SOFTWARE ENGINEERING

The term software engineering is composed of two words, software and engineering.

Software is more than just a program code. A program is an executable code, which serves some computational purpose. Software is considered to be a collection of executable programming code, associated libraries and documentations. Software, when made for a specific requirement is called software product.

Engineering on the other hand, is all about developing products, using well-defined, scientific principles and methods.

Software Engineering is the discipline that aims to provide methods & procedures for developing software system.

It is the application of a systematic disciplined & quantifiable approach of development & maintenance of software. It includes different techniques & procedures of ―Software development process to improve the reliability of software‖.

In other words, software Engineering is the application of science & maths by which the capabilities of computer equipments are made useful to man via computer programs.

NEED OF SOFTWARE ENGINEERING

The need of software engineering arises because of higher rate of change in user requirements and environment on which the software is working.

Large software - It is easier to build a wall than to a house or building, likewise, as the size of software become large engineering has to step to give it a scientific process.

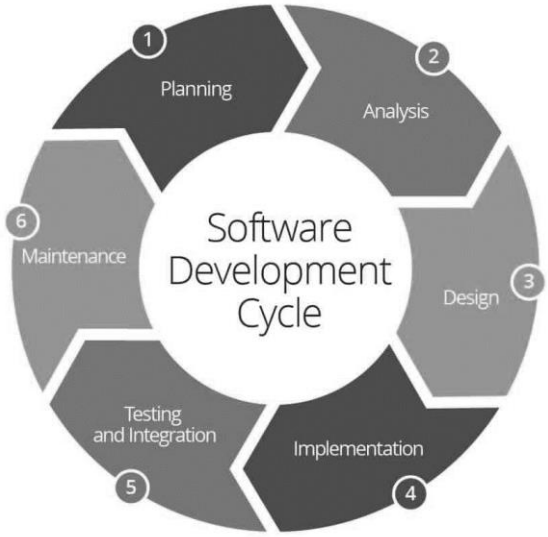
Scalability- If the software process were not based on scientific and engineering concepts, it would be easier to re-create new software than to scale an existing one.

Cost- As hardware industry has shown its skills and huge manufacturing has lower down the price of computer and electronic hardware. But the cost of software remains high if proper process is not adapted.

Dynamic Nature- The always growing and adapting nature of software hugely depends upon the environment in which the user works. If the nature of software is always changing, new enhancements need to be done in the existing one. This is where software engineering plays a good role.

Quality Management- Better process of software development provides better and quality software product.

SOFTWARE DEVELOPMENT STAGES(SDLC)



The system-development life cycle enables users to transform a newly-developed project into an operational one.

The System Development Life Cycle, "SDLC" for short, is a multistep, iterative process, structured in a methodical way. This process is used to model or provide a framework for technical and non-technical activities to deliver a quality system which meets or exceeds a business"s expectations or manage decision-making progression.

Traditionally, the systems-development life cycle consisted of five stages. That has now increased to seven phases. Increasing the number of steps helped systems analysts to define clearer actions to achieve specific goals.

Similar to a project life cycle (PLC), the SDLC uses a systems approach to describe a process. It is often used and followed when there is an IT or IS project under development.

The SDLC highlights different stages (phrases or steps) of the development process. The life cycle approach is used so users can see and understand what activities are involved within a given step. It is also used to let them know that at any time, steps can be repeated or a previous step can be reworked when needing to modify or improve the system.

1. Planning

This is the first phase in the systems development process. It identifies whether or not there is the need for a new system to achieve a business"s strategic objectives. This is a preliminary plan (or a feasibility study) for a company"s business initiative to acquire the resources to build on an infrastructure to modify or improve a service. The company might be trying to meet or exceed expectations for their employees, customers and stakeholders too. The purpose of this step is to find out the scope of the problem and determine solutions. Resources, costs, time, benefits and other items should be considered at this stage.

2. Systems Analysis and Requirements

The second phase is where businesses will work on the source of their problem or the need for a change. In the event of a problem, possible solutions are submitted and analyzed to identify the

best fit for the ultimate goal(s) of the project. This is where teams consider the functional requirements of the project or solution. It is also where system analysis takes place—or analyzing the needs of the end users to ensure the new system can meet their expectations. Systems analysis is vital in determining what a business"s needs are, as well as how they can be met, who will be responsible for individual pieces of the project, and what sort of timeline should be expected.

There are several tools businesses can use that are specific to the second phase. They include:

CASE (Computer Aided Systems/Software Engineering)

Requirements gathering

Structured analysis

3. Systems Design

The third phase describes, in detail, the necessary specifications, features and operations that will satisfy the functional requirements of the proposed system which will be in place. This is the step for end users to discuss and determine their specific business information needs for the proposed system. It"s during this phase that they will consider the essential components (hardware and/or software) structure (networking capabilities), processing and procedures for the system to accomplish its objectives.

4. Development

The fourth phase is when the real work begins—in particular, when a programmer, network engineer and/or database developer are brought on to do the major work on the project. This work includes using a flow chart to ensure that the process of the system is properly organized. The development phase marks the end of the initial section of the process. Additionally, this phase signifies the start of production. The development stage is also characterized by instillation and change. Focusing on training can be a huge benefit during this phase.

5. Integration and Testing

The fifth phase involves systems integration and system testing (of programs and procedures)—normally carried out by a Quality Assurance (QA) professional—to determine if the proposed design meets the initial set of business goals. Testing may be repeated, specifically to check for errors, bugs and interoperability. This testing will be performed until the end user finds it acceptable. Another part of this phase is verification and validation, both of which will help ensure the program"s successful completion.

6. Implementation

The sixth phase is when the majority of the code for the program is written. Additionally, this phase involves the actual installation of the newly-developed system. This step puts the project into production by moving the data and components from the old system and placing them in the new system via a direct cutover. While this can be a risky (and complicated) move, the cutover typically happens during off-peak hours, thus minimizing the risk. Both system analysts and end-users should now see the realization of the project that has implemented changes.

7. Operations and Maintenance

The seventh and final phase involves maintenance and regular required updates. This step is when end users can fine-tune the system, if they wish, to boost performance, add new capabilities or meet additional user requirements.

Different software life cycle models

Many life cycle models have been proposed so far. Each of them has some advantages as well as some disadvantages. A few important and commonly used life cycle models are as follows:

Classical Waterfall Model

Iterative Waterfall Model

Prototyping Model

Evolutionary Model

Spiral Model