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.

SDLC Models for Engineering Projects : A Comparative Analysis

1. Waterfall Model

- ✓ **Advantages:** Structured, predictable, clear documentation, easy to manage for small, well-defined projects.
- ✓ **Disadvantages:** Inflexible, changes are difficult to implement later stages, high risk of project failure if requirements are unclear at the outset.
- ✓ **Applicability:** Suitable for projects with well-understood requirements and limited changes anticipated. (e.g., Building a bridge with pre-defined specifications)

2. Agile Model

- ✓ **Advantages:** Flexible, adaptable to changing requirements, faster feedback loop, promotes collaboration between developers and stakeholders.
- ✓ **Disadvantages:** Requires strong team communication and discipline, may not be suitable for projects with strict deadlines or complex dependencies.
- ✓ **Applicability:** Ideal for projects with evolving requirements, rapid iteration cycles, and a need for early user feedback. (e.g., Developing a new software application with changing functionalities)

3. Spiral Model

- ✓ **Advantages:** Combines features of Waterfall and Agile, risk-driven approach minimizes project failures, allows for iterative development with risk mitigation at each stage.
- ✓ **Disadvantages:** Complex to manage, requires experienced project managers, can be time-consuming for smaller projects.
- ✓ **Applicability:** Highly beneficial for large, complex projects with significant risks and uncertainties. (e.g., Developing a new spacecraft or medical device)

4. V-Model

- ✓ **Advantages:** Emphasis on early and rigorous testing, ensures quality throughout the development lifecycle, reduces late-stage defects.

- ✓ **Disadvantages:** Similar to Waterfall, inflexible for changing requirements, requires upfront planning of testing procedures.
- ✓ **Applicability:** Suitable for projects with stringent safety or regulatory requirements, where early defect detection is crucial. (e.g., Developing safety-critical systems for nuclear power plants or airplanes)

Choosing the Right Model –

The optimal SDLC model depends on several factors, including:

- ✓ **Project size and complexity:** Larger projects with more unknowns may benefit from the risk-mitigation of Spiral models, while smaller ones might thrive with Agile's flexibility.
- ✓ **Requirement clarity:** Waterfall excels with clear upfront requirements, while Agile is better suited for evolving needs.
- ✓ **Project deadlines:** Agile's iterative approach allows for faster delivery of working features, while Waterfall provides a more predictable timeline.
- ✓ **Project risk:** V-Model and Spiral models prioritize risk identification and management, which is crucial for projects with high-impact potential failures.
- ✓ By considering these factors, engineering teams can choose the SDLC model that best supports their project goals and maximizes the chances of success.