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TE Comps B

SE - Assignment 1

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 program requires 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 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 terms of time to develop and efforts taken by people, as compared 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 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 and testing approach. Each development phase is followed by a corresponding testing phase.
* Strong emphasis on validation & verification clear documentation; reduces risk by identifying issues early.
* Limited adaptibity to changing requirements potential for miscommunication between development and testing phases.
* Incremental model - Similar to iterative models but the software is built in increments, each delivering specific functionality.

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* 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 Softwares functionality.
* Allows for iterations, refined features, and early feedback, suitable for projects with evolving requirements.
* Requires clear planning & co-ordination between iterations, potential for scope creep.
* 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 approaches & improvement 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 CMMI model has superseeded the CMM model, though the CMM model continues to be a

general theoretical process capability model used in the public domain.

- CMMI framework consists of a collection of computer programs based on knowledge engineering, software engineering, integrated product and process development and provides sourcing

- 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. Explain the differences between prescriptive process models & evolutionary process models.

Prespective process model	Evolutionary process model
• Developed to bring order & structure to the software development process	• Stages consists of growing increments of an operational software product with evolution.
• It can accomodate changing requirement • It is more popular • waterfall model & incremental models are a few examples of prespective process model.	• Improvement is required in the product • It is less popular. eg: spiral & proto typing model as well as RAD model.

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Provides 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 & delivered independently while ensuring integration & testing along the way.
- RAD model - When there is a need to quickly produce a working prototype to gather users feedback & 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 & adaptibility are crucial & the project can be divided into smaller increments with frequent iterations, allowing for continuous feedback & changes.
- Compare & contrast the waterfall model & agile methodologies in terms of project planning and progress tracking.

- Waterfall model is the first approach used in software development procen.
- It is also called as classical life cycle model or linear sequential model.
- In waterfall model any phase of development procen begins only if previous phase is completed.
- Agile software development describes an approach to software development in clear which requirements & solutions evolve through the collaborative effort of self-organizing & cross-functional teams & their customers.
- It advocates adaptive planning, evolutionary development, early delivery and continual improvement & it encourages rapid and flexible response to change.
- The term agile was popularized, in this context by the Manifesto for agile software development.

7. Apply procen metrics to evaluate the efficiecy and effectiveness of waterfall, agile (both scrum & kanal methodologies, considering factors such as development speed, adaptability to change & customer satisfaction

1. Waterfall
Development speed:
waterfall is a linear & 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 requirement due to its rigid structure.
- Metrics: Number of change requests, impact and your time + delays caused by change required

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 time, velocity.

Adaptability to change.

- Agile methodologies are highly adaptable to changing requirements due to regular iterations + flexibility
- Metrics: Number of changes incorporated per sprint cycles time taken to respond to change requests.

Features	Waterfall model	Incremental Model	Prototype model	Spiral model
Requirement specification	well understood	Not well understood	no 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	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