Systems Development

[[TOC]]

Information Systems

*[IS]: Information System

IS : An organized combination of *people*, *hardware*, *software*, *communication networks* & *data resources* that *collect*, *transform* & *disseminate* **information** in an organization Example: *Hospital Management Systems streamline patient care, from admission to discharge, ensuring data accuracy and accessibility*

Key Components of Information Systems

Hardware Physical devices like servers, workstations, networking equipment **Software** Applications and programs used to process and manage data **People** Users and IT personnel who manage and maintain the system **Data** Raw facts and figures that are processed to generate meaningful information **Network** Infrastructure that connects the components, facilitating communication

Systems Analysis & Design

System Analysis : The process of examining a business situation for the purpose of developing a system solution to a problem It often involves studying processes and gathering system requirements

Importance of System Analysis in Project

- Ensures clarity in understanding the project's goals
- Aids in identifying potential challenges
- Forms a foundation for the design, development & deployment phases
- Reduces project risks and uncertainties

System Design : The phase where the system specifications are detailed It involves designing the architecture, interfaces and components

Designing Effective Information Systems

Key principles for robust design **User-Centered Design** Focus on the needs and feedback of end-users **Scalability** Design should cater to future growth and expansion **Flexibility** System should easily integrate with other systems or adapt to new requirements **Security** Ensure data protection and user privacy

Software Development Life Cycle

*[SDLC]: Software Development Cycle

1. **Planning**

Define the system's scope and objectives Align the system with organization goals, identify constraints & allocate resources

2. **System Definition**

   Gather and analyze requirements Involved deep interaction with stakeholders to gather detailed system requirements

3. **Design**

   Detail system specifications Here we create the blueprint of the system Includes *data structures*, *UI/UX designs*, *system workflows*, etc

4. **Implementation**

   Coding, testing, and installing the system Here we converts designs into working code Involves unit testing to ensure production functions as intended

5. **Maintenance & Iterations**

   Ongoing updates, bug fixes, and improvements After development product needs regular fixing of bugs regular add new features from feedback

Agile Methodology

> A shift from traditional waterfall methodology
>
> > Emphasizing *adaptability & collaboration* Add breaks and smaller chunks called **iterations** Allowing for *continuous feedback* and *adjustments*

Principles of Agile Development

- Embrace change for customer advantage
- Delivering working software frequently
- Collaboration between developers and stakeholders
- Simplicity and focusing on what's necessary

Extreme Programming

*[XP]: eXtreme Programming

> XP emphasizes customer satisfaction and introduces engineering practices like continuous integration and test-driven development to improve software quality and responsiveness to changing requirements

Scrum

A agile framework, organizes work in **sprints** *short, time-boxed periods*

It includes roles like **Scrum Master** and **Product Owner** and ceremonies like **Daily Stand-ups** and **Sprint Retrospectives** to keep projects on track

Object-Oriented Analysis and Design

*[OOAD]: Object-Oriented Analysis and Design

> A methodology that models systems as a group of interacting objects Each object object represents some entity of interest in the system being modeled and has its own *behavior*, *data*, and *operations*
>
> > *In a hospital system, `Patient` and `Doctor` can be objects, each with their attributes and methods like `schedule_appointment` or `prescribe_medicine`*

*[OOAD]: Object-Oriented Analysis & Design

Benefits of OOAD - Enhances modularity and reusability - Facilitates real-world modeling - Offers better flexibility and maintainability

Key Concepts

Class : Blueprint for creating objects or *instances*

Object : Instance of a class

Inheritance : Acquiring the properties of one class by another class

Polymorphism : Ability of a function or method to work in different ways based on the input

Challenges of OOAD • Complexity in designing classes and relationships • Potential for engineering • Requires deep understanding of the domain

Real world applications of OOAD ▼ E-commerce platforms modeling products, carts, and users ▼ Social media platforms representing posts, comments, and reactions ▼ CRM systems modeling customers, interactions, and sales pipelines

Rational Unified Process

*[RUP]: Rational Unified Process

RUP is a software development process that emphasizes task structuring and iterative progress It integrates OOAD

Phases of RUP

1. **Inception** Define the system's vision and scope

2. **Elaboration** Address potential risks and develop a detailed system architecture
3. **Construction** Develop the system, evolving through iterative cycles
4. **transition** Deploy the system to the end-users

Key Principles of RUP

- Iterative development
- Managing risks proactively
- Continuous verifications of quality
- Flexibility to adapt to changes

Advantages of RUP

- Structured approach to complex projects
- Emphases on stakeholder feedback
- Focus on addressing risks early
- Continuous integration and testing

Challenges & Critique of RUP

- Can be cumbersome for small projects
- Demands significant planning upfront
- Potentially higher costs due to its comprehensive nature

Comparing RUP with other Methodologies

vs Agile is more prescriptive, whilst Agile is adaptive **vs Waterfall** is more iterative, whilst Waterfall is linear **vs Scrum** more detailed process than Scrum

Videos

Information Systems Project Management

*[IS]: information system

> The systematic approach to managing projects from inception to completion
>
> > Provides structure, ensures alignment with objectives, and increases the chance of project success

Is Project Management Lifecycle

The 4 Phases

- **Initiation**

  Setting the projects direction its Scope We establish a clear **project vision** and define its purpose this ensures stakeholders have a shared understanding & provides a clear roadmap to guide future actions

- **Planning**

  Outlining the steps, allocating resources and setting the timeline Determines the **how** of the project **Resource Allocation** assign tools, personnel and budget **Risk Management** identify and mitigate risk

- **Execution**

  Implement the plans, monitor progress and make adjustments **This is where the plan comes to life Challenges** Scope creep & communication gaps

- **Close-down**

  Wrapping up all project activities Provides closure to all stakeholders Offers post project reflection to learn lessons *Complete, assess & transition the project*

Project Identification and the Rise of E-Commerce

This has a lot to do with **strategic planning & foundations**

Project Identification

project identification : Recognizing and defining potential projects that could meet an organizational need or address and opportunity

> Identifying the right projects aligns with strategic goals and delivers maximum value

Project Identification Process

Recognize The Need Or Opportunity understand the organization's needs or opportunities in the market

Define The Project Delineate the *scope*, *objectives* and *deliverables* of the potential project

Feasibility Study Investigate if the project is *technically*, *economically* & *operationally* feasible

Preliminary Cost-Benefit Analysis Estimate potential costs versus benefits to determine project viability

Stakeholders

Who are the stakeholders Individuals or entities impacted by the project's outcome

> We need to identify their needs, concerns & expectations to help shape project choices

Corporate Strategic Planning

Steps

> The strategic planning process is a systematic approach comprising several jey phases ensuring a structured and comprehensive planning eleanor

Phase 1 : Vision Setting

A compelling vision provides direction and inspires stakeholders

!!! Example SpaceX's vision !!! Quote To enable humans to become a multi-planetary species sets a clear and inspiring direction for all its undertakings

Phase 2 : SWOT Analysis

Strengths Internal capabilities **Weaknesses** Internal limitations **Opportunities** External areas of potential growth **Threats** External challenges

Phase 3 : Setting Objectives

Setting **Specific**, **Measurable**, **Achievable**, **Relevant** & **Time Bound** SMART

Phase 4: Strategy Formulation

> *Strategies are the means to achieve objectives* They might involve
>
> - expanding to new markets
> - launching new products
> - forming strategic partnerships

Phase 5: Implementation of Strategy

Convert strategies into actions

requires
- aligning resources - training staff - set up monitoring mechanism

Phase 6: Evaluation and Control

Periodically reviewing the progress against set objectives and tweaking strategies as required

Electronic Commerce

Business-to-Consumer

B2C represents direct selling to individual consumers on the internet

Key Components

Online Storefronts The website interface where customers view products **Shopping Carts** Allows customers to collect and purchase multiple items **Payment Gateways** Secure systems to process payments **Customer Feedback Mechanisms** Ratings and reviews influencing purchase decisions

Business-to-Employee

B2E revolves around businesses providing services, information, or products to their employees via the internet

Benefits

Personalized Content Tailored intranet content based on job role or department **Efficient HR Processes** Online benefits enrollment, leave applications, and more **Enhanced Training** E-learning platforms and modules for employee development

Business-to-Business

B2B e-commerce, companies sell products, services, or information to other companies through the internet

- B2B transactions often involve higher volumes than B2C.
- Contracts, negotiations, and longer sales cycles are common.
- B2B requires relationship-building over time, with trust being paramount

Project Initiation and Planning

Project initiation : the formal process of defining the scope, objectives, & stakeholders for a new project

Important because it sets the foundation for what the project aims to achieve Enables stakeholders to understand & commit to the project's vision

project planning : involves setting goals, defining roles & establishing timelines to ensure a project's success

A detailed plan serves as a roadmap for project execution Helps in avoiding issues such as scope creep and delays

Steps

Project Conceptualization Develop a preliminary visions for the project **Stakeholder Identification** Identify and engage people or entities that have a interest in the project **Resource Allocation** Plan & allocation necessary resources like *time*, *manpower* & *tools* **Objective Setting** Establish clear, measurable & achievable objectives

Project plan - Creation Compilation of all the elements into a cohesive project plan **Review** Validate the project plan with stakeholders to ensure alignment and feasibility

Project Feasibility

> sets the stage for project success by evaluating if the objectives are achievable analysis helps to identify and mitigate risks early in the project lifecycle

types **Technical Feasibility** Evaluates whether the project can be completed with the current technology Also assesses the technical skills and resources needed **Economic Feasibility** the financial aspects of the project to determine if it is viable from an economic standpoint **Legal Feasibility** Reviews legal requirements such as licenses, patents, and regulations that could impact the project **Operational Feasibility** Assesses if the organization has or can obtain the necessary resources and expertise to bring the project to fruition **Scheduling Feasibility** Examines if the project can be completed within the defined timeline

Go/No-Go Decision A final decision point where all the feasibility studies are evaluated to decide whether the project should proceed or be terminated

Baseline Plan

After the feasibility analysis

A baseline plan serves as a standard for measuring project performance It allows for effective project control by providing a comparison between planned and actual outcomes

Activities

- **Identifying Objectives**

  The first step is to lay out the project objectives clearly

- **Resource Allocation**

Assigning resources such as manpower, time, and money to different tasks

- **Scheduling**

  Developing a timeline for all the activities and milestones

Steps

1. **Identify Objectives** Establish clear goals for the project
2. **Allocate Resources** Assign necessary resources to achieve these goals
3. **Create Schedule** Develop a timeline with milestones
4. **Stakeholder Review** Get feedback from key stakeholders
5. **Implement Changes** Revise the plan based on feedback
6. **Finalize Plan** Lock in the baseline project plan

Structured Walk-Through

> This is a review process used to validate the quality and completeness of a deliverable

!!! Danger Enables early detection of issues and fosters team collaboration

Roles and Responsibilities

!!! todo Facilitator Leads the walk-through and manages the process !!! example Presenter The person who produced the deliverable being reviewed !!! Warning Reviewers Team members or experts who evaluate the deliverable

Explanation of Structured Walk-Through Steps **Initiate Walk-Through** Facilitator starts the process **Presenter Shares Deliverable** Material for review is shared **Reviewers Evaluate** Reviewers scrutinize the deliverable **Feedback Collected** Observations are noted **Revisions Made** Necessary changes are implemented

Requirement Determination Techniques

Interviews

!!! Tip A qualitative method to gather explicit information Enables direct interaction between interviewer and interviewee

2 types Structured Interviews Predetermined questions, strict order **Unstructured Interviews** Open-ended questions, more flexibility

Observations

Observe workers provides implicit information Understanding the workflow & identifying bottlenecks

• Real-time data collection • Identify unspoken needs & practices

Benefits	**Pitfalls**	• *Observer Effect* Behavior changes when being observed • Time-consuming
		Computing Support
JAD Sessions		
Prototyping		
Contemporary Approaches		