

Systems Development Lifecycle

- Introduction
- Seven Phases in the SDLC
- Why Systems Fail
- Prototyping

INTRODUCTION

- Why do businesses build information systems ?
- How does a business know when it is time to replace the old information system with a new one ?

INTRODUCTION

- Developing of an information system may fail.
- There are many factors that must be considered and come together in order to develop a successful information system.
- The SDLC = Systems Development Life Cycle is one approach to reduce the risk of failure.

Introduction

- **Systems development life cycle (SDLC)** - a structured step-by-step approach for developing information systems.

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    graph TD
      Plan[Plan] --> Analysis[Analysis]
      Analysis --> Design[Design]
      Design --> Develop[Develop]
      Develop --> Test[Test]
      Test --> Implement[Implement]
      Implement --> Maintain[Maintain]
  
```

Seven Phases in the SDLC

- There are literally hundreds of activities associated with each phase of the SDLC
- Such activities include:
 - Determining budgets
 - Gathering systems requirements
 - Documentation
 - Modeling

Seven Phases in the SDLC

SDLC Phase	Activities
1. Plan	<ul style="list-style-type: none"> • Define the system to be developed • Set the project scope • Develop the project plan including tasks, resources, and time frames
2. Analysis	<ul style="list-style-type: none"> • Gather the business requirements for the system
3. Design	<ul style="list-style-type: none"> • Design the technical architecture required to support the system • Design system models
4. Develop	<ul style="list-style-type: none"> • Build the technical architecture • Build the database and programs
5. Test	<ul style="list-style-type: none"> • Write the test conditions • Perform the testing of the system
6. Implement	<ul style="list-style-type: none"> • Provide training for the system users • Write detailed user documentation
7. Maintain	<ul style="list-style-type: none"> • Build a help desk to support the system users • Provide an environment to support system changes



Seven Phases in the SDLC

- *Phase 1: Plan*
- involves determining a solid plan for developing your information system.
- The three of the most important activities involved during the planning phase:
 - Identify and select the system for development
 - Set project scope
 - Develop project plan

Seven Phases in the SDLC

- Identify and select the system for development
 - Key question: “What systems are required to support the strategic goals of your organization?”
 - Companies cannot develop all proposed IS, so they look into the critical success factors.
- **Critical success factor (CSF)** - a factor simply critical to your organization’s success.

Seven Phases in the SDLC

- Once the system to be developed in defined, then the project needs to be scoped.
- **Set project scope** - clearly defines the high-level system requirements.
- It is a birds-eye-view of the project.
- **Project scope document** - a written definition of the project scope and is usually no longer than a paragraph.

Seven Phases in the SDLC

- Developing a project plan is the final activity of the planning phase.
- **Project plan** - defines the what, when, and who questions of system development including all activities to be performed, the individuals, or resources, who will perform the activities, and the time required to complete each activity.

Seven Phases in the SDLC

- **The project plan should include:**
 - **Project milestones** - represent key dates for which you need a certain group of activities performed.
 - **Project manager** - an individual who is an expert in project planning and management, defines and develops the project plan and tracks the plan to ensure all key project milestones are completed on time.

Seven Phases in the SDLC

- Phase 2: Analysis
- The analysis phase involves
 - The end users
 - The IT specialists

Working together

- To understand and
- Document

the business requirements for the system.

Analysis Phase

Conduct preliminary investigation, also called feasibility study

Perform detailed analysis

Analysis Phase

What is the **preliminary investigation**?

- Determine exact nature of problem or improvement and whether it is worth pursuing
- Findings are presented in feasibility report, also known as a feasibility study

Analysis Phase

What is detailed analysis?

1. Study how current system works
2. Determine user's wants, needs, and requirements
3. Recommend solution

Sometimes called logical design

Seven Phases in the SDLC

Phase 2: Analysis

- A useful way to gather system requirements is:
 1. **Joint application development (JAD)** - knowledge workers and IT specialists meet, sometimes for several days, to define or review the business requirements for the system.
 2. **Requirements definition document** - prioritizes the business requirements and places them in a formal comprehensive document.
 3. **Sign-off** - the knowledge workers' actual signatures indicating they approve all of the business requirements.

Seven Phases in the SDLC

- Phase 3: Design
- The primary goal of the design phase
 - Build the technical architecture required to support the system.
- This includes
 - Design of the technical architecture
 - Design system models.

Seven Phases in the SDLC

- Technical architecture –
 - Defines the hardware, software, and telecommunications equipment required to run the system.
- The final architecture must meet your needs in terms of
 - Time
 - Cost
 - Technical feasibility
 - Flexibility

Seven Phases in the SDLC

- It is important to ensure that the final architecture meet
 - Current system needs
 - Future system needs

Seven Phases in the SDLC

- **Modeling** - the activity of drawing a graphical representation of a design.
- You model everything you build including
 - Reports
 - Programs
 - databases

Seven Phases in the SDLC

- There are many different types of modeling activities performed during the design stage
 - Graphical user interface (GUI)
 - The interface to an information system.
 - the ability to model the information system screens for an entire system.
 - Entity relationship diagram
 - Data flow diagram
 - Project dictionary

Seven Phases in the SDLC

MAIN MENU

Customer Menu

Customer Tracking

Inventory Tracking

Sales Tracking

Supplier Tracking

MAIN MENU

Customer Tracking

Sales Tracking

Supplier Menu

Supplier Tracking

Inventory Tracking

GUI Design: Alphabetical order of buttons
GUI Design: Categorical order of buttons

Analysis Phase

What is an **entity-relationship diagram** (ERD)?

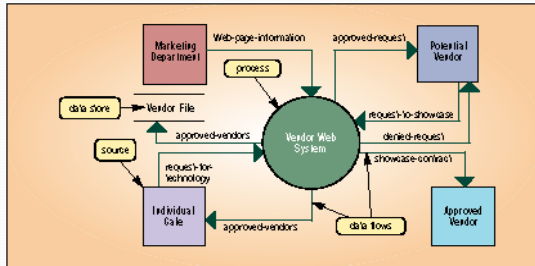
- Tool that graphically shows connections between entities in system

The diagram shows several entities: CUSTOMER (green), SUPPLIER (yellow), INVENTORY (blue), SALES (purple), and ORDER (orange). Relationships are shown with lines and cardinalities: CUSTOMER (1) to ORDER (M), SUPPLIER (1) to ORDER (M), INVENTORY (1) to ORDER (M), and SALES (1) to ORDER (M). There are also self-referencing relationships on some entities like ORDER and INVENTORY.

Analysis Phase

What is a **data flow diagram (DFD)**?

- Tool that graphically shows flow of data in system



Analysis Phase

What is a **project dictionary**?

Contains all the documentation and deliverables of project

Helps keep track of huge amount of details in system

Variety of techniques to enter items in project dictionary

Structured English

Decision tables

Decision trees

Data dictionary

Next

Seven Phases in the SDLC

- Phase 4: Development
- **Development phase**
 - Take all of your detailed design documents from the design phase and transform them into an actual system.

Seven Phases in the SDLC

- Activities during this phase include
 - Coding programs
 - Creating databases
 - Deploying the telecommunications equipment
 - Installing hardware and software
- In other words
 - Build the technical architecture.
 - Build the database and programs.

Seven Phases in the SDLC

- Phase 5: Test
- Verifies that the system works and meets all of the business requirements defined in the analysis phase.
- **Test conditions** - the detailed steps the system must perform along with the expected results of each step.

Seven Phases in the SDLC

Phase 5: Test

- Testing is critical
 - Must have test plans
 - Write the test conditions.
- Perform the testing of the system.

Seven Phases in the SDLC

- *Phase 6: Implement*
 - Bringing the system into life by placing it in the organization
- During this phase
 - You distribute the system to all of the workers and they begin using the system to perform their everyday jobs.

Seven Phases in the SDLC

Phase 6: Implement

- During this phase
 - **You create User documentation**
 - Highlights how to use the system.
 - You perform training to the employees to use the system

Seven Phases in the SDLC

Phase 6: Implement

- **Online training** - runs over the Internet or off a CD-ROM.
- **Workshop training** - is held in a classroom environment and lead by an instructor.

Seven Phases in the SDLC

• *Phase 7: Maintain*

- It is the final phase of the system development effort
- Monitor and support the new system to ensure it continues to meet the business goals.

Seven Phases in the SDLC

Phase 7: Maintain

- Once the system is in place you need to provide support
 - Build a help desk to support the system users.
 - Provide an environment to support system changes.

Why Systems Fail

- Only 20% of systems built today are successful, 80% of systems development fail.
- Five primary reasons why systems fail include:
 1. Unclear or missing requirements
 2. Skipping SDLC phases
 3. Failure to manage project scope
 4. Failure to manage project plan
 5. Changing technology

Why Systems Fail

Unclear or Missing Requirements

- The business requirements drive the entire system.
- If they are not accurate or complete there is no way the system will be successful.

Why Systems Fail

Unclear or Missing Requirements

- Gathering inaccurate requirements?
 - ✗ System must not allow students to add classes
 - ✓ System must allow students to add classes
- Missing Requirement?
 - Forgetting to include into the system the calculation of a student grade point average

Why Systems Fail

Skipping SDLC Phases

- The first thing individuals tend to do when a project falls behind schedule is to start skipping phases in the SDLC.
- Skipping any of the phases is sure to lead to system failure.

Why Systems Fail

Failure To Manage Project Scope

- The project manager must track the status of each activity and adjust the project plan if a activity is added or taking longer than expected.
- What could happen in a project to this effect is
 - **Scope creep** - occurs when the scope of the project increases.
 - **Feature creep** - occurs when developers add extra features that were not part of the initial requirements.

Why Systems Fail

Failure To Manage Project Plan

- Managing the project plan is one of the biggest challenges during systems development

ID	Task Name	Duration	Resource Names	May 26, '02	June 2, '02	June 9, '02	June 16, '02	June 23, '02
1	Plan	3 days						
2	Set Scope	3 days	Scott	█				
3	Analysis	8 days						
4	Gather Business Requirements	8 days	Anne, Martha	█	█			
5	Design	3 days						
6	Model GUI	3 days	David			█		
7	Develop	2 days	Logan					
8	Build Database	2 days						
9	Test	3 days						
10	Write Test Condition	3 days	Martha					
11	Implement	1 day?						
12	Install System	1 day?	Leigh					
13	Maintain	6 days						
14	Set Up Help Desk	6 days	Naomi					

Sample Project Plan

Why Systems Fail

Failure To Manage Project Plan

- The project plan is the road map you follow during the development of the system.
- Developing the initial project plan is the easy.
- Managing, revising, and updating the project plan is the hard part.

Why Systems Fail

Changing Technology

- Technology changes so fast that it's almost impossible to deliver an information system without feeling the pain of changing technology.

Prototyping

- **Prototyping** - the process of building a model that demonstrates the features of a proposed product, service, or system.
- **Prototype** - a model of a proposed product, service, or system.

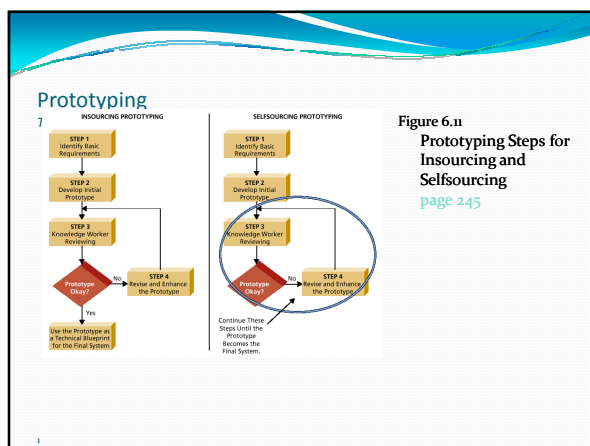
Prototyping

- Prototyping can be used to perform a variety of functions
 - Gathering requirements
 - Helping determine requirements
 - Proof-of-concept prototype - used to prove the technical feasibility of a proposed system.
 - Selling prototype - used to convince people of the worth of a proposed system.

Prototyping

The Prototyping Process

- The prototyping process involves four steps:
 1. Identify basic requirements
 2. Develop initial prototype
 3. Knowledge worker review
 4. Revise and enhance the prototype



Prototyping

The Advantages of Prototyping

- The advantages of prototyping include
 - Encourages active knowledge worker participation.
 - Helps resolve discrepancies among knowledge workers.
 - Gives knowledge workers a feel for the final system.
 - Helps determine technical feasibility.
 - Helps sell the idea of a proposed system.

Prototyping

The Disadvantages of Prototyping

- The disadvantages of prototyping may include
 - Leads people to believe the final system will follow shortly.
 - Gives no indication of performance under operational conditions.
 - Leads the project team to forgo proper testing and documentation.