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Kameniev Roman

Computer Science Student of the

Kharkiv National University of Radio Electronics

Golian Nataliia

Candidate of Technical Sciences,

Associate Professor of the Department of Software Engineering,

Engineer of the 1st category of Department of International Relations

Kharkiv National University of Radio Electronics

A COMPREHENSIVE COMPARISON OF DEVELOPMENT METHODOLOGIES ON A SYSTEM EXAMPLE WITH A FIXED COST AND UNAPPROVED REQUIREMENTS

Summary. *The relevance of using the management methodology in developing the latest software systems is due to the great demand from small and medium-sized businesses to optimize the software development process for business development. The work examines the possibilities of unique methodologies and the main problems of their use due to the impracticality of creating systems with fixed functionality due to the use of flexible development methodologies.*

Key words**:** *management of small systems, the fundamental problem of flexible design systems, development optimization.*

For businesses, the main task is scaling, improving services, and increasing profitability. Creating their software product to achieve these goals is one of the most apparent approaches due to the significant shift in society's focus toward

information technology. Businesses with no prior experience with information technology try to make a software product with minimal investment in its development and expect it to solve all their problems.

Creating a software product is a complex and lengthy process with many iterations and internal processes that are not advertised to the client and require their involvement only in exceptional cases.

There are two main types of methodologies: flexible and static. Agile [1] belongs to the flexible type, while Waterfall [2] belongs to the static type.

The Waterfall methodology is a linear, sequential approach to software development, consisting of a sequence of stages, each of which must be completed before the next phase begins.

The main steps in the Waterfall model are as follows:

– Requirements gathering: The first step in the Waterfall methodology is to collect and document all requirements for the software.

– Design: The software design is created once the requirements are collected. This stage involves creating a detailed plan for developing the software.

– Implementation: Once the design is completed, the development team starts coding and implementing the software based on the design plan.

– Testing: The software is tested to ensure it meets the requirements and works as intended.

– Deployment: Once testing is completed and the software is approved, it is implemented for end-users.

– Maintenance: The final stage includes ongoing software maintenance and support.

Waterfall methodology is a linear approach to software development, where each stage must be fully completed before moving on to the next step (see Figure 1). There is little room for flexibility or changes after a stage is completed,

which makes it less suitable for projects that may require frequent changes or rework.

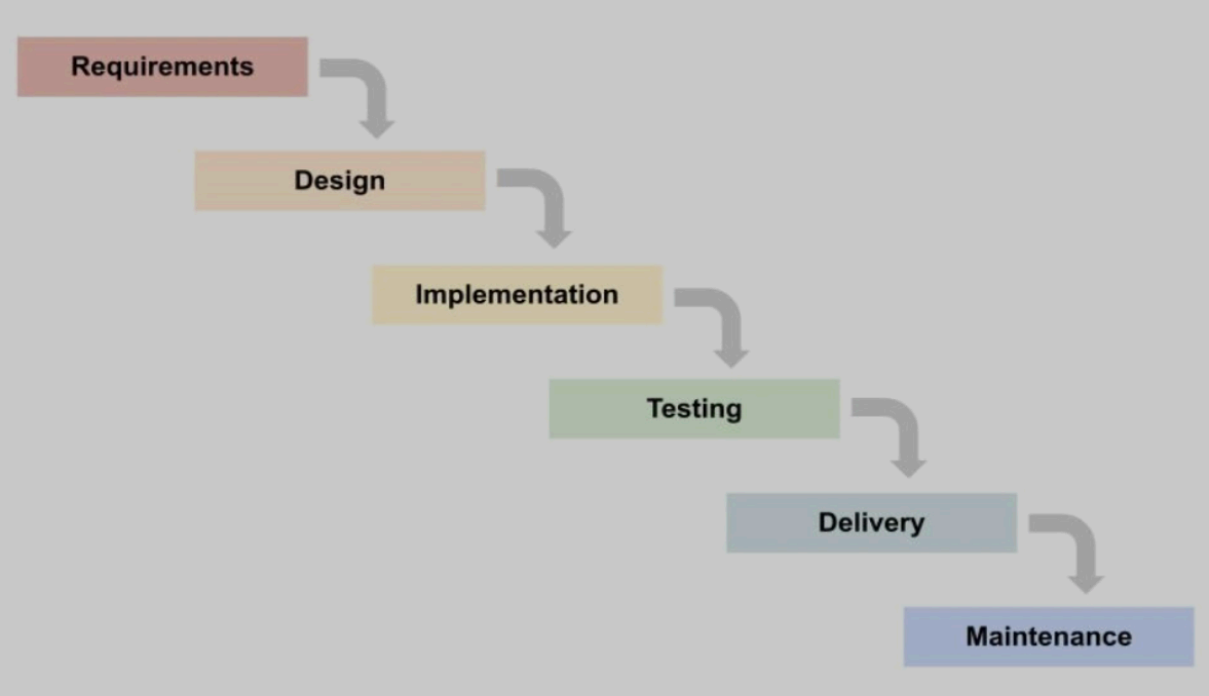

Fig. 1. Scheme of the methodology Waterfall

Agile methodology is an iterative approach to software development that emphasizes collaboration, flexibility, and customer satisfaction. Unlike Waterfall methodology, Agile does not use a linear process but instead focuses on breaking the project down into smaller, manageable stages that can be developed and delivered iteratively.

The fundamental principles of Agile methodology include:

- People and interactions are more important than processes and tools.
- Working software is more important than comprehensive documentation.
- Customer collaboration is more important than contract negotiation.
- Responding to change is more important than following a plan.

The main principles of Agile methodology include:

- People and interactions are more important than processes and tools: Agile values[3] communication and collaboration between team members and stakeholders over rigid processes and tools.

– Working software is more important than comprehensive documentation: Agile emphasizes delivering working software over extensive documentation, although documentation is still necessary.

– Customer collaboration is more important than contract negotiation: Agile prioritizes close collaboration with the customer or end-user to ensure the software meets their needs and expectations.

– Responding to change is more important than following a plan: Agile acknowledges that requirements may change over time and emphasizes the ability to adapt and respond to change.

– The Agile methodology typically involves a series of short development cycles, known as sprints, during which a small amount of work is developed and delivered (see Figure 2).

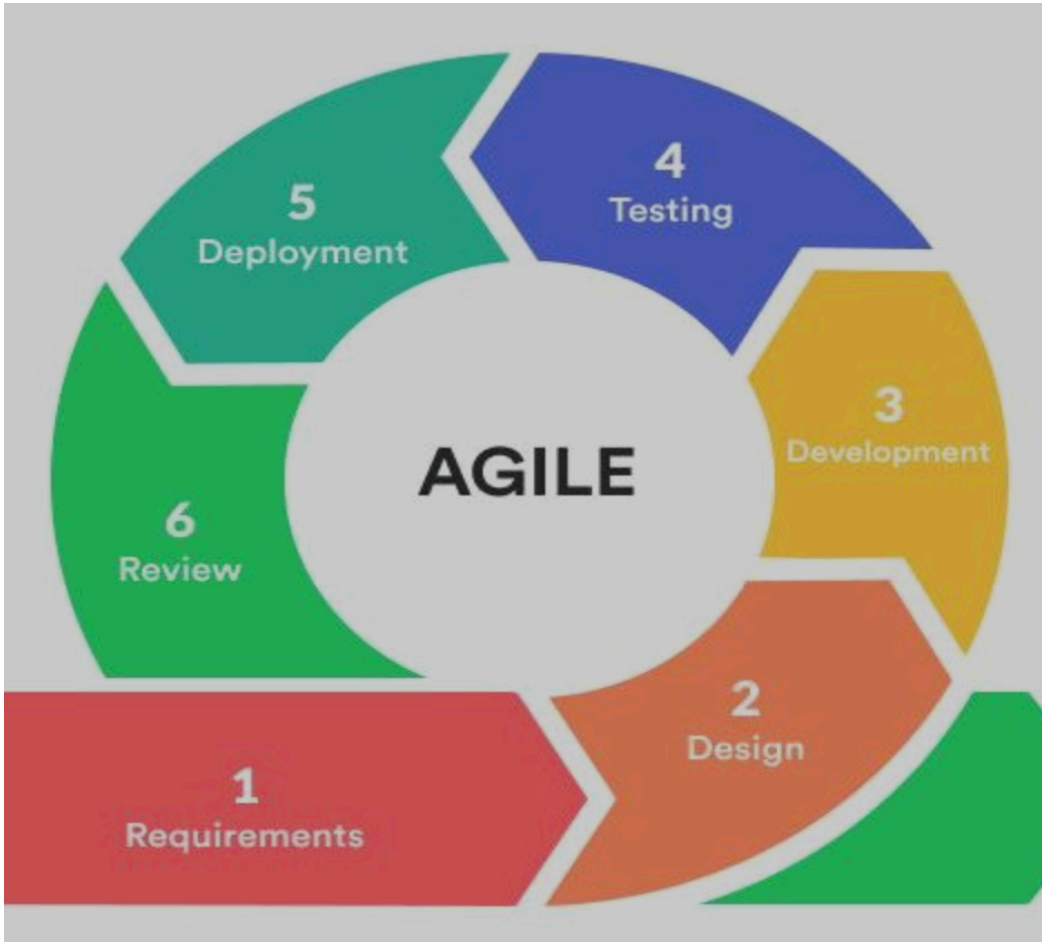

Fig. 2. Scheme of the methodology Agile

The drawbacks of methodologies become apparent when a project has a fixed cost but unfixed requirements. From the perspective of the Waterfall methodology, unfixed requirements are not acceptable for starting development. However, a fixed price is one of the aspects that may lead to choosing Waterfall.

The planning stage may be disrupted due to insufficient requirements, and development may take longer than planned. Still, a fixed cost will not allow for completing the project, skipping one of the stages, or even having the entire product not working. If Agile is chosen for such a project, insufficient requirements are a significant problem for starting development, but if the requirements are at least partially formed, development can begin. A fixed cost is a bigger problem because it limits the possibility of iterative project development.

However, the project should already have a minimum viable version through the Agile structure, which may not have all the planned functionality. Indirectly, there is no correct methodology option for such a project because the drawbacks are significant, but everything depends on the customer's priorities.

References

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