How Public Sectors Can Adopt the DevOps Practices to Enhance the System

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Abstract

DevOps comprises a set of practices that incorporates IT operations and software development. DevOps' main aim is to reduce the life cycle of system development and provide a continuous delivery of software that is of the highest quality. Various aspects of DevOps are retrieved from the agile methodology, which is why it is always complementary with agile software development. The public has a lot to gain from the adoption of DevOps culture, in which the key benefits include; improved communication, collaboration, stability, and speed. However, to effectively adopt this culture is not an easy task, but if it is effectively done, there is plenty of rewards that will be achieved in public. DevOps will significantly help overcome the challenges attached to traditional models within the public sector, enhancing opportunities to accept the digital transformation. DevOps approach is an evolution that focuses on processes and tools that supports better collaboration and faster production between operations and development and has been standardized to become the best practice for the development teams globally. Therefore, the government needs to deliver a more efficient technology to the public, and currently, DevOps is the most efficient approach in achieving the required technological advancements. This research paper illustrates how the public sector can adopt the DevOps practices to enhance their system. Within the literature review context, the paper will address DevOps' challenges within the public sector and identify how the challenges can be addressed. Also, the paper will identify various opportunities that come along with DevOps within the public sector.

Key Words

DevOps, Software development, Cloud, Information technology.

Introduction

DevOps comes from development and operations which the terms are condensed to form a collaboration of the two term. It is a software engineering culture whose main aim is at the integration, continuous review, partnership, and interaction between IT professionals and software developers. DevOps' main aim is to deliver software to all the organizations in the world through the removal of barriers that exist between the delivery and development of the software product efficiently and quickly (Davis & Daniels, 2016). Within the public sector, programs are running inefficiently and slowly as a result of the legacy systems. However, public expectations from delivery, speed, and technology are on the rise. Thus, with the growing expectations, there comes the need for better software development and project management approach (Nocera et al., 2016). Therefore, DevOps intervenes in the public sector to address the challenges encountered due to the traditional software development models. The focus on the collaboration between development and operations creates a new approach that helps manage complex operations within the public sector.

The complexity of operations is broken down into monitoring, performance management, log management, deployment management, configuration management, and infrastructure management. DevOps is developed with all the technological, infrastructural elements that can be easily controlled using codes. Thus, with the cloud

on the rise, infrastructure management can be done in real-time through a web service (Lwakatare et al., 2016). The automation of infrastructure solves the challenges of being available physically inside a data center to make network and hardware changes. The main benefit is that the scale of cost is in line with the demand and the provision can be made automatically without paying the hardware upfront. The configuration management resolves the manually configuring and installing packages when the hardware is put in place (Feijter et al., 2017). Thus, the benefits of using the solutions of configuration automation are that the servers are exactly deployed each time in the same way. If a change is to be made across various servers, a change can occur in only a single place. It is worthy to note that DevOps is not only a set of tools, but it is also a philosophical shift that requires buy-in from the entire team that is involved so that it can succeed. Additionally, it depends on a high level of collaboration for DevOps to change the public sector's situation.

Literature Review

How DevOps can be Adopted in the Public Sectors

The government must deliver a more efficient technology in the public sector, and DevOps is currently considered the most effective. Within the public sector, many programs have been running inefficiently and slowly. The government's information technology systems and processes are becoming more outdated while the public's expectations about delivery, speed, and technology are rising (Ravichandran et al., 2016). The private sector is pushing IT experiments and boundaries with improved delivery methods and technological support, while the public sector is facing challenges from constrained financial resources, legacy rules and processes, and regulations (Riungu et al., 2016). Additionally, the public sector is completely saddled with traditional technology that requires modernization. Fortunately, recent developments and innovations in IT management, technology, and process provide opportunities that help the government deliver its products of technology effectively. In particular, the public sector has been on the rise of looking at DevOps, which will help them cope with some of these challenges.

The public sector is saddled with the debt of legacy technology, but this problem can be solved by delivering timeliness, quality, and various public services that the citizens expect by adopting DevOps culture, which is a collaborative and transformational methodology. DevOps can offer the governmental organizations the agility they require to meet the expectations of the emerging services (O'Neill, 2017). Many governmental departments are still spending money and operating on systems of IT that are aging. Many of these systems are old enough to render impossibilities and difficulties when upgraded to meet current regulations and practices (Punjabi & Bajaj, 2016). Therefore, building DevOps cultures and organizations helps eliminate the technical dept by bringing in the relevant stakeholders in the delivery and design of the projects of software development in their entire life cycle and ensure that they maintain their use and relevance to the public (Nocera et al., 2016). It simply means that the internal alignment that DevOps foster can enhance the software teams in reducing the marketing time and increase the business's value by coming up with services and products designed to meet the needs of the entire public sector.

DevOps cannot be implemented overnight due to its difference from the current IT development practices. It is a continuously evolving method for making changes in various processes that improve daily work activities. Therefore, some tips are considered to implement the DevOps cultures and practices successfully in the public sector (Ikerionwu & Edgar, 2016). Firstly, the initial application should be wisely chosen since adopting DevOps in the public sector quickly may result in disappointments and unrealistic expectations. Secondly, there should be a cross-functional team for every application since DevOps is concerned more about people than software. DevOps' core benefit is that it unites previously soiled teams, which results in better-expedited engagement and collaboration results (Yasar, 2017). Individuals that make up these teams include the project, manager, security professionals, and other stakeholders. Thus, these teams are

essential to the entire process of DevOps implementation. They are supposed to take part throughout the design phase and software life cycle. Additionally, the operations teams enhance production guidance in the entire life cycle of the software development.

Furthermore, in DevOps, knowledge sharing is crucial, and every team member is supposed to be on the same page regarding the project. Implementing blameless post-mortems within the system outages goes hand in hand with fixing and addressing challenges in a team-friendly and transparent way (Bass et al., 2015). This is one of the best practices that many IT organizations within the government have adopted and relate to every part of DevOps, which includes the technology, processes, and people. Also, the implementation of DevOps should remain laser-focused in order to remove any constraints (Feijter et al., 2017). Thus, it means that there must be improvements on how codes flow from a very simple idea to a point at which it provides business value. The DevOps should thus be kept laser-focused on removing any constraints within the pipeline, which includes manual processes that do not add any value to the public's goals (Kim et al., 2016). The best way constraints can be withheld by having an engineer or a control viewer who assesses all the changes before reaching the public.

The transition into DevOps within the public cannot just happen merely because there is a huge investment in the DevOps tools, but it also requires a shift in mindset and culture. Thus, the IT complexity should not be recognized as an inhibitor for change, but it should be considered a driver for change (Colavita, 2016). Also, since DevOps' implementation is a mission-critical project, clear milestones and objectives should be put forward. Demonstrating the project and getting quick wins ensures that the project is running on-budget and on-time. Furthermore, effective DevOps means that time is measured correctly and that all the information required can be accessed by all the teams that require the information (Marchetto et al., 2016). It simply means that the team that handles the DevOps project in the public sector should be well empowered with data. The perspective of the industry aims at providing the necessary tools for the implementation of DevOps. However, identifying the starting point with DevOps may be difficult, but it is also clear and a very common approach to technology which results in an improvement of measurable performance and a positive change in culture within the public sector.

Challenges to DevOps within the Public Sector

The public sector is not fully embracing DevOps, which comes with various challenges of adopting the technology. Funding is one of the main challenges faced by the user of DevOps within the public sector. Government funding has always been a concern within the public sector (Hamunen, 2016). Therefore, the resources that are required are not available, which is essential when leveraging the DevOps. Funding is a challenge that requires to be grappled by all the agencies within the public sector. There is always a perception that those necessary resources are not available, which is a very important consideration when implementing DevOps. This also means that technology is expensive and is considered a strain within an agency with tight resources (Schaller, 2016). Also, professionals see the management of IT innovative approaches as a practice that drains more resources. However, years of research and data have revealed that DevOps adoption can help organizations save more money through improved efficiency. Also, in the IT budget management sector, DevOps is the most ultimate way, which means that delaying DevOps' implementation develops a technical dept that is expensive to address.

Traditional or legacy systems are another significant obstacle as the governments work within their legacy systems and constrained resources that require upgrades to implement the DevOps culture fully. The upgrade requires a lot of money, and once again, this is due to constrained resources as the old systems require capital to upgrade (Kim et al., 2016). Also, the upgrade requires a long time and can also be tedious to get through, and this makes the public sector hesitate to implement the DevOps practices. Also, it is hard to determine the upfront cost and persuade the leaders to invest in DevOps, a budgetary priority in IT or even stop spending more money on outdated IT systems (Marchetto et al., 2016). Many agencies have made major investments

in technology, of which many of them are not applicable in the world of DevOps of automation and rapid iteration. Thus, they always feel that they should use these tools continually until their investments finish their course.

Culture is another challenge since DevOps is a culture of software engineering. The main problem with changing the government's environment is that it takes massive restructuring, patience, and more time (John et al., 2017). Also, it needs leaders to get involved completely in incremental changes and aligning steps. The government tends to averse to the risks since the work implications are far-reaching. As a result, it becomes harder to convince the decision-makers to take chances with a new approach and, most especially, embraces failure among its processes (Colavita, 2016). Thus, changing an organization's culture is very difficult and takes complete commitment, patience, and time. DevOps projects that have succeeded prove that they must be implemented initially within a small scale and then expanded incrementally with leaders required to support the early teams and promote success. Additionally, it requires managers who communicate with employees and encourage them on the progress of the change (Davis & Daniels, 2016). Furthermore, leaders must interact and encourage the entire public about the changes that DevOps bring about. Changing the IT systems is an easy task; however, the difficulty lies in changing the organizations' attitudes and philosophies.

How Public Sectors in the United States can benefit and how Current Processes are Leveraged using DevOps Approach

DevOps within the United States public sector enable digital transformation, fulfill on-budget, on-time project delivery, and fulfill customer satisfaction. Therefore, to make the DevOps become a success within the public sector, there are a few steps that the United States government takes to help in leveraging the use of the DevOps approach. Firstly, it is to recognize IT's complexity, which cuts across all the departments in the nation. It is necessary to change the leader's mindset within the public and understand the complexity attached to the traditional approaches used within the nation. Thus, leaders in the United States government need to discover the potential benefits offered by DevOps and then leverage the benefits accordingly (Ravichandran et al., 2016). Secondly, the objectives of implementing the DevOps approach need to be very clear. Having a clear understanding of the objectives regarding the public's needs is very fundamental for the United States government. Thus, the progress has always been demonstrated repeatedly to ensure that the project is running on-budget and on-time. Thirdly, the entire team that manages the project should be well empowered with enough data. Effective DevOps means that there should be the most appropriate data with the designing team.

Companies that have incorporated DevOps practices within the United States get simpler, plain, and done. DevOps may deliver in maximum innovation, functionality, and speed with only one team made up of members with cross functions all working together. DevOps models of IT operation's key aspects are to create standardized production and automated deployment environments (Kim et al., 2016). Resolution time is also made faster by DevOps since team members are not required to wait for a different team to fix and troubleshoot a problem. This means that it makes deployment predictable and frees people from routinely repetitive tasks, and moves ahead to do things with a higher value. Furthermore, it is essential to consider that data should be accessible to every company and organization in the public sector in the United States that requires it in order to work efficiently. Therefore, even though there are some challenges, if DevOps is strategically implemented within the public sector in the United States, it can speed up the delivery and efficiency of services faster than traditional methods.

Conclusion

DevOps is changing in a fundamental way how development and operations are done in the modern world. The practice requires a new set of priorities, new tools, and new skills, and it also takes time and offers a new perspective. However, before getting into the journey of DevOps implementation, they are supposed to understand various approaches, practices, and technologies that help change the current culture and support a moving culture.

DevOps' implementation is not that easy, like just buying a tool and ensuring that everyone gets to use it. Therefore, DevOps is more than a team of resources or a person since it is a culture that evolves constantly. Consequently, it is not just a destination that is easily arrived, but it is made up of a journey that comes with improvements. Therefore, the entire public sector is supposed to embrace the DevOps and get ready for the entire journey. The collaborative process should also be made more efficient and quicker to create a strong bond between the various teams in the public sector. DevOps guarantees faster service delivery and production that does not suffer from low-quality issues.

DevOps provides development and operations teams total visibility in the projects, swaps various human processes involved with development and operations, and brings about automation. DevOps also enhances the IT performance significantly within the public sector as it ensures that the developers and operators are closely working together to achieve the same goal. DevOps also improves communication between the two sides, making products be improved, deployed, and developed faster. Every team is aligned with the goals and functions of the project so that their work is directed ultimately towards the same point. DevOps is a very important application and software project within the public sector as it significantly improves the collaboration between the development and operations teams. Additionally, successful implementation of DevOps practices within the public sector thrives on transparency and openness. Thus, it is recommended that it start small and consider how projects that are open source-based can assist in driving an effective collaboration between different teams that are working together to achieve a specific goal.

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