A DevOps Capability
- The IVI DevOps Effectiveness Assessment

Purpose

The DevOps Effectiveness Assessment (DEA) is a new IVI assessment drawing on the IT Capability Maturity Framework (IT-CMF). The assessment provides a holistic analysis of an organization's DevOps maturity, and identifies the key relevant IT-CMF Critical Capabilities (CCs) to aid improvement. DevOps refers to a set of technical, architectural, and cultural practices aimed at increasing the efficiency and effectiveness of delivering business needs into production, through improved communication and collaboration between business, development, and IT operations.

The DEA is based on rigorous academic research and collaboration with experts from leading organizations. This paper outlines the key insights from this research, which have informed the development of the DEA.

Understanding DevOps

DevOps emerged as a response to challenges being faced by web services organizations such as Netflix, Amazon, and Google. From their beginnings as start-ups in the late 1990s, by the late 2000s, they, and other web service providers, were operating large-scale complex infrastructure to support their large and growing user base. On the one hand, the Operations objective is to ensure continuous user service by providing a stable and reliable operating environment. On the other, the Development objective is to release frequent small batches of service updates and new features, using agile development practices. These objectives present a challenge: how to deploy service updates quickly and frequently, without undermining the reliability and stability of the operating environment [1]–[4]. The DevOps approach is to bring together Development and Operations to address this challenge. The challenge resonated with the IT community and was broadened over time to encompass the efficiency of the whole delivery cycle, as well as the quality of the products and services provided.

DevOps presents a solution to the challenge that organizations face in releasing product updates into complex operating environments without causing service loss or disruption. This is not a new challenge. However, the need to find solutions to the challenge has intensified as agile development practices and complex scalable infrastructure configurations have come to the fore over the last decade [1], [5]. Agile practices involve iteratively developing and releasing small batches of new features and service updates frequently [6]. This frequency creates a need for infrastructure Operations to have robust and repeatable ways to re-configure and update its deployments with minimal service impacts [7]. DevOps was conceived as a collaboration of Development and Operations engineers to meet this challenge [8]. While it is the norm that DevOps implementation happens in environments where agile software project management methodologies are used [9], studies have shown that DevOps practices can also be successfully deployed in regulated industries [10].

Amazon web services compare the challenge in today's world for organizations to transform how they build and deliver software, to how physical goods companies transformed how they designed, built, and delivered products using industrial automation throughout the 20th century [11].

> *"These days, regardless of what industry we are competing in, the way we acquire customers and deliver value to them is dependent on the technology value stream… Now more than ever, how technology work is managed and performed predicts whether our organizations will win in the marketplace, or even survive"* [8].

Organizations are driven to transform digitally by both their competitors and their customers. Adopting new ways of working, such as those offered by DevOps, addresses this need. There are also internal operational issues such as poor communication, manual processes, QA, and data monitoring issues where DevOps can vastly improve outcomes [12]. However, one size does not fit all; each organization will have its unique context and must identify the benefits it values and develop its own approach to achieving DevOps [1], [13], [14]. The 'State of DevOps' reports [15]–[17], based on analysis of survey responses from more than 25,000 technical professionals worldwide, provide some compelling statistics for organizations contemplating a move to DevOps. For instance, these reports claim that companies with high-performing IT organizations are twice as likely to exceed their profitability, market share, and productivity goals. High-performing IT organizations experience 200 times more frequent deployments and 24 times faster recovery from failure than their peers. These are compelling statistics to encourage DevOps adoption.

DevOps Effectiveness Assessment and Improvement Process

DevOps's goal is to increase value by enabling the right features to be delivered quickly and often, to a high quality, in operating environments that are robust and reliable [18]. It involves activities across a broad spectrum of IT capabilities, which will vary in importance depending on the business context and the specific organization's needs [1], [13], [19], [20]. Transitioning to DevOps requires a change in both culture and mindset. The importance of executive support when embarking on a DevOps transformation cannot be overstated [15], [21]–[25]. The DEA is built upon the following DevOps principles:

- Design flexible, independent services that meet business goals.
- Deliver small batches of services and features in short cycles of design, build, test, and deploy.
- Orchestrate the delivery cycle using automation, integrated tooling, and configuration management.
- Maintain a commitment to quality, security, and compliance, with ongoing validation, monitoring, and feedback.
- Balance speed and agility with stability and continuity.
- Maintain an end-to-end view of services offerings, focusing on user needs and business value.
- Ensure an organizational commitment to collaboration and shared ownership, with defined roles and responsibility.
- Work agile and lean practices in cross-functional teams.

- Embed learning, continuous improvement, and innovation practices.

Figure 1 below depicts the DevOps cycle of continuous, collaborative, and iterative software delivery.
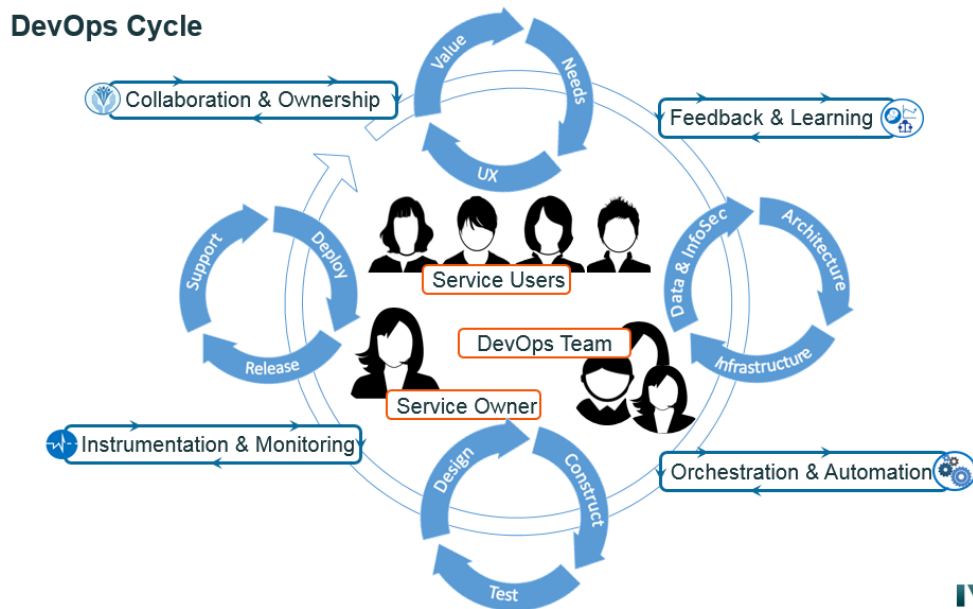

Figure 1 The DevOps Cycle

The DEA aims to assist organizations in their transition to DevOps. It covers technical, architectural, and cultural practices aimed at increasing the efficiency and effectiveness of delivering business needs into production, through improved communication and collaboration between business, development, and IT operations. Assessing and improving DevOps using the DEA is a two-stage process. First, the high-level DEA introduces DevOps and gives an initial indication of DevOps maturity. It also identifies key focus areas in IT-CMF for further assessment and improvement. The DEA measures the organization's high-level DevOps maturity across nine IT-CMF CCs: Solutions Delivery (SD), Technical Infrastructure Management (TIM), Enterprise Architecture Management (EAM), Service Provisioning (SRP), IT Leadership and Governance (ITG), Strategic Planning (SP), Project Management (PM), Information Security Management (ISM), and Benefits Assessment and Realization (BAR) (Figure 2). These CCs have been optimized to support the latest developments in digital IT, including DevOps. Each CC consists of a detailed maturity survey, as well as a set of practices and metrics to aid improvement.

Figure 2 Nine Critical Capabilities of IT-CMF Support DevOps

Research Methods

In addition to undertaking rigorous academic research, the DEA was further developed in collaboration with experts from leading organizations to ensure it reflects both state-of-the-art organizational practice and academic thinking. It was developed through a collaborative, workgroup model that was established as a community of practice to understand, share, and iteratively advance DevOps practices.

Conclusion

DevOps presents a solution to the challenge of releasing product updates into complex operating environments without causing service loss or disruption. DevOps increases value by enabling improved communication and collaboration between business, development, and IT operations to increase the efficiency and effectiveness of delivering business needs into production in operating environments that are robust and reliable. Transitioning to DevOps requires a change in both culture and mindset. The DEA is built upon nine DevOps principles and aims to assist executives in guiding their organizations in their transition to DevOps.

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The Innovation Value Institute (IVI) is a multi-disciplinary research and education establishment co-founded by Maynooth University and Intel Corporation. IVI researches and develops management frameworks to assist business and IT executives deliver digitally enabled business innovation. IVI is supported by a global consortium of likeminded peers drawn from a community of public and private sector organizations, academia, analysts, professional associations, independent software vendors, and professional services organizations. Together, this consortium promotes an open ecosystem of research, education, advisory support, international networking, and communities-of-practice. IVI is supported through Enterprise Ireland's and IDA's Technology Centre programme.

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