Agile Methodologies

1. **Waterfall Model:**

    - Waterfall model is a sequential model that divides software development into pre defined phases.
    - Each phase must be completed before the next phase begin with no overlapping between the phases.
    - When to use: Requirements are clear & project is short.

2. **Iterative Waterfall Model:**

    - Iterative waterfall model provides feedback path from every phase to its preceding phases.
    - Feedback paths allow the phase to be reworked in which errors are committed and these changes are reflected in later phases.

3. **Incremental Model:**

    - Incremental model is a process of software development where requirements are broken down into multiple standalone modules.
    - Each iteration passes through requirements, design, coding and testing phases.
    - Each subsequent release adds functions to the previous release until all the design functionality had been implemented.
    - The first increment is often a core product where the basic requirements are addressed and the supplementary features are added in the next increment.
    - When to use: When the requirements are superior ; When customer demands a quick release of the product & A project has a lengthy development schedule.

4. **Spiral Model:**

    - Couples the iterative feature of prototyping with the controlled or systematic aspects of the linear sequential model.

- It allows the incremental releases of the product or incremental refinement through each iteration around the spiral.
- When to use: Deliverance required to be frequent ; requirements is not clear ; changes may require at any time ; large and high budget projects.

5. WIN WIN Spiral Model:

- At the beginning of each pass of the spiral, the negotiation activities are carried out in a WIN WIN spiral model.
- The process of negotiation means the compromise has to be faced by the customers and developers. When both sides agree, only then successful negotiation occurs.
- Customer's win: Obtaining the system that fulfills most of the requirements of the customer.
- Developer's win: Getting the work done by fulfilling most of the realistic requirements of the customer in a given deadline and achievable budgets.

6. Prototyping Model:

- Prototyping is defined as the process of developing a working replication of the product or system that has to be engineered.
- Prototype of the end product is first developed, tested and refined based on customer feedback repeatedly until a final acceptable prototype is achieved which forms the basis for developing a final product.
- When to use: When the requirements of the product are not clearly understood or changing quickly ; Used for developing user interfaces, high technology software intensive system, system with complex algorithms and interfaces.

7. Concurrent Model:

- Also known as concurrent engineering which can be schematically represented as series of framework activities, actions of tasks and their associated states.

- Moves from one state to another state.
- Communication activity is completed in the first iteration.
- Modelling activity will finish the communication activity initially and then move to the underdevelopment state.
- If the customer specifies any change in the requirement then the modelling moves from underdevelopment state to awaiting change state.

8. Unified Model:

- Architecture centric, usecase driven, iterative & incremental model.
- Phases: Inception, Elaboration, Conception, Transition & Production.
- Inception: Business requirements for the software is identified & rough architecture of the system is proposed.
- Elaboration: Creating an executable architecture baseline which acts as the first cut for executable system.
- Conception: All the necessary features of the software are implemented in source code.
- Transition: Software is given to end users for testing and feedback for both defects & necessary changes.
- Production: The ongoing use of the software is monitored and support for the infrastructure is provided.

9. Agile Model:

- Agile refers to something that is quick or adaptable.
- A software development approach based on iterative development.
- Divide projects into smaller iterations and avoid long term planning.
- Scope and requirements of the project are defined at the start of the development phase.
- Each iteration is a small time frame that lasts anywhere from 1 to 4 weeks.

10. Agile Methodologies:

- Crystal.
- Scrum.
- Feature-driven development.
- Lean development.
- Dynamic software development method.
- Kanban.
- Extreme programming.

11. Scrum:

- Manage tasks in team based development conditions.
- Scrum is executed by small team of between 7 to 9 people including scrum master and product owner.
- In scrum, project is divided into cycles (2 to 3 weeks) called sprints.
- Sprints refer to the timebox in which set of features must be developed.
- Multiple sprints are combined to release the software product.

12. Extreme Programming:

- It is very helpful when there is constantly changing the demands or requirements from the customers or when they are not sure about the functionality of the system.
- Frequently releases the product in short development cycle which inherently improves the productivity of the system and also introduces a checkpoint where any customer requirement can be easily implemented.
- Develops software by keeping customer in the target.

13. Crystal:

- Chartering: Creating a development team, performing a preliminary feasibility analysis, developing initial plan, fine tuning the development methodologies.

- Cyclic delivery: The main development phase consists of two or more delivery cycles.
- Wrap up: Deploying the software in user environment, post deployment reviews.

14. Dynamic Software Development Method:

- Rapid application development strategy for software development.
- Gives an agile project distribution structure.
- Users must be actively connected and teams have been given the right to make decisions.

15. Feature Driven Development:

- Providing clients with timely updated and functional software.
- At all levels of FDD, reporting and progress tracking is required.
- The designing and building features are the center of this method.

16. Lean Software Development:

- Goal is to speed up the software development by lowering costs.
- Step1: Eliminating waste.
- Step2: Amplifying learning.
- Step3: Defer commitment.
- Step4: Early delivery.
- Step5: Empowering the team.
- Step6: Building integrity.
- Step7: Optimize the whole.

17. Kanban:

- Japanese word that refers to a card that contains all of the information required to complete a product at each stage of its journey to completion.
- Kanban in software testing is all about showing project status such as what's waiting to be picked up in a backlog, what's work is now in progress and what's work is finished.

18. Difference Between Verification & Validation.

- Verification: Are we building the product right?
- Validation: Are we building the right product?