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### The Waterfall Model

Software engineers and product developers commonly use waterfall models to learn about the software development life cycle (SDLC). Steps are logically sequenced in the waterfall model. Each phase of development has distinct endpoints or goals that cannot be revisited once completed, similar to the direction water flows over a cliff. [4]

Projects that are well documented, have defined requirements, have ample resources, have an established timeline, and are using technology that is well understood are ideal for waterfall methodologies. Spiral models, agile project management (APM), sync-and-stabilize, and joint application development (JAD) are alternatives to waterfall. [4]

#### Advantages of the waterfall model:

- A common goal can be achieved through clear documentation and planning stages.
- Ensures a disciplined, structured organization.
- Tasks can be easily understood, followed, and arranged.
- Manages departments according to schedules and deadlines.
- Becomes accustomed to defining before designing, then coding.
- Easy modification of specifications or designs at an early stage.
- Establishes clear deadlines and milestones. [4]

#### Disadvantages of the waterfall model:

- When a flaw is discovered in a design, the entire process needs to be re-done.
- Ignores the possibility of receiving feedback from clients or users during the process and making changes as needed.

- Postpones testing until after the development cycle is complete.
- Error correction is not considered.
- It does not respond well to requests for adjustments, updates, or changes.
- By preventing overlap between processes, efficiency is reduced.
- As the life cycle progresses, a working product is not available.
- Not suitable for completing complex, high-risk, ongoing, or object-oriented projects [4]

### The Agile Model

A vision for a business need can be transformed into a software solution using the Agile software development methodology. Described as continual planning, learning, improvement, collaboration, evolutionary development, and early delivery, agile software development emphasizes continuous planning, learning, and improvement. Adaptability to change is encouraged. [1]

#### Advantages of the agile model:

- Agile methodologies are unremitting in their delivery of software.
- As a result of the software features being delivered to the customers after every Sprint, they are happy with the product.
- The working feature which made customers happy can be viewed by them.
- The current release of the product can accommodate any feedback or changes requested by the customers.
- Business people and developers must interact daily in Agile methodologies.
- The product design is taken into account in this methodology.
- Even in the later stages of development, changes in requirements are accepted.
- Organizational synergy can be improved through Agile/Scrum approaches that break down organizational barriers and foster trust and partnership. [2]

### Disadvantages of the Agile Methodology:

- There is less documentation in Agile methodologies.
- It is sometimes difficult to predict the results of Agile methodologies since requirements are not always clear.
- During the software development life cycle, estimating the actual time it will take is difficult in a few cases.
- A project that never ends is always at risk due to the ever-evolving features.
- It is difficult to estimate the effort and resource requirements for complex projects. [2]

### Impact of Agile and Waterfall models

Agile methodologies has improved the quality within the organizational, methodical, and cultural framework. Many reports have been done, the one I have read through was the Impact of Agile Methodology on Software Development Process by Gaurav Kumar and Pradeep Kumar Bhatia. Found at [https://www.researchgate.net/publication/255707851\\_Impact\\_of\\_Agile\\_Methodology\\_on\\_Software\\_Development\\_Process](https://www.researchgate.net/publication/255707851_Impact_of_Agile_Methodology_on_Software_Development_Process)

Waterfall methodologies has a negative impact when changes are needed to be made or when there are new requirements. I found this article by Kaushal Chari and Manish Agrawa on Impact of incorrect and new requirements on waterfall software project outcomes. Found at [https://www.researchgate.net/publication/316362583\\_Impact\\_of\\_incorrect\\_and\\_new\\_requirements\\_on\\_waterfall\\_software\\_project\\_outcomes](https://www.researchgate.net/publication/316362583_Impact_of_incorrect_and_new_requirements_on_waterfall_software_project_outcomes)

### References:

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2. rajkumarupadhyay515. Agile Methodology Advantages and Disadvantages. 22 May, 2020. <https://www.geeksforgeeks.org/agile-methodology-advantages-and-disadvantages/>
3. TutorialRide.com. Agile Process in Software Engineering. 2017. <https://www.tutorialride.com/software-engineering/agile-process-in-software-engineering.htm>
4. Sarah Lewis. Tech Target. Waterfall model. February 2019. <https://www.techtarget.com/searchsoftwarequality/definition/waterfall-model>
7. Kaushal Chari and Manish Agrawal. Impact of incorrect and new requirements on waterfall software project outcomes. DOI:10.1007/s10664-017-9506-4 (February 2018). [https://www.researchgate.net/publication/316362583\\_Impact\\_of\\_incorrect\\_and\\_new\\_requirements\\_on\\_waterfall\\_software\\_project\\_outcomes](https://www.researchgate.net/publication/316362583_Impact_of_incorrect_and_new_requirements_on_waterfall_software_project_outcomes)