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CHAPT.

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# 1. SOFTWARE ENGINEERING

Software engineering is defined as a process of analyzing user requirements and then designing, building, and testing software application which will satisfy those requirements.

It is an engineering stream dedicated to software development. Software programs can be developed without S/E principles and methodologies but they are indispensable if we want to achieve good quality software in a cost effective manner

There are various definitions for software engineering

# IEEE DEFINITION

IEEE, in its standard 610.12-1990, defines software engineering as the application of a systematic, disciplined, which is a computable approach for the development, operation, and maintenance of software.



**IEEE**

# FRITZ BAUER DEFINITION

The establishment and used standard engineering principles. It helps you to obtain, economically, software which is reliable and works efficiently on the real machines.




# BOEHM DEFINITION

The practical application of scientific knowledge to the creative design and building of computer programs. It also includes associated documentation needed for developing, operating, and maintaining them.



## 2. CHANGING NATURE OF SOFTWARE ENGINEERING

Now-a-days, the software landscape has been completely changed . There are 7 various software each for a specific use

- System Software
  - Application Software
  - Engineering and Scientific Software
  - Embedded Software
  - Product Line Software
  - Web Application
  - AI Software
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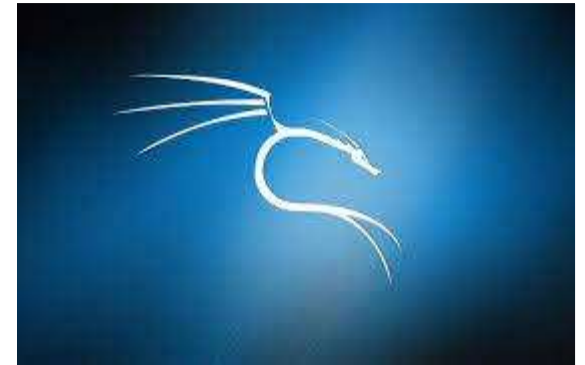
# SYSTEM SOFTWARE

System software is a collection of programs which are written to service other programs. Some system software processes complex but determinate, information structures.

Example : Operating Systems



Mac OS



# APPLICATION SOFTWARE

Application software is defined as programs that solve a specific business need. Application in this area process business or technical data in a way that facilitates business operation or management technical decision making.

Example: MS Office Suite



# ENGINEERING AND SCIENTIFIC SOFTWARE

This software is used to facilitate the engineering function and task.

Computer-aided design, system simulation, and other interactive applications have begun to take a real-time and even system software characteristic.

Example: MATLAB, Stellarium, ORCAD



# EMBEDDED SOFTWARE

Embedded software resides within the system or product and is used to implement and control feature and function for the end-user and for the system itself.

Fly-by-wire control systems found in aircraft.

Motion detection systems in security cameras.



# PRODUCT LINE SOFTWARE

Designed to provide a specific capability for use by many different customers,



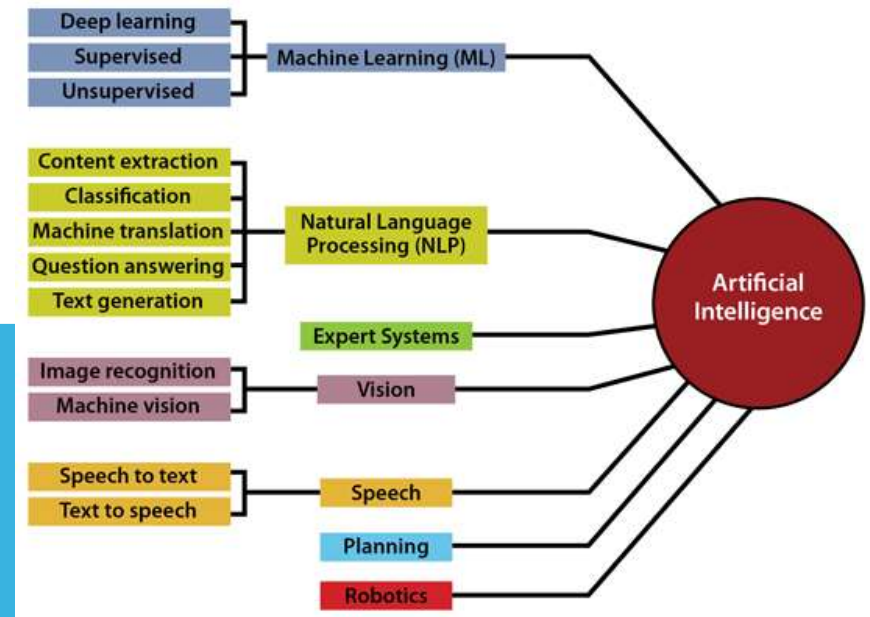
# WEB APPLICATION

It is a client-server computer program which the client runs on the web browser. In their simplest form, Web apps can be little more than a set of linked hypertext files that present information using text and limited graphics.



# AI SOFTWARE

Artificial intelligence software makes use of a non-numerical algorithm to solve a complex problem that is not amenable to computation or straightforward analysis.



# 3. SOFTWARE MYTHS

- ✓ Software Myths
- ✓ Software is easy to change
- ✓ Computers provide greater reliability than the devices they replace.
- ✓ Testing software or 'proving' software correct can remove all the errors.
- ✓ Reusing software increases safety.
- ✓ Software can work right the first time.
- ✓ Software can be designed thoroughly enough to avoid most integration problems.
- ✓ Software with more features is better software.
- ✓ Aim is to develop working programs.

# SOFTWARE MYTHS (CONTD..)

We have all the standards and procedures available for software development i.e. the software developer has all the reqd.

The addition of the latest hardware programs will improve the software development.

Managers think that, with the addition of more people and program planners to Software development can help meet project deadlines (If lagging behind).

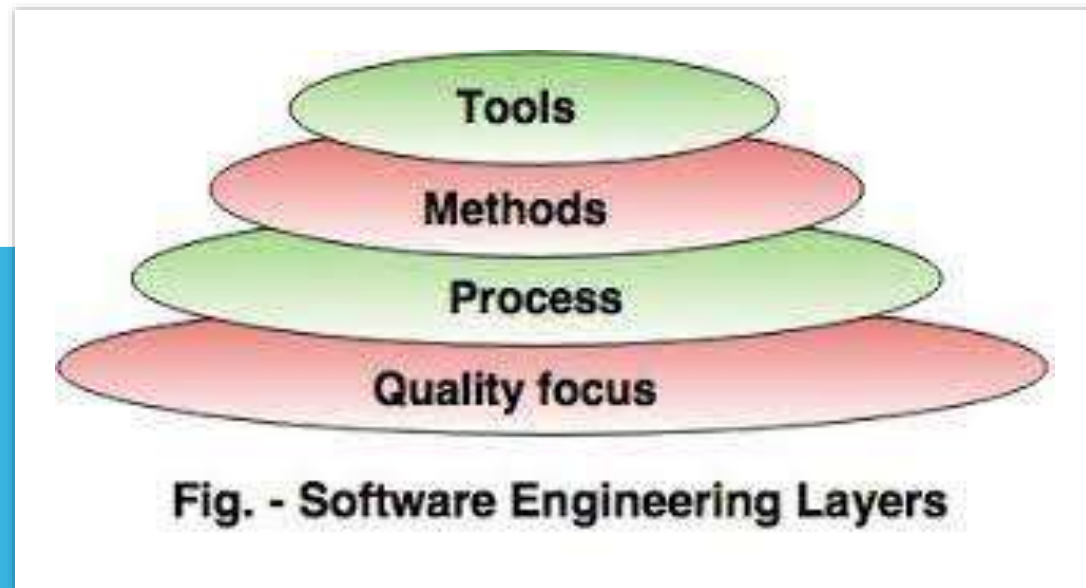


## 4. LAYERED TECHNOLOGY

Software engineering is a fully layered technology.

To develop a software, we need to go from one layer to another.

All these layers are related to each other and each layer demands the fulfillment of the previous layer.



# 5. PROCESS FRAMEWORK

Framework is a Standard way to build and deploy applications. Software Process Framework is a foundation of complete software engineering process. Software process framework includes all set of umbrella activities.

**Contains 5 activities :**

- Communication
- Planning
- Modelling
- Construction
- Deployment.

## 5. PROCESS FRAMEWORK CONTD.

**Under Process framework the umbrella activities include:**

- Risk Management
  - Software Quality Assurance
  - Software Configuration Management
  - Measurement
  - Format Technical Reviews
- 

# 6.CMMI

The Capability Maturity Model Integration (CMMI) is a process and behavioral model that helps organizations streamline process improvement and encourage productive, efficient behaviors that decrease risks in software, product, and service development.

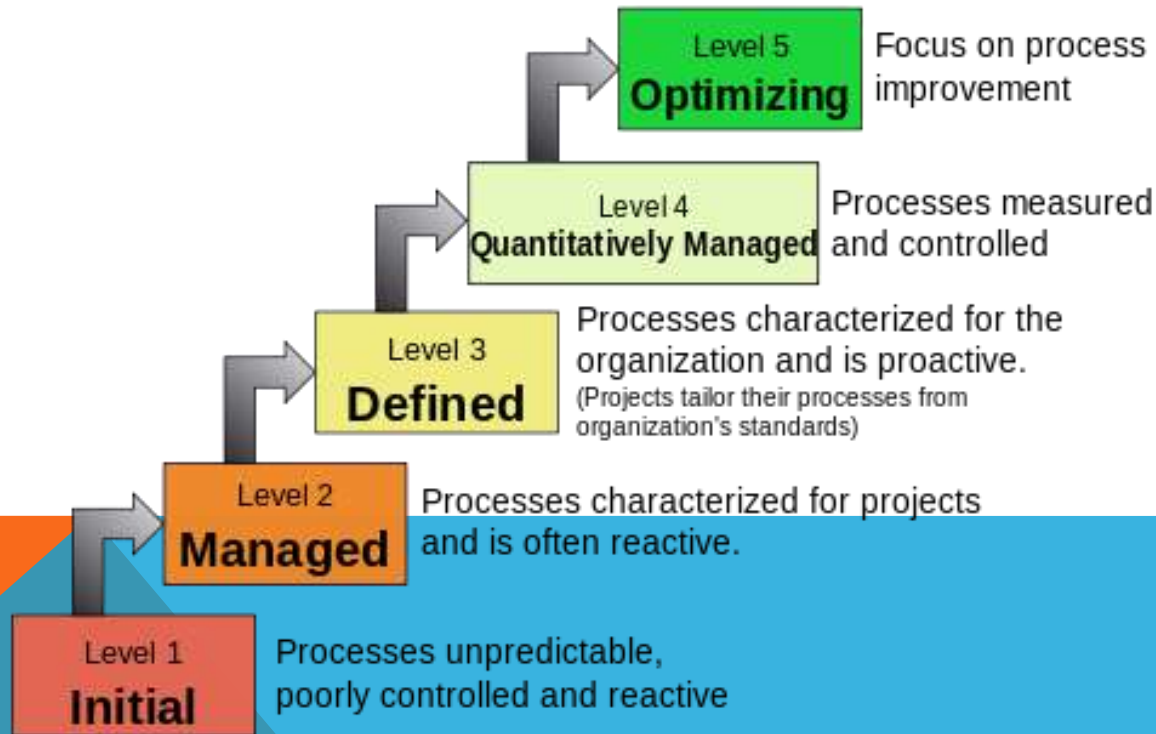
was developed by the Software Engineering Institute at Carnegie Mellon University as a process improvement tool for projects, divisions, or organizations.



**CMMI**<sup>®</sup>

# CMMI LEVELS

## Characteristics of the Maturity levels



# 7.PROCESS PATTERNS

At any level of abstraction, patterns can be defined. They can be used to describe a problem and solution associated with framework activity in some situations. While in other situations patterns can be used to describe a problem and solution associated with a complete process model.

There are 3 types of patterns :

- Stage Pattern :
- Establishing Communication might be an example of a staged pattern
- Task Pattern:
  - Problems associated with a software engineering action or work task and relevant to successful software engineering practice
  - Phase Pattern:
- Even when the overall flow of activities is iterative in nature, it defines sequence of framework activities that occurs within process.

# PROCESS ASSESSMENT

A software process assessment is a disciplined examination of the software processes used by an organization, based on a process model.

The assessment includes the identification and characterization of current practices, identifying areas of strengths and weaknesses, and the ability of current practices to control or avoid significant causes of poor (software) quality, cost, and schedule.

There are 3 types of assessment:

- Self-assessment: Performed Internally by a company's own personnel
- Second Party Assessment: Performed by an external assessment team
- Third Party ; Performed by a third party

# 8.PERSONAL PROCESS MODELS

Personal Software Process (PSP) is the skeleton or the structure that assist the engineers in finding a way to measure and improve the way of working to a great extend.

The aim of PSP is to give software engineers with the regulated methods for the betterment of personal software development processes.

**PSP has 4 levels;**

- Level 0 : Personal Measurement, Basic Size measures, Coding standards
- Level 1: Includes Planning of time and scheduling
- Level 2: Introduces Personal Quality Management design and code reviews.
- Level 3: Personal Process Evolution.

# TEAM PROCESS MODELS

The goal of TSP is to build a “self directed” project team that organizes itself to produce high quality software.

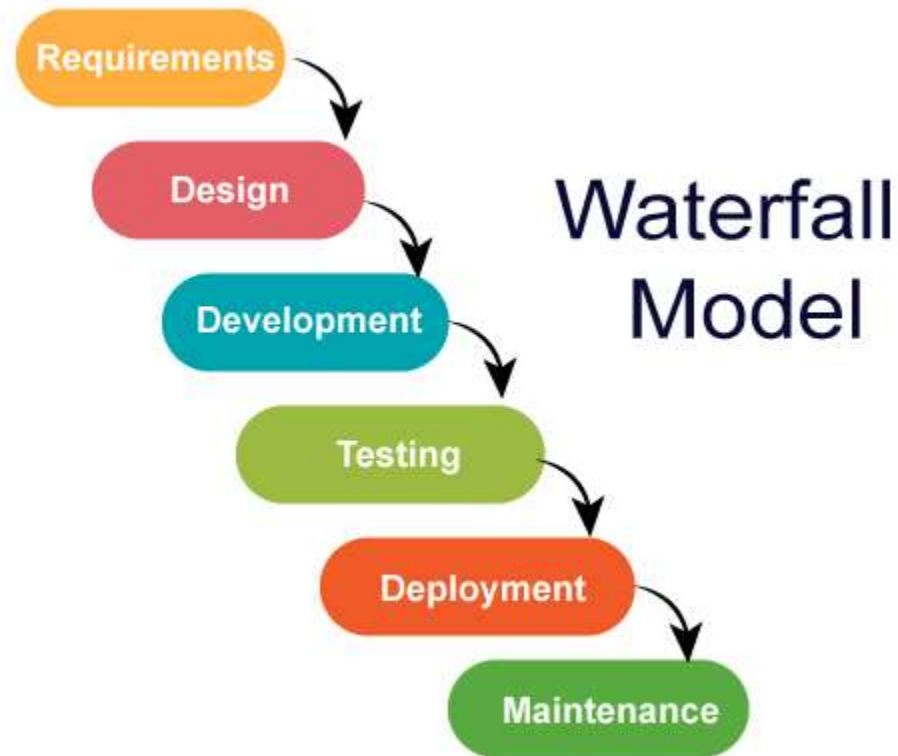
TSP defines the following framework activities: project launch, high level design, implementation, personal and team process model, integration and test, and postmortem.



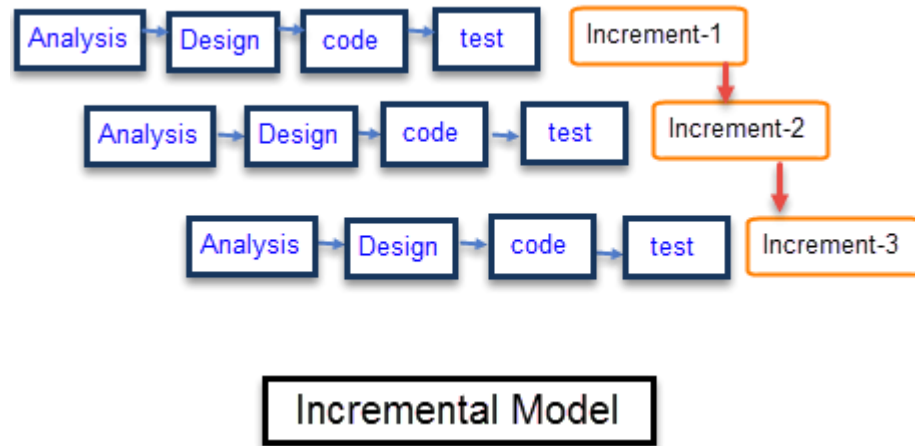
# SDLC



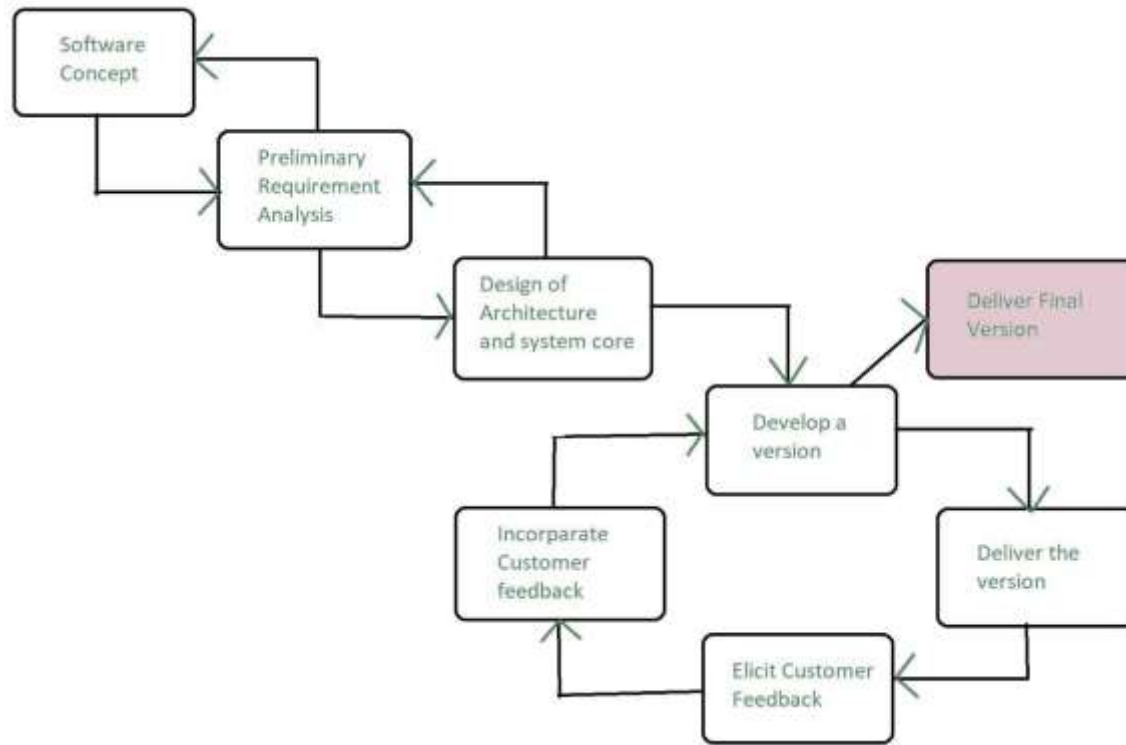
# WATERFALL MODEL



# INCREMENTAL PROCESS MODEL



# EVOLUTIONARY PROCESS MODEL



# UNIFIED PROCESS

