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SE Assignment-1

1) As the technology changes, the user requirements and environment on which software is working also changes. So every organization is ranked based on the software engineering principles used by that organization

Implementing and managing large size of software programmer requires a specific method modulorize the tasks so that size of software can't harm the software quality.

Software engineering provides methodology for implementing complex software system with high quality. Without any standard method or management, it is difficult to address defects in the product and correct them as early as possible. Software engineering provides this functionality. Extending the previous software to add new functionality requires more cost in terms of time to develop and efforts taken by people as compare to the process of developing new software to provide ~~that~~ functionality.

Software engineering provides a way in which software system can be able to scale as needed in future

2] Waterfall Model - Sequential and Linear approach

- each phase must be completed before moving to the next one
- Clear and structured, suitable for projects with well-defined requirements, minimal changes and stable scope
- limited flexibility for changes, difficult to adapt to evolving requirements, potential for late-stage errors discovery

* V-model (Validation and Verification model) - parallel development and testing approach. Each Development phase is followed by a corresponding ~~phase~~ testing phase

- Strong emphasis on validation and verification, clear documentation reduces risks by identifying issues early
- Limited adaptability to changing requirements, potential for Miscommunication between development and testing phases

* Incremental model - Similar to ~~agile~~ iterative model but the software is built in increments each delivering specific functionality
  - Early delivery of functional models, reduced time to market, allows for better integration testing

* Iterative model - Similar to agile, but with more structured and defined phases. Each iteration may include a subset of the software's functionality
  - Allows for iterations, refined features and early feedback, suitable for projects with evolving requirements

3] The CMM models application in software development has sometimes been problematic. Applying multiple models that are not integrated within and across an organization could be ~~easily~~ costly in training appraisals and improvement activities.

- The capability maturity model integration (CMMI) project was formed to sort out the problem of using multiple models for software development processes, thus the CMMI model has superseded the CMM model, though the CMM model continues to be a general theoretical process capability model used in the public domain

- CMMI framework has three groups as
1. CMMI for development (CMMI - DEV)
2. CMMI for service (CMMI - SVC)
3. CMMI for acquisition (CMMI - ACQ)

4] PROCESS

PRESCRIPTIVE MODEL	Evolutionary Process Model
- Dereloped to bring order and Structure to the software dereloprnent process	- Stages consists of growing increments of an operational software product with evolution
- It can accommdate changiy requirement	- Improvement is required in the product
- It is more popular	- Less Popular
- Waterfall model and incremental models are a ~~few~~ examples of prescriptive process model	- e.g Spiral & prototyping model as well as RAD model

5] Incremental model - When a project can be divided into smaller functional ~~requirements~~ increments, allowing certain modules to be developed and delivered independently while ensuring integration and testing along the way

- RAD model - when there is a need to quickly produce a working prototype to gather user feedback and make refinements before proceeding with full development
- Waterfall model - When requirements are stable and changes are minimal making it possible to plan and execute the project in a linear sequence of phases

- Agile model (Scrum) - When Flexibility and adaptability are crucial and the project can be divided into smaller ~~requirements~~ increments with frequent iteration, allowing for continous feedback & changes

6] Waterfall model is the first approach used in software development process. It is also called as classical life cycle model or linear sequential model.
In waterfall model any phase of development process begins only if previous phases in completed.

- Agile software development describes an approach to software development under which requirements and solutions revolve through the collaborative effort of self-organising & cross functional teams and their customers.

- It advocates adaptive planning, evolutionary development, early delivery and continual improvement and it encourages rapid and flexible responses to change

- The term agile was popularized in the context by the manifesto for agile software development

7] *Waterfall

i] Development Speed:

- Waterfall is a linear and sequential methodology where each phase must be completed before moving on the next. This can lead to longer development process

Metrics: Time taken for each phase (requirements, design, development, testing, deployment)

ii] Adaptability to change:

- Waterfall is less adaptable to changes in requirements due to its rigit structure

metrics: number of change requests, impact analysis time and delays caused by change requests.

iii] Customer Satisfaction:

- Waterfall may have limited customer involvement until the end which could affect satisfaction

metrics: Customer feedback at the end of the project post-deployment support requirements.

* Agile (Scrum & kanban)

i] Development speed:

- Agile methodologies emphasize incremental development, ~~feature~~ allowing for quicker delivery of working features

metrics: number of user stories completed per sprint of cycle time, velocity

ii] Adaptability to change

- Agile methodologies are highly adaptable to changing requirements due to regular iterations & flexibility

metrics: Number of changes incorporated per sprint/cycle, time taken to respond to change requests

iii) Customer Satisfaction

- Agile methodologies involve continous customer feedback and collaboration, leading to improved satisfactin

Metrics : Regular customer feedback scores, frequency of customer involvement

8) features	Waterfall model	Incremental model	Prototyping model	Spiral model
Requirement specification	Well understood	not well understood	Not well understood	well understood
Understanding requirements	well understood	not well understood	not well understood	well understood
Availability of reusable components	No	Yes	Yes	Yes
Risk Analysis	only at beginning	No risk Analysis	no risk analysis	YES
User involvement	Only at beginning	intermediate	high	high
Implementation time	long	less	less	depends on project
Flexibility and expertise required	rigid, high	less, high	high, medium	flexible, high
cost control	Yes	no	no	Yes
resource control	yes	yes	no	yes