and improve effectiveness (*i.e., doing the right things*).

- BPI projects also spend time understanding the *as-is system*, but much less time than BPA projects.

- BPIs primary focus is on improving business processes, so time is spent on the *as-is* only to help with the improvement analyses and the *to-be* system requirements.

- Popular BPI activities include:

  a) Duration Analysis
  b) Activity-based Costing
  c) Information benchmarking

Business Process Improvement (BPI)

a) Duration Analysis

- Involves a detailed examination of the amount of time it takes to perform each process in the current as-is system.

- The analysts begin by determining the total amount of time it takes, on average, to perform a set of business processes for a typical input.

- They then time each of the individual steps (or sub processes) in the business process.

- The time to complete the basic steps are then totaled and compared to the total for the overall process.

Business Process Improvement (BPI)

b) Activity-Based Costing

- Examines the cost of each major process or step in a business process rather than the time taken.

- The analysts identify the costs associated with each of the basic functional steps or processes, identify the most costly processes, and focus their improvement efforts on them. Assigning costs is conceptually simple.

- They examine the direct cost of labor and materials for each input.

- Materials costs are easily assigned in a manufacturing process, while labor costs are usually calculated based on the amount of time spent on the input and the hourly cost of the staff.

- However, there are indirect costs such as rent, depreciation, and so on that also can be included in activity costs.

Business Process Improvement (BPI)

c)   Information Benchmarking

- This is used to determine how a system performs when tested under a particular workload. It can test the following:

    i.   Stability
    ii.   Responsiveness
    iii. Effectiveness
    iv.   Speed

- Benchmarking is the practice of comparing business processes and performance metrics to industry bests and best practices from other companies.

- This then allows organizations to develop plans on how to make improvements or adapt specific best practices, usually with the aim of increasing some aspect of performance.

Business Process Reengineering

- **BPR** means changing the fundamental way in which the organization operates, moving away from the current way of doing business and making major changes to take advantage of new ideas and new technology.

- BPR projects spend little time understanding the as-is, because their goal is to focus on new ideas and new ways of doing business.

- Two popular BPR activities include:

   i.   Outcome analysis
   ii. Technology analysis

Business Process Reengineering

i. Outcome analysis

Focuses on understanding the fundamental outcomes that provide value to customers.

With this approach, the system analysts encourage the managers and project sponsor to pretend they are customers and to think carefully about what the organization's products and services enable the customers to do—and what they *could* enable the customer to do.

ii. Technology analysis

Technical or Technology Analysis is a key step in ensuring the success of a software project, and is essential in understanding the technical requirements of your proposed software project.

Business Process Reengineering

Technical Analysis can be useful to:

- Confirm with the customer that we have gathered all business requirements accurately, and begin with designing and building the application after approval from the customer.

- It can be used as a reference when building the application.

- It can be used by the client to verify that the final application actually matches what was initially agreed upon.

Questions...

1. What are the key deliverables that are created during the analysis phase? What is the final deliverable from the analysis phase, and what does it contain?

2. Explain the difference between an as-is system and a to-be system.

3. What is the purpose of the requirements definition?

4. Explain the difference between a closed-ended question, an open-ended question, and a probing question. When would you use each?

5. What are the three primary things that a facilitator does in conducting the JAD session?

Thank You!

THE END

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