



Software Engineering I

System Development Life Cycle (SDLC)

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System and System engineering

- A *system* is a collection of elements related in a way that allows a common objective to be accomplished.
 - In computer systems, these elements include hardware, software, people, facilities, and processes.
- *System engineering* is the practical application of scientific, engineering, and management skills necessary to transform an operational need into a description of a system configuration that best satisfies that need.
 - It is a generic problem-solving process that applies to the overall technical management of a system development project.

Fundamental phases

Planning

Recognizing the
current System

Implementation

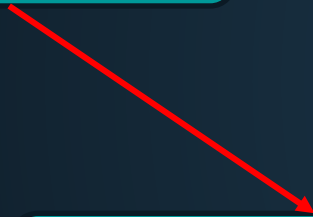
Constructing the
new system

Analysis

Breaking the System into
elements

Updating the System
elements or the relations

Design



Important points

- Is a process of *gradual refinement*.
 - The deliverables produced in the analysis phase provide a general idea of the shape of the new system. These deliverables are used as input to the design phase, which then refines them to produce a set of deliverables that describes in much more detailed terms exactly how the system will be built.
 - Each phase refines and elaborates on the work done previously.

1- Planning

- Is the fundamental process of understanding *why* an information system should be built and determining how the project team will go about building it.
- It has two steps.
 1. project initiation
 2. project management

1-1- Project initiation

- During *project initiation*, the system's business value to the organization is identified: How will it lower costs or increase revenues? Most ideas for new systems come from outside the IS area (e.g., from the marketing department, accounting department) in the form of a *system request*.
 - A system request presents a brief summary of a business need, and it explains how a system that supports the need will create business value.
- The IS department works together with the person or department that generated the request (called the *project sponsor*) to conduct a *feasibility analysis*.
- The *system request* and *feasibility analysis* are presented to an information systems *approval committee* to decide whether the project should be undertaken.

1-2- Project management

- Once the project is approved, it enters *project management*.
- During project management, the *project manager* creates a *workplan*, staffs the project, and puts techniques in place to help the project team control and direct the project through the entire SDLC.
- The deliverable for project management is a *project plan*, which describes how the project team will go about developing the system.

2- Analysis

- Answers the questions of *who* will use the system, *what* the system will do, and *where* and *when* it will be used.
- During this phase, the project team investigates any current system(s), identifies opportunities for improvement, and develops a concept for the new system.
- It has three steps.
 1. Selecting analysis strategy
 2. Gathering requirements
 3. Preparing advanced proposal

2-1- Analysis strategy

- An *analysis strategy* is developed to guide the project team's efforts.
- Such a strategy usually includes an analysis of the current system (called the *as-is system*) and its problems and then ways to design a new system (called the *to-be system*).
- Types of strategies
 - Data-oriented
 - Process-oriented
 - Object-oriented

2-2- Requirements gathering

- Through interviews or questionnaires.
- The analysis of this information—in conjunction with input from the project sponsor and many other people—leads to the development of a concept for a new system.
- The system concept is then used as a basis to develop a set of business *analysis models*, which describe how the business will operate if the new system is developed.

2-3- Advanced system proposal

- The analyses, system concept, and models are combined into a document called the advanced system proposal, which is presented to the project sponsor and other key decision makers who decide whether the project should continue to move forward.

3- Design

- Decides *how* the system will operate, in terms of the hardware, software, and network infrastructure; the user interface, forms, and reports; and the specific programs, databases, and files that will be needed.
- The design phase has five steps.
 1. Selecting design strategy
 2. Designing the physical architecture of the system
 3. Designing interface of the system
 4. Designing database and file specifications
 5. Designing the program design

Steps of Design(I)

- *Design strategy*
 - System will be developed by the company's own programmers,
 - System will be outsourced to another firm (usually a consulting firm),
 - Company will buy an existing software package.
- *Physical architecture design* describes the hardware, software, and network infrastructure to be used.
- The *interface design* specifies how the users will move through the system (e.g., navigation methods such as menus and on-screen buttons) and the forms and reports that the system will use.

Steps of Design(II)

- The *database and file specifications* are developed. These define exactly what data will be stored and where they will be stored.
- *Program design*, which defines the programs that need to be written and exactly what each program will do.

End of Design

- This collection of deliverables (architecture design, interface design, database and file specifications, and program design) is the *system specification* that is handed to the programming team for implementation.
- At the end of the design phase, the feasibility analysis and project plan are reexamined and revised, and another decision is made by the project sponsor and approval committee about whether to terminate the project or continue.

4- Implementation

- The system is actually built (or purchased).
- This phase has three steps.
 1. System construction.
 2. Installation.
 3. preparing a support plan for the system.

Phases of Implementation

- System *construction* is the first step. The system is **built** and **tested** to ensure that it performs as designed. Because the cost of bugs can be immense, testing is one of the most critical steps in implementation.
- *Installation* is the process by which the old system is turned off and the new one is turned on. One of the most important aspects of conversion is the development of a *training plan* to teach users how to use the new system and help manage the changes caused by the new system.
- The analyst team establishes a *support plan* for the system. This plan usually includes a formal or informal post-implementation review as well as a systematic way for identifying major and minor changes needed for the system.



References

- Dennis, Wixon, Tegarden, “System Analysis and Design, An Object Oriented Approach with UML”, 5th Edition, 2015.



What we will talk about next...

- Process models