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Abstract

The US Army Corps of Engineers needed to upgrade their web development process from a traditional Waterfall approach to a more agile DevOps methodology. Over the course of eight weeks, the project team successfully implemented the necessary changes and achieved a smooth transition to the new development environment. The project involved analyzing the existing Waterfall practice in one project by identifying inefficiencies and designing a DevOps framework tailored to the specific needs of the US Army Corps of Engineers. The team collaborated closely with technical leads, including developers, testers, and operations personnel, to ensure a seamless integration of DevOps principles and practices. Throughout the project, the team encountered challenges related to cultural shifts, infrastructure changes, and training requirements. However, through effective communication, training programs, and change management strategies, these challenges were overcome, and the organization experienced improved collaboration, faster deployment cycles, and enhanced software quality.

Background

The Waterfall and Dev/Ops Method

The waterfall method is a traditional, sequential approach to software development. It follows a linear process (as seen on Figure 1) where each phase of the project, such as requirements gathering, analysis, design, coding, testing, and deployment, is completed before moving on to the next phase. The waterfall method emphasizes extensive planning and documentation upfront and presumes that requirements will remain stable throughout the project.

On the other hand, DevOps is an approach that aims to bridge the gap between development and operations teams, promoting collaboration and shared responsibilities throughout the software development lifecycle. DevOps emphasizes continuous integration, continuous delivery, and automation to enable faster and more frequent software releases as seen on the infinite cycle in Figure 2. It focuses on breaking down the barriers between development and operations, encouraging close communication, and promoting a culture of shared ownership and accountability.

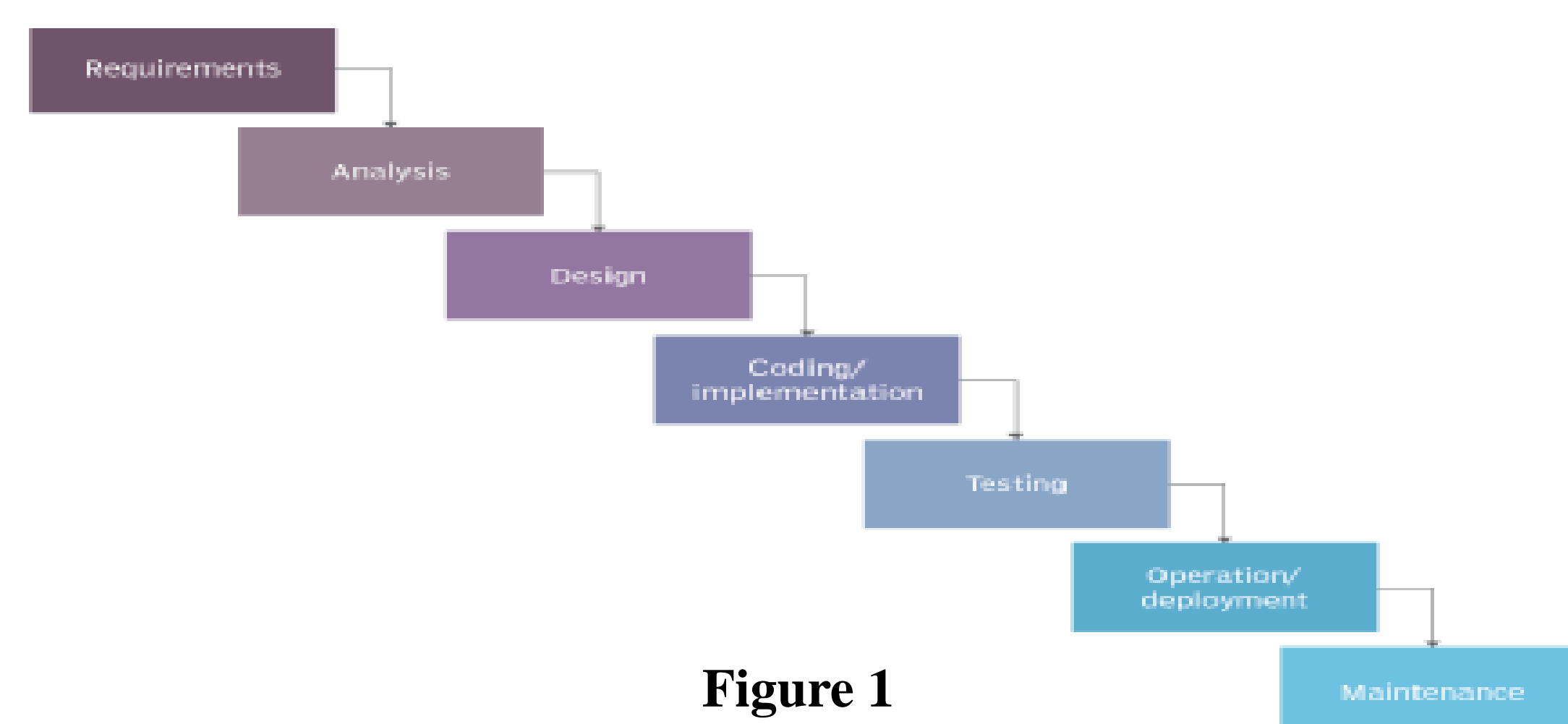


Figure 1
Waterfall Method

Problem

The communication and collaboration between the development and operations teams had not been as efficient as they could have been, leading to longer deployment times and reduced efficiency. To address these issues, the management decided to implement DevOps in their software development work environment.

Methodology & Challenges

The project approach steps:

- Conduct an in-depth analysis of the existing Waterfall web development environment to identify pain points and bottlenecks.
- Collaborate with technical leads to define the requirements and goals for the Dev/Ops transition.
- Design a customized Dev/Ops framework tailored to the specific needs of the US Army Corps of Engineers.
- Implement the necessary infrastructure changes to support the new development environment.
- Provide comprehensive training programs to familiarize the teams with Dev/Ops principles and practices.
- Enhance the current communication of the team.

The team encountered several challenges, including resistance to change, infrastructure constraints, and skill gaps. To overcome these challenges, the project team implemented the following strategies:

- **Implementation:** The implementation of Dev/Ops required a mindset shift from an individual-based to a team-based approach [1].
- **Culture Change:** This is a significant obstacle, as it is human nature to resist change [2]. To address this challenge, the team created a DevOps culture that encourages collaboration, continuous feedback, and a focus on automation.
- **Management Activities:** Conducted change management activities to address resistance to change, emphasizing the benefits of Dev/Ops and involving key technical leads in decision-making processes.

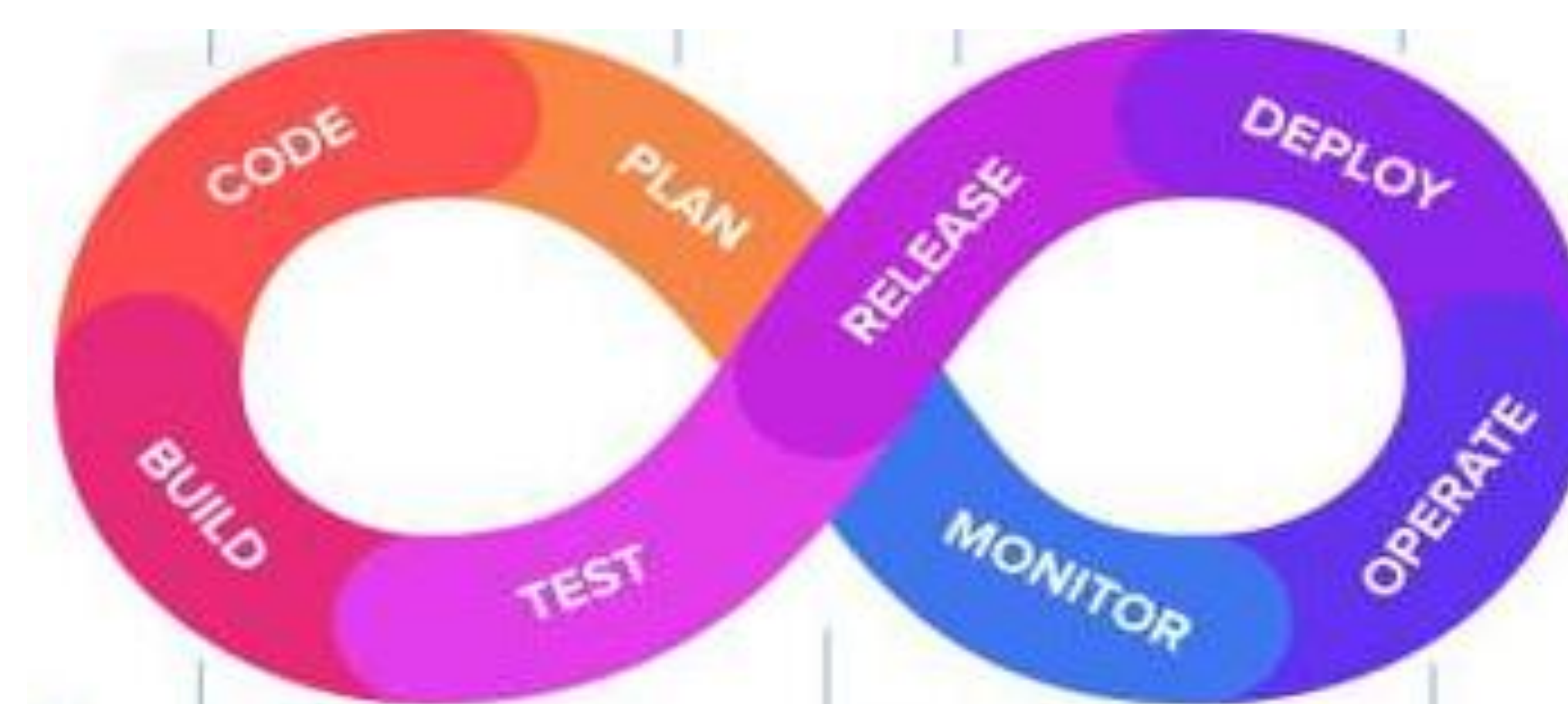


Figure 2
Dev/Ops Method

- **Collaborate:** Collaborated with the IT department to identify and address infrastructure constraints, ensuring the necessary tools and technologies were in place to support the new development environment.
- **Training:** Implemented comprehensive training programs to bridge skill gaps between team members, ensuring they had the necessary knowledge and expertise to adopt Dev/Ops practices effectively.

Results and Discussion

After eight weeks of dedicated effort, the project team successfully completed the transition to Dev/Ops from a Waterfall web development environment for a project. Table 1 demonstrates the outcomes and benefits that were achieved.

Table 1. Outcomes and Benefits	
Outcome	Benefits
Improved collaboration and communication	Increased efficiency and reduced time-to-client for software releases.
Enhanced software quality	Continuous integration, automated testing, and deployment.
Greater flexibility and adaptability	Ability to respond quickly to customer needs.
Efficient development processes	The software delivery time was reduced by 30%
Increased job satisfaction and engagement	Empowerment and autonomy provided by the Dev/Ops approach.

Conclusions

The US Army Corps of Engineers successfully transitioned a project to Dev/Ops from a waterfall methodology. This eight-week project aimed to transform the software development process within the organization and enhance agility, collaboration, and overall efficiency. Through careful planning, collaboration with technical leads, and the implementation of a customized DevOps framework, the organization achieved a smooth transition from the traditional Waterfall approach to the more agile DevOps methodology.

The project team encountered various challenges, including resistance to change, infrastructure constraints, and skill gaps among team members. However, these challenges were effectively addressed through change management activities, collaboration with the IT department, and comprehensive training programs. The team's dedication and efforts resulted in improved collaboration and communication, enhanced software quality, greater flexibility, and adaptability, streamlined development processes, and increased job satisfaction and engagement among team members.

The successful implementation of DevOps principles and practices has empowered the US Army Corps of Engineers to better meet the evolving demands of software development. This project serves as a valuable example and resource for other organizations considering similar transitions, highlighting the importance of careful analysis, technical lead collaboration, and training in achieving a successful DevOps transformation.

References

- [1] S. Patel. (2020, November 10). DevOps for Waterfall Web Development Teams: Best Practices and Pitfalls (1) [Article]. Available: <https://dzone.com>
- [2] P. Kumar. (2021, January 13). Implementing DevOps in a Waterfall Web Development Team: A Practical Guide (1) [Article]. Available: <https://www.infoq.com>

