IE-PE 227 (Ma'am Pintor) topic 3

System life cycle - also known as the system development life cycle (SDLC), is a model that describes a system's existence from conception to disposal.

STAGES OF THE SYSTEM LIFE CYCLE

PLANNING- The first stage of the SDLC, where the project is planned out.

Analysis - the stage where the needs of the company are determined, and how to meet them.

Design - the stage where the architecture, components, and data for the system are defined.

Development - the stage where the system is created.

Testing - is a crucial phase that ensures the system is free of errors and functions correctly under various conditions.

Implementation - the stage where the system is deployed.

Maintenance - is an ongoing phase where the system is monitored, maintained, and updated as needed.

OTHER STAGES OF THE SYSTEM LIFE CYCLE INCLUDE:

1. Feasibility analysis
2. Prototyping
3. Software development
4. Integration
5. Operations
6. Retirement
7. Phase-out
8. Disposal

THERE ARE DIFFERENT MODELS FOR THE SDLC

Agile – is an iterative approach to delivering software products.

Key characteristics

- **Deliver value quickly**: Focus on delivering value to customers quickly and continuously
- **Embrace change**: Welcome change as an opportunity to gain a competitive advantage
- **Collaborate regularly**: Ensure regular collaboration between project and business teams
- **Measure progress**: Measure progress based on work completed

Waterfall – is a linear, sequential project management method that breaks down a project into phases.

Requirements, design, development,testing,deployment,maintenance

V-Shaped – also known as the Verification and Validation model, is a software development lifecycle (SDLC) approach that emphasizes early.

Iterative –I is a development approach that breaks down projects into smaller, manageable chunks called iterations.

Design & development~testing~implementation

Spiral - is a software development process that uses a series of iterations to manage risk and develop software.

1. **Objectives determention and identify alternative solutions**
2. **Identify and resolve risks**
3. **Develop next version of the product**
4. **Review and plan for the next phase**

Topic 4

SYSTEMS ANALYSIS AND DESIGN

Systems development is systematic process which includes phases such as planning, analysis, design, deployment, and maintenance.

Systems Analysis It is a process of collecting and interpreting facts, identifying the problems, and decomposition of a system into its components. Conducted for the purpose of studying a system.

Systems Design It is a process of planning a new business system or replacing an existing system by defining its components or modules to satisfy the specific requirements

System Design focuses on **how to accomplish the objective of the system**.

System Analysis and Design (SAD) mainly focuses on −

- Systems
- Processes
- Technology

The word System is derived from Greek word ***Systema***, which means an organized relationship between any set of components

Constraints of a System

A system must have three basic constraints −

- A system must have some **structure and behavior** which is designed to achieve a predefined objective.
- **Interconnectivity** and **interdependence** must exist among the system components.
- The **objectives of the organization** have a **higher priority** than the objectives of its subsystems.

- Properties of a System
- A system has the following properties –

Organization implies structure and order.

Interdependence how the components of a system depend on one another.

Integration is concerned with how a system components are connected together.

Central Objective The objective of system must be central

Elements of a System

Outputs and Inputs

- The main aim of a system is to produce an ***output*** which is useful for its user.
- ***Inputs*** are the information that enters into the system for processing.
- ***Output*** is the outcome of processing.

Processor(s) The processor is the element of a system that involves the actual transformation of input into output.

- ***Control*** the control element guides the system
- ***Feedback*** provides the control in a dynamic system.

Environment the environment is the “supersystem” within which an organization operates

Boundaries and Interface

• A system should be defined by its boundaries. ***Boundaries*** are the limits that identify its components, processes, and interrelationship when it ***interfaces*** with another system.

• Each system has boundaries that determine its sphere of influence and control.

• The knowledge of the boundaries of a given system is crucial in determining the nature of its interface with other systems for successful design.

Types of Systems

Physical or Abstract Systems

- ***Physical systems*** are tangible entities. We can touch and feel them.
- ***Abstract systems*** are non-physical entities or conceptual that may be formulas, representation or model of a real system

Open or Closed Systems

- An ***open system*** must interact with its environment.
- A ***closed system*** does not interact with its environment

Adaptive and Non Adaptive System

- ***Adaptive System*** responds to the change in the environment in a way to improve their performance and to survive. (human beings, animals)
- ***Non Adaptive System*** is the system which does not respond to the environment.(machine)

Permanent or Temporary System

- ***Permanent System*** persists for long time. For example, business policies.
- ***Temporary System*** is made for specified time and after that they are demolished.

Natural and Manufactured System

- ***Natural systems*** are created by the nature. For example, Solar system, seasonal system.
- ***Manufactured System*** is the man-made system. For example, Rockets, dams, trains.

Deterministic or Probabilistic System

- ***Deterministic system*** operates in a predictable manner and the interaction between system components is known with certainty.
- ***Probabilistic System*** shows uncertain behavior. The exact output is not known

Social, Human-Machine, Machine System

• ***Social System*** is made up of people. For example, social clubs, societies.

Machine System is where human interference is neglected. All the tasks are performed by the machine. For example, an autonomous robot

Man–Made Information Systems

- It is an interconnected set of information resources to manage data for particular organization, under Direct Management Control (DMC).
- ***Formal Information System*** − It is based on the flow of information in the form of memos, instructions, etc., from top level to lower levels of management.
- ***Informal Information System*** − This is employee based system which solves the day to day work related problems.
- ***Computer Based System*** − This system is directly dependent on the computer for managing business applications. For example, automatic library system

Systems Models

Schematic Models is a 2-D chart that shows system elements and their linkages.

- Different arrows are used to show information flow, material flow, and information feedback.

Flow System Models shows the orderly flow of the material, energy, and information that hold the system together.

Static System Models

- They represent one pair of relationships such as *activity–time* or *cost–quantity*.

Dynamic System Models

- Business organizations are dynamic systems

Categories of Information

Strategic Information

Management Control Information

Operational Information

Strategic Information

This information is required by topmost management for long range planning policies for next few years

Managerial Information

This type of Information is required by middle management for short and intermediate range planning which is in terms of months. For example, sales

Operational information

This type of information is required by low management for daily and short term planning to enforce day-to-day operational activities. For example, keeping employee attendance records

System Analysis and Design (SAD) methodologies provide structured approaches to developing and improving systems by encompassing

Here's a breakdown of key aspects of SAD methodologies:

- ***Purpose:***

SAD helps organizations plan, analyze, and design systems to achieve specific goals by understanding existing systems.

- ***Core Principles:***
    - ***Systems Thinking*****:** Viewing the problem as a whole, considering all interconnected elements.
    - ***Problem Definition*****:** Clearly articulating the issues and requirements that the system needs to address.
    - ***Requirement Gathering*****:** Collecting information from stakeholders to understand their needs and expectations.
    - ***Iterative Development*****:** Making improvements based on feedback and testing.
- ***Common SAD Methodologies*****:**
    - ***System Development Life Cycle (SDLC*****):** A structured approach with phases including planning, analysis, design, implementation, and maintenance.
    - ***Waterfall*****:** A sequential approach where each phase is completed before moving to the next.

    - ***Agile*****:** A flexible and iterative approach that allows for changes during development.
    - ***Lean Startup*****:** An approach that focuses on rapid prototyping and testing to minimize waste.
    - ***Design Sprint:*** A methodology focused on quickly identifying and solving a problem
- ***Important Concepts*****:**
    - ***Data Modeling*****:** Creating diagrams or representations of data structures to help understand the organization of data in a system.
    - ***Prototyping*****:** Creating a preliminary version of a product to test its viability, usability, and feasibility
- ***Benefits of Using SAD Methodologies*****:**
    - ***Improved efficiency*****:** Streamlines development processes and ensures effective solutions.
    - ***Enhanced problem-solving*****:** Supports a structured approach to identify and address issues.
    - ***Reduced risks*****:** Addresses potential problems early in the development cycle.
    - ***Better communication*****:** Ensures everyone involved is on the same page.
    - ***Increased quality*****:** Leads to more robust and effective systems.

Topic 2 ***INFORMATION SYSTEMS: ENHANCING DECISION-MAKING PROCESSES***

Decision making process - is a series of steps one or more individuals take to determine the best option or course of action to address a specific problem or situation.

As the digital landscape evolves, the integration of these systems into the core functions of a business is not just beneficial but essential for sustaining growth and maintaining a competitive edge.

THE ROLE OF DATA ANALYTICS IN DECISION-MAKING

Data analytics - serves as a cornerstone of modern information systems, providing the empirical foundation upon which sound decision-making is predicated.

PREDICTIVE ANALYTICS: ANTICIPATING FUTURE TRENDS

Predictive analytics - a subset of data analytics, leverages historical data to forecast future outcomes.

This foresight is invaluable for strategic planning, as it allows businesses to allocate resources efficiently and capitalize on emerging it before their competitors.

REAL-TIME ANALYTICS: IMMEDIATE INSIGHT EXTRACTION

Real-time analytics - offers immediate insights, facilitating prompt responses to emerging challenges and opportunities.

DIGITAL INFRASTRUCTURE: THE BACKBONE OF INFORMATION SYSTEMS

Digital infrastructure - is paramount for the effective deployment of information systems. It encompasses the hardware, software, network resources, and services required for the seamless collection, processing, and dissemination of information across an organization.

CLOUD COMPUTING: SCALABILITY AND FLEXIBILITY

Cloud computing – it has revolutionized digital infrastructure by offering scalable and flexible solutions that accommodate the evolving needs of businesses. By migrating to cloud-based platforms, organizations can enhance their computational capabilities, reduce operational costs, and facilitate collaboration across geographically dispersed teams.

CYBERSECURITY: SAFEGUARDING CRITICAL DATA

Cybersecurity – it measures to protect sensitive data from breaches and unauthorized access. Implementing comprehensive cybersecurity strategies ensures the integrity and confidentiality of data, thereby fostering trust and enabling organizations to make data-driven decisions with confidence.

Crafting an Effective IT Strategy

An effective IT strategy aligns information systems with organizational goals, ensuring that technological investments yield maximum returns. This strategic alignment is critical for optimizing decision-making processes and achieving long-term business objectives.

Aligning IT with Business Objectives

To craft an effective IT strategy, organizations must align their technological initiatives with overarching business objectives. This alignment necessitates a thorough understanding of organizational goals, market trends, and technological advancements.

Embracing Innovation and Digital Transformation

Innovation and digital transformation - are integral components of a forward-thinking IT strategy.

Emerging technologies such as:

artificial intelligence

blockchain

Internet of Things (IoT)

Embracing emerging technologies can unlock new avenues for data collection and analysis, thereby enhancing decision-making capabilities.

Digital transformation - also involves reimagining business processes to leverage the full potential of digital technologies. This transformation requires a shift in mindset, where organizations are open to experimenting with new approaches and challenging traditional ways of doing business.

The Strategic Imperative of Information Systems

The strategic imperative of integrating information systems into decision-making processes cannot be overstated.

Enhancing Operational Efficiency

Information systems enhance operational efficiency by automating routine processes, streamlining workflows, and reducing redundancies.

Facilitating Informed Decision-Making

By providing a comprehensive view of organizational performance and market dynamics, information systems facilitate informed decision-making at all levels of the enterprise.

Resource Management

System resource - is any usable part of a computer that can be controlled and assigned by the operating system so all of the hardware and software on the computer can work together as designed.

Resources which needs to be managed

Primary memory is a computer that stores data, instructions and programs currently in use.

Persistent storage a data storage device that keeps data even when the device is powered off or disconnected from the system.

CPU When the OS runs a piece of software it has to find the program files on the storage drive, load them into main memory, and instruct the CPU to start executing the program from the beginning.

Network Bandwidth, which is the amount of data that can be transmitted in a fixed amount of time, is expressed in multiples of bits per second in digital devices.

Display server or window server - is a program whose primary task is to coordinate the input and output of its clients to and from the rest of the operating system, the hardware, and each other.

File system controls how data is stored and retrieved. Without a file system, data placed in a storage medium would be one large body of data with no way to tell where one piece of data stops and the next begins.

Sound server - is software that manages the use of and access to audio devices (usually a sound card).

A ***general system model of a firm*** views a company as an interconnected system with key components like inputs (resources), processes (operations transforming inputs), outputs (products/services), and feedback loops, all operating within a dynamic external environment.

Important aspects of the general systems model:

Open System - meaning they interact with and are influenced by their external environment, including customers, competitors, suppliers, and economic factors.

Subsystems -a company can be broken down into smaller, interrelated subsystems like production, finance, marketing, and human resources, each with its own functions but contributing to the overall system.

Interdependence - all parts of the system are interconnected and interdependent, meaning changes in one area can affect others.

Dynamic Equilibrium -the system strives to maintain a balance by adapting to internal and external changes through feedback loops and adjustments.

Applications of the General Systems Model:

Strategic Planning -analyzing how different business functions interact to achieve strategic goals.

Problem Solving -identifying root causes of issues by examining the whole system rather than isolated components.

Performance Improvement - identifying areas for optimization by analyzing the flow of inputs, processes, and outputs.

Ma'am Era

Satellite Communication (1960s)

- enabled the global distribution of news, entertainment, and live events, making the world feel more interconnected.

2. The Mechanical Age: 1450 – 1840

- Punch cards is the another development in this era.
    - Introduced in 1801
    - Binary logic
    - Fixed program operating in real time.

Internet in Media (Late 20th Century)

- Internet decentralized information dissemination, enabling individuals to publish content, share ideas, and interact with others on a global scale.

Digital Media (21st Century)

- Social media platforms, such as Facebook, Twitter, and Instagram, allowed individuals to create and share content, leading to the rise of citizen journalism and user-generated news.