S.E Assignment - 1

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1. What is the significance of recognizing software requirements in the software engineering process?

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 or specific method modularize the tasks so that size of software can't harm the Quality.

- Software engineering provides methodology for implementing complex software systems 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 term of time to develop and efforts taken by people, as compare to the p

of developing new ~~significance~~ software to provide that functionality.

- Software engineering provides a way in which software syste 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 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 & verification model) - Parallel development & testing approach. Each development phase is followed by a corresponding testing phase strong emphasis on validation & verifica clear documentation, reduces risk by identifying issues early

- Limited adaptibility to changing requirements, 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, reduced time to market, allows for better integration testing

Requires careful planning to define increments, possible integration challenges.

- Iterative model :- Similar to agile, but with more structured & defined phases. Each iteration may include a subset of the software's functionality
- Allows for iterations, refined features, & early feedback, suitable for projects with evolving requirements.
- Requires clear planning & co-ordination between iterations, potential for scope creep.

(8) 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 models that are not integrated within and across an organization could be costly in training appraisals, & improvements activities.

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was formed to sort out the problem of using multiple models for software development process, thus the C model has superseded the CMM model, though the CMM model continues to be a general theoritical process capabi model used in the public domain.

CMMI framework consists of a collection of computer prog

based on knowledge, engineering, software engineering, integrated product & process development & provider sourcing.
- CMMI framework has three groups:-
① CMMI for development (CMMI-DEV)
② CMMI for service (CMMI-SVC)
③ CMMI for aquisation (CMMI-ACQ)

④ Explain the differences between prescriptive process models & evolutionary process models

Prespective process model

① Developed to bring order & structure to the software development process.

② It can accomodate changing requirement

③ It is more popular

④ Waterfall model & incremental models are a few examples of prespective process model

Evolutionary process model.

① Stages consists of growing increments of an operational software product with evolution.

② Improvement is required in product.

③ It is less popular

④ Spiral & prototyping model as well as RAD model

⑤ Provide examples of situations 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 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 adaptibility are crucial and the project can be divided into smaller increments with frequent iterations, allowing for continuous feedback and changes.

6. Compare and contrast the Waterfall model and agile methodologies in terms of project planning and 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
- In water fall model any phase of development process begins only if previous phase is completed.

- Agile software development [illegible] approach to software development under which requirements and solutions evolve through the collaborative effort of self-organizing and cross functional teams and their customers.
- It advocates adaptive planning, evolutionary development, early delivery, and continual improvement, and it encourages rapid and flexible response to change.
- The term agile was popularized, in this context, by the Manifesto for agile software development.

2. Apply process metrics to evaluate the efficiency and effectiveness of waterfall, agile (both scrum & Kanban) methodologies, considering factors such as development speed, adaptability to change and customer satisfaction.

1. Waterfall

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

Adaptability to change:

- Waterfall is less adaptable to changes in requirements due to its rigid structure.
- Metrics: Number of change requests, impact analysis time and delays caused by change requests

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.

2. Agile (Scrum & Kanban):

Development Speed:

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

Adaptability to change:

- Agile methodologies are highly adaptable to changing requirements due to regular iterations and flexibility.
- Metrics: Number of changes incorporated per sprint/cycle, time take to respond to change requests.

Customer satisfaction:

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

8. Justify the relevancy of the following comparision 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 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	Rigid	Less	High	Flexible
Expertise required	High	High	medium	High
Cost control	Yes	No	No	yes
Resource control	yes	yes	No	yes