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SE- Assignment-1

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1] What is significance of recognizing software requirement in the software engineering process?

→ As, the technology changes, the user requirements & environment in which software is working also changes. So every organization is worked based on the software engineering principles used by that organization.

Implementing & managing large size of software programmes require a specific method modularize 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.

Extending the previous software to add new functionality require more cost in terms of time to develop & 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) Describe the main characteristics of different process models used in software development.

→ * Waterfall model - Sequential & linear approach. Each phase must be completed before moving to the next one.

- Clean & structured, suitable for projects with well-defined requirement, minimal changes & stable scope.
- Limited flexibility for changes, difficult to adapt to evolving requirement, potential for late-stage errors discovery.

* V-model & (Validation & Verification model) :- Parallel development & testing approach. Each development phase is followed by a corresponding testing phase.

- Strong emphasis on validation & verification & documentation reduce risk by identifying issues early.
- Limited adaptability to changing requirement potential for miscommunication between development & testing phases.

* Incremental model - Similar to iterative models, but the software is built in increments, each delivering specific functionality.

- Early delivery of functional modules, reduce time to market, allows for better integration testing.
- Require careful planning to define increments, possible integration challenges.

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3.] How does the capability maturity model (CMM) contribute to improving software development process?

→ The CMM models application in software development has sometimes been problematic. Applying multiple model that are not integrated within & across an organization could be costly in training apparatus and implement activities.

The capability maturity model integration (CMMI) project was to sort out the problem of using multiple model for software development process, 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 consist of a collection of computer programs based on knowledge, engineering, software engineering, integrated product & process development & process sourcing.

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

4] Explain the difference between prespective process models & evolutionary process models.

⇒ Prespective process model

- Developed to bring order & structure to the software development process.

- It can accomodate changing requirement.

- It is more popular.

- Waterfall model & incremental models are a few examples of prespective models.

Evolutionary process model

Stage consists of growing increment of an operational software product, with evolution.

Improvement is required in the product.

It is less popular.

Eg: Spiral & prototyping model as well as RAD model.

5] Provide Examples of situation where using a specific process model would be more suitable.

→ Incremental model - When a project can be divided into smaller functional increments, allowing certain modules to be developed & delivered independently with ensuring integration & testing along the way.

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RAD model - When there is a need to quickly produce a working prototype to gather user feedback & make requirements before proceeding with full development.

- Waterfall model - When requirements are stable & changes are minimal, making it possible to plan & execute the project in a linear sequence of phases.
- Agile model (Scrum) - When flexibility & adaptability are crucial & the project can be divided into small increments with frequent iteration, allowing for continuous feedback & changes.

6] Compare & contrast the waterfall model & agile methodologies in terms of project planning & progress tracking.

→ Waterfall model is the first approach used in software development process.

- It is also called as classical life cycle model or linear sequential model any phase of development process begins only if previous phase is completed.
- A cycle software development describes an approach to software development under which requirement & solution evolve through the collaborative effort of self-organizing & cross functional teams & their continuous

It adequately adapts planning, evolutionary development, early delivery & ~~continuous~~ improvement & it engenders rapid & flexible responses to change.

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

7] Apply various metrics to evaluate the efficiency & effectiveness of waterfall, agile (Scrum & Kanban) methodologies, considering factors such as development speed, adaptability to change & customer satisfaction.

→ 4. Waterfall:- Development Speed:-

Waterfall is a linear & sequential methodology where each phase must be completed before moving to the next. This can lead to longer development cycles.

- Metric: Time taken for each phase (Requirement design, development, testing, deployment).

Adaptability to Change:-

Waterfall is less adaptable to changes in requirement due to its rigid structure.

- Metric: Number of change requests, impact analysis, time & delays caused by change requirement.

• Agile (Scrum & Kanban):

Development Speed:

- Agile methodology emphasize incremental development allowing for quicker delivery of working features
- Metrics: Number of user stories completed per sprint or cycle time, velocity

Adaptability to Change:

Agile methodologies are highly adaptable to changing requirement due to regular iteration & flexibility.

Metric: No. of changes implemented per sprint / cycle & time taken to respond to change requests.

Customer Satisfaction:

- Agile methodologies involve continuous customer feedback & collaboration; leading to improved satisfaction
- Metrics: Regular customer feedback scores, frequency of customer involvement.

8] Justify the relevance of the following comparisons for software development models.

Features	Waterfall Model	Incremental Model	Prototyping model	Spiral Model
Requirement Specification	Well Understood	Not well Understood	Not well Understood	Well Understood
Understanding Requirement	Well understood	Not well Understood	Not well understood	Well Understood
Availability of reusable components	No	Yes	Yes	Yes
Risk Analysis	Only at the beginning	No risk analysis	No risk Analysis	Yes
User involvement	Only at the beginning	Intermediate	High	High
Implementation time	Long	less	less	Depend on project
Expertise require	High	High	Medium	High
Cost control	Yes	No	No	Yes
Resource Control	Yes	Yes	No	Yes