PMM ASSIGNMENT

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# Iterative Development Methodologies

1. Agile development: Agile methodology is one of the most utilized approaches in the IT industry today, even some software methodologies are based on agile principles. It is used to design a software management process, which allows regular interaction in the development project for the project team members. Agile mainly focuses on the end product, as it contains short-term development cycles called iterations. Each iteration is like a mini software project, it lasts about 1 to 4 weeks. The various tasks in the iterations include planning, analysing, adding new functionalities, designing, coding, testing, documenting and etc . When the number of iterations starts increasing, the development team starts to re-examine the project regularly, as regular re-examination helps to get a better version of every iteration and therefore will create a successful end product release. This iteration process of agile also helps to reduce risk in the software development projects (Oladele, 2022) .
2. DevOps: DevOps is a combination of development and operations. Usually, these two entities work independently of each other, but DevOps combines the two in the software development life cycle, as combining these two leads to great benefits such as improved efficiency, faster development of software and good product quality (Lombardi, 2021) .
3. Spiral Model: Spiral methodology involves four phases in its development process, and each phase goes through in a spiral or cycle, after each cycle for the phases, they advance to a new iteration in development. It is the developers that make each phase pass through in a spiral or cycle. The 4 phases of the spiral model are:

* Planning: The developers identify and understand the objectives at this stage of the phase.
* Risk analysis: The developers will try to identify and reduce the risks undertaken in the development stage of the project.
* Engineering: The developers will build, design, and develop the product based on the previous phases.
* Evaluation: The developers will assess the status of the entire project and arrange plans for the next iteration.

Unlike the waterfall model, the spiral model allows the developers to make changes in the code or design when it is in the testing stage .

(Lombardi, 2021) (Oladele, 2022)

1. RAD: RAD stands for Rapid Application Development , as the name itself tells us that , it provides quicker software development . Not only that, with quicker development it also provides high-quality, this is due to the active user participation in the development process. Prototyping, user testing, reusing software components, utilizing focus groups for requirement gathering, informal communication and etc are all used in RAD in order to improve the quality of the software product development . The main objective of RAD is always to accelerate the entire software development process. RAD also has a great flexibility between the developers and the clients , as the developers will adjust their requirements from feedback received form the clients , as this methodology will also lead to greater client satisfaction (Oladele, 2022) (Lombardi, 2021) .

# Agile approach vs Waterfall approach

* Project planning involves activities such as Timeline, budget and staff working method.
* Project execution involves tasks such as: Status reports, quality and changes.
* Project closing involves: Evaluation and client involvement.

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| Agile approach | Waterfall |
| Timeline: Agile does not have a fixed timeline, as the schedule changes depending on the project progress (Hoory & Bottorff, 2022) . | Timeline: Waterfall has a fixed timeline, as the start to the end of the project is already mapped out from the beginning (Hoory & Bottorff, 2022) . |
| Budget: The budget is more flexible with the Agile, as it is willing to allow changes of spending during the middle of the project, or even towards the later phase of the project (Hoory & Bottorff, 2022) . | Budget: The budget is fixed, meaning that the budget amount will not change during the progress of the project (Hoory & Bottorff, 2022) . |
| Staff working method: Agile allows the team members to work simultaneously on different phases of the project (Hoory & Bottorff, 2022) . | Staff working method: Waterfall is a sequential linear of system, meaning that the project team must complete a certain project phase to move to the next project phase (Hoory & Bottorff, 2022). |
| Status reports : Tracking of status is also made regularly , as the approach of tracking status is different in Agile . As progress is measured in each sprint (Freeman, 2022) . A sprint is a short period of time in the project team will work together to complete a set amount of work or specific goals (Hakes, 2022). The project teams measures the sprints and sends the sprint reports to the project stakeholders . Another way of tracking project progress is through the demo of the built functionality (Freeman, 2022) . | Status reports: In the Waterfall approach status reports are executed regularly to analyse development. The project managers also create weekly reports of the status and sends it to the project stakeholders, such as, the project sponsors, upper management, staff members and etc (Freeman, 2022) . |
| Quality: Agile is best suited when project teams when to progress faster in the project. Also, there is overall more checking of progress in Agile development than Waterfall, so therefore more checking of progress helps to maintain the quality of the project (Hoory & Bottorff, 2022). | Quality: Waterfall is a better approach in terms of, if a project must meet strict regulations such as completing a project phase at a certain time. This type of discipline action can help maintain the quality of the project, in terms of avoiding project delays, as project delays can cause bad reputation with the clients and customers (Hoory & Bottorff, 2022) . |
| Changes: Agile development is able to adapt to changes, such as taking in new information even at a later stage of the project (Hoory & Bottorff, 2022) . | Changes : Waterfall model is not adaptive , as it cannot make changes during the middle of the project . For example, if a defect is found, the entire process needs to start over (Lutkevich, 2022) . |
| Evaluation: Agile development has an adaptive life cycle, and the projects are completed iteratively in a cycle (Lees, 2021). | Evaluation: Waterfall has a predictive life cycle, as projects are completed in a sequential order (Lees, 2021). |
| Client involvement: Agile includes clients in the project development at every step (Hoory & Bottorff, 2022) . | Client involvement: Waterfall does not involve any client feedback during the ongoing process of the project, because the course of the project is already outlined from the beginning (Hoory & Bottorff, 2022) . |

# Recommendations on how to integrate agile practices into a large-scale software engineering organization

* Consider team-coordination as top priority: If a large-scale software enterprise wants to implement a project with a Scrum like project management method (Scrum is a common Agile project management method) the scrum team needs to know their roles. Firstly , they need to identify what information will flow between them and other development teams , and secondly they need to identify , analyse and resolve coordinating issues and risks that might broad across the entire project as a whole . A special scrum team needs to be coordinated properly and needs to be shown topmost importance, to for the project to succeed (Ozkaya, et al., 2015).
* Use an architectural runway to manage technical complexity: What is a technical complexity? Technical complexity is sometimes found in projects , its when they are design problems associated with products that have never been produced before , or with techniques that are unknown or not been tried before (Khinda, 2015) . That is where architectural runway can help, the architectural runway goal will be to bring stability to support future iterations of development. That stability will be very important to multiple teams working in the project (Ozkaya, et al., 2015) .
* Align feature-based development: Some Agile teams will implement a feature in the components of the system, as by them doing that, this will give them the ability to focus on something that has stakeholder value. This is also known as vertical alignment. The main aim of creating this feature-based development, is to provide flexibility in aligning teams vertically or in combination, and to minimize dependencies of software modules, so that they can be faster progression (Ozkaya, et al., 2015).
* Adapt leadership styles : Managers telling subordinates what to do and how to do it , kills the creativity and innovation . For a team to have agile leadership styles in a large organization , the agile manager needs to start being like a servant leader , and also help the team explore options , make decisions and continuously improve . Agile teams need to be cross-functional for them to work efficiently in a large organization (Morgan, 2021) . Cross-functional means groups of people from various departments in an organization, who work together in order to achieve a common goal (Organ & Bottorff, 2022) .
* Having the right people on the team : For example , If the Agile team goal is to produce quality product at a faster rate , they cannot just have developers on their team . They need to include a Scrum Master , tester , UX/XI designer , operations professional and etc (Morgan, 2021) .

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