

ASSIGNMENT-3

Research and compare SDLC models suitable for engineering projects. Present findings on waterfall, Agile, Spiral and V-Model approaches emphasizing their advantages, disadvantages and applicability in different engineering contexts.

There are so many different SDLC models in software engineering. Choosing the right SDLC Model depends on various factors such as **project requirements, timelines, budget, Project Complexity, team expertise** etc. However, each software development methodology has some significant distinctions that we may proceed from. The main difference between the models is that they all **plan the necessary development activities and steps in different ways**. That's why the development teams choose the model according to their project needs and requirements.

there is a comparison of SDLC models suitable for engineering projects, focusing on the Waterfall, Agile, Spiral, and V-Model approaches.

1. Waterfall model-

The Waterfall model is a linear and sequential approach to software development where each phase must be completed before moving on to the next one, similar to the downward flow of a waterfall. It is best suited for:

- Projects with well-defined, stable requirements.
- Simple projects with a fixed timeline and budget.
- Projects using familiar technology.
- Projects with fixed requirements not rapidly changed.

Advantages:

- Each phase has specific documentation, facilitating progress tracking and project management.
- Suitable for projects with stable and well-defined requirements from the start.
- Enables better predictability in timelines and deliverables, aiding in effective project planning and resource allocation.

Disadvantages:

- Difficulty in accommodating any changes due to the model's inflexible nature, as each stage fully depends on the previous one.
- Testing conducted after implementation, leading to potential late discovery of defects in the process.
- Clients are mainly involved in the initial phase, making significant changes difficult later in the development process.

2. Agile-

Agile is an iterative approach that breaks the project into smaller increments. The development and testing activities are concurrent, with each increment going through a full software development cycle. It is suitable for:

- Projects with rapidly changing requirements.
- Projects with a high degree of uncertainty.
- Projects required early and continuous delivery.
- Projects with a collaborative team and stakeholders.

Advantages:

- The Agile model allows for changing requirements even late in development.
- It delivers working software frequently.
- Promotes sustainable development with regular interactions.

Disadvantages:

- Agile model requires a skilled and collaborative team for the project.
- It heavily depends on customer involvement.
- Difficult to estimate the overall project timeline and cost.

3. Spiral Model-

The Spiral model combines elements of the Waterfall and Agile models. It focuses on risk assessment and it has four phases: **planning, risk analysis, development**, and **Review and plan next phase**.

This model is suitable for:

- Those Projects have high risk and changing requirements continuously.
- Projects requiring early prototyping and user feedback.
- Projects with a large budget and experienced team.

Advantages:

- Allows for early prototyping and user feedback.
- Focuses on risk assessment and mitigation.
- Suitable for large, complex projects with changing requirements.

Disadvantages:

- Requires a skilled team with risk assessment expertise
- Can be time-consuming and costly
- Difficult to estimate the overall project timeline and cost

4. V-model-

The V-Model is an extension of the Waterfall model that emphasizes **testing**. It has a testing phase corresponding to **each development phase**.

It is suitable model for:

- Projects with strict quality control requirements.
- Projects with well-defined and stable requirements.
- Projects that have a high cost of failure.

Advantages:

- V- model emphasizes testing and ensuring high-quality output product.
- It is suitable for projects with strict regulatory requirements.
- It provides a clear roadmap with defined deliverables for each phase.

Disadvantages:

- The V-Model progresses linearly without the ability to revisit previous stages leading to limited adaptability.
- All project requirements must be clearly identified and documented at the beginning, which is a barrier to adjustments.
- Testing and integration in the V-Model occur towards the end of the project, raising risks as issues may impact project timelines and quality.

In summary, the choice of SDLC model depends on the specific requirements of the engineering project. A combination of models may also be used to leverage the strengths of each approach.