



How DevOps is Implemented in the Wild

Three DevOps-Enabling Organizational Structures

Abstract

An in-depth analysis of enterprise DevOps-enabling organizational structures, the impact of DevOps on IT and a transition model utilized by enterprises for successful adoption.

Author:

Nicole Reineke
Hanna Yehuda

Table of contents

Table of contents	2
Executive summary	3
Methodology	3
DevOps level set	
The Infrastructure Automation Paradigm Shift.....	4
Standout Motivations for the Shift.....	5
Migration to the cloud	
Creation of a self-service portal	
Automation of Legacy Environments	
An Analysis of Organizational Impact.....	6
The Small Team Model	
The Scale Team Model	
The Transitional Team Model – A Stepping Stone	
What was the difference between adopters and non-adopters?	10
The keys to success	
Recognition of the value of automation.	
Tooling and Ownership of architectural direction.....	
Training, reskilling and supplementation of knowledgeable resources.	
Organizational fluidity to support a right-sized team for a right-sized project	
Conclusion.....	11

Executive summary

DevOps implementation is not a one-size-fits-all initiative. This research identifies and analyzes three directional models of adoption within IT organizations – including a successful model for transitioning traditional IT teams – providing an important stepping stone in the DevOps implementation journey. This research also identifies new organizational roles and the critical components needed for success.

Methodology

This research was conducted through interviews with more than 40 enterprise IT teams and more than 60 subject-matter experts between March and October 2019. For the purpose of this report, enterprises are classified as businesses having more than 1000 employees and more than \$1 billion in annual revenue. Industries represented include: Biotechnology, Entertainment, Financial Services, Food & Beverages, Information Technology and Services, Leisure, Travel & Tourism, Machinery, Oil & Energy, Retail and Telecommunications. Participants were located across 11 Countries: 60% located within the United States, 40% from countries including Argentina, Czech Republic, France, Germany, India, Israel, Japan, Netherlands, Philippines, South Africa, and Spain. The goal was to quantify and understand the ways enterprises have adopted DevOps practices into their IT environments.

DevOps level set

For the purpose of this report, the term DevOps will refer to initiatives for implementing Culture, Automation, Lean, Measurement, and Sharing (CALMS¹) in pursuit of operational efficiencies and increased ability to deliver business value using culture and tooling.

This research was designed to identify DevOps impact on IT teams, focusing specifically on how the Automation and Measurement portions of enterprise implementations affect organizational team composition. Many of the enterprises interviewed referred to these aspects of their initiatives as infrastructure automation or Infrastructure as Code (IaC).

¹ CALMS acronym believed to be coined in 2010 as CAMS <https://itrevolution.com/devops-culture-part-1/>

The infrastructure automation paradigm shift

Thriving businesses in the digital age have shed the notion of IT as an independent provider of hardware. Emerging instead are cross-functional teams that possess infrastructure expertise and work together to deliver business value.² Achieving this organizational dynamic requires the ability to better enable the consumption of resources in an on-demand, scalable fashion, eliminating manual steps in the pursuit of continuous improvement.

Whether through a named DevOps initiative or through a shift in behavior to support business needs, nearly two-thirds of all enterprises interviewed have moved – or are in the process of moving – from manual infrastructure operations to infrastructure automation for better service delivery to the business. In some cases, the consumption was automated through IaC. In other cases, it was implemented through the shift to consuming Platform as a Service (PaaS) resources provided by a public cloud. One organization referred to their shift in delivery as “moving our focus from providing equipment to providing service” to create more value for the business.

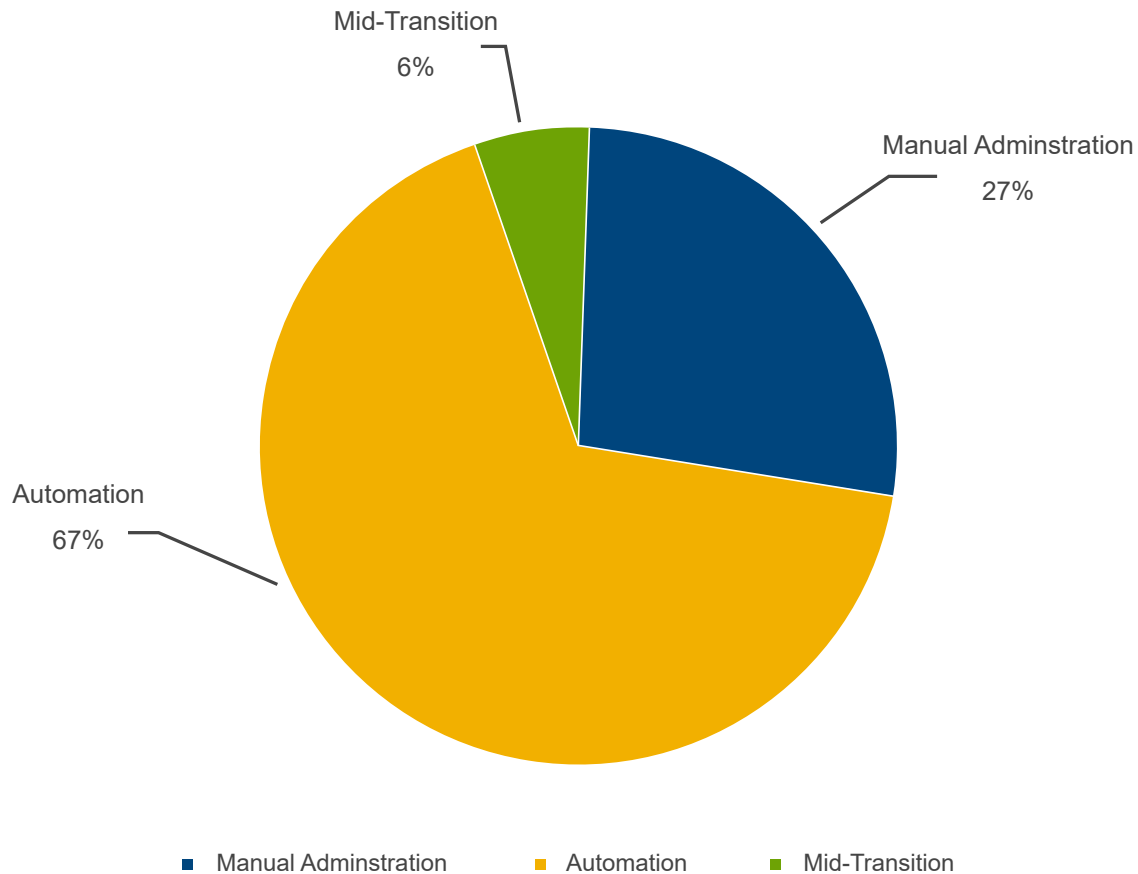


Chart: Adoption of infrastructure automation as part of DevOps initiative. Sample size 30 enterprises.

² Jeanne Ross “Designed Digital” <https://www.youtube.com/watch?v=Z4l5mlKerZ0#action=share>

Standout motivations for the shift

Looking into the reasons for DevOps adoption, three trends stand out as primary motivators. These are:

- Migration to or increased utilization of public cloud
- Creation of a self-service portal
- Automation of legacy environments

Migration to the public cloud

Several retail enterprises cited adding the ability to dynamically leverage the public cloud to supplement their internal infrastructure as a primary motivation for adoption DevOps and subsequent automation initiatives. Migrating some workloads to the public cloud as needed or sharing the load with internal infrastructure during massive spikes in utilization caused by variable business cycles requires significant DevOps and automation expertise. Without this capability, organizations would be required to purchase infrastructure capacity to cover their predicted peak utilization periods – an expensive and difficult approach.

Organizations with existing on-premises infrastructure and services face the daunting engineering challenge of enabling it all to take advantage of expansion capabilities to the cloud. This new approach to engineering and infrastructure demands a shift in organizational mindset and tooling, leading to the adoption of DevOps.

Creation of a self-service portal

Large enterprises with teams that consume internal resources pointed to a shift in their users' expectations of how IT was providing services. They noted that their internal users were not satisfied with long turnaround times for resource requests. For these organizations, the adoption of DevOps was necessary to enable their IT team to deliver a public cloud experience in their private cloud and support the creation of a self-service portal. Implementing DevOps processes and related toolsets were seen as a way to achieve continual improvement and measurement within their IT organization, while enabling a responsive self-service resource request system.

Automation of legacy environments

Organizations managing large, on-premises environments pointed to a need for improved utilization and management of legacy infrastructure as a primary motivation to DevOps adoption. Several of these organizations cited that they started with basic automation of deployment and management actions to reduce time spent on repetitive processes. Additional DevOps initiatives were then brought onboard to create continual delivery process improvement and instill organizational alignment. In many cases, they cited this approach decreased failure rates and improved delivery times.

An analysis of organizational impact

The research identified three distinct ways enterprises organize their teams to implement projects and tooling related to their internal initiatives. These categories are characterized as a Small Team, a Scale Team, and a Transitional Team. Several enterprises identified all three models in different parts of their organization.

While the titles of individuals across different enterprises vary wildly, an approximation of the team members can be depicted as shown here in Figure 1.

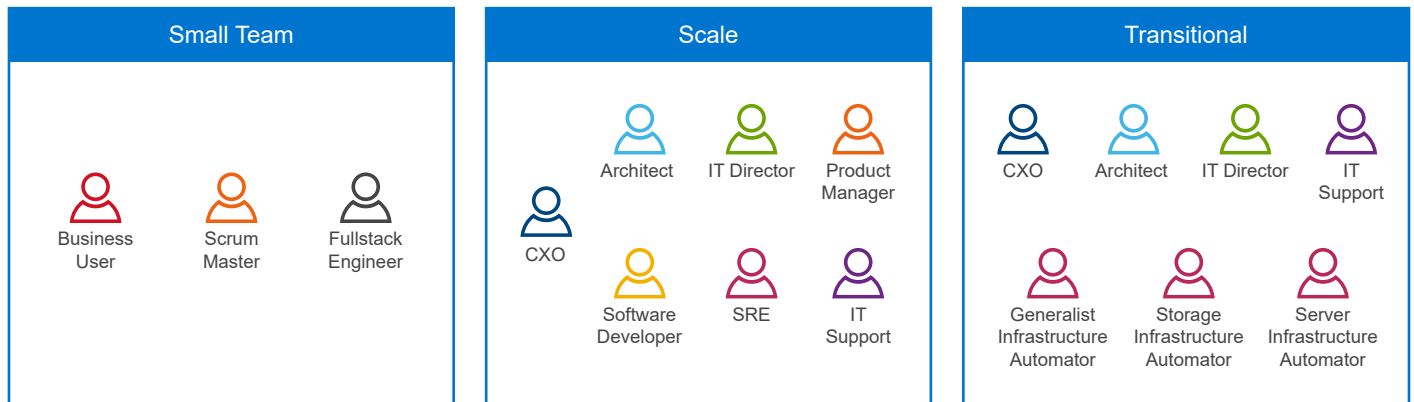


Figure 1: Three organizational models as seen in the enterprises adopting IaC

The Small Team model

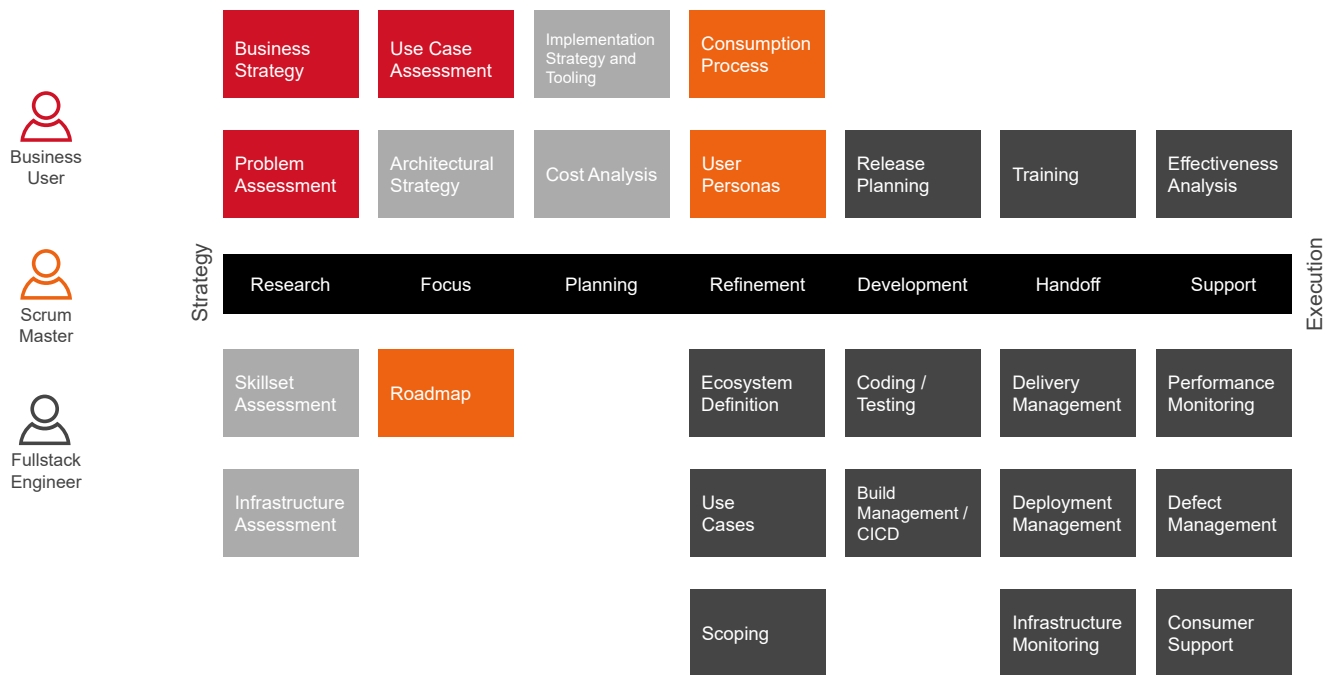


Figure 2: Example of a Small Team model ownership breakout. This is represented using a framework visualization technique method made popular by Pragmatic Marketing®, modified to fit the organizational structure and responsibilities of DevOps.

Several enterprises noted that this model is incredibly effective for projects that are small, or pre-released, or cloud-based. However, when projects transition to production, or run into scale issues, or grow to a point where sustaining engineering is required, the teams are often forced to shift more toward the Scale Team model – featured in the next section – where they can lean on the expertise of an architect or site reliability engineer (SRE) to thrive.

Generally, Small Teams are comprised of business users, scrum masters, and full-stack engineers.

- Business users typically represent the needs of the organization and are tied directly to the consumers of the service or solution being provided by the team.
- Scrum masters aid in the roadmap prioritization and team enablement.
- Full-stack engineers in this model are highly skilled with a diverse range of skill sets. When describing their day-to-day responsibilities, enterprise employees in this role describe that 30% of their day is on building/ CI/CD, deployment and delivery of projects, about 40% of the day was monitoring and continual improvement of performance, and another 30% dedicated to training, research and meetings. While the idea of an engineer being an expert in everything is powerful, it is also clear there is a diverse set of skills and that there are often teams of differently skilled engineers working together building on strengths to accomplish their projects.

The Scale Team model



Figure 3: Example of a Scale Team model with ownership breakout

Enterprises following this model noted the importance of organizational roles that enable coordination across large groups or across many projects. Within this team structure, we find that initiatives typically have executive-level sponsors – referred to as the CXO – architects, IT directors, and software developers.

- The CXO is critical in achieving buy-in for organizational transformation, communicating business strategy, and identifying areas of opportunity that can be met through operational shifts in implementation. The CXO is often credited with general direction, championing ideas like “we will develop everything using cloud native, to allow us to flex dynamically to the best available operating environment” which can be seen as a guiding vision for downstream implementation.
- The architect role is critical in determining the strategy and the direction that will be followed, as well as mentoring and training engineering staff.
- The IT director level role is especially important in identifying and implementing the tooling to support organizational initiatives. In several enterprise interviews, the absence of a strong IT director led to initial adoption failures and delays in the success of their implementations. While the actual tools selected vary widely – and included several enterprises who developed and wrote their own – the importance of this role in establishing and upholding the standards is universal across all enterprises.
- Product managers perform use-case definitions and prioritize implementation for business deliverables. In agile environments, they partner with or act as product owners managing a backlog and clarifying stories.
- Software developers in this model are responsible for delivering the business value and are frequently partnered with site reliability engineers (SREs) in running and managing the CI/CD pipeline.
- SREs take on the critical role of delivery and deployment management and continual improvement of resource delivery.
- IT Support acts as first line interface to the business users, often escalating critical issues to software developers or SREs.

The Transitional Team model – a stepping stone

Of the enterprises we interviewed, nearly 50 percent had groups within their organization which followed the Transitional Team model. This looks structurally very similar to the Scale Team model, however instead of consisting of distinct SRE and software development members, infrastructure specialists are learning, adopting and utilizing skill sets around automation, coding, and continuous delivery. The Transitional Team model appears to be a stepping stone for a mature traditional IT team to adopt DevOps and eventually move to either Scale Team or Small Team organizational structures.

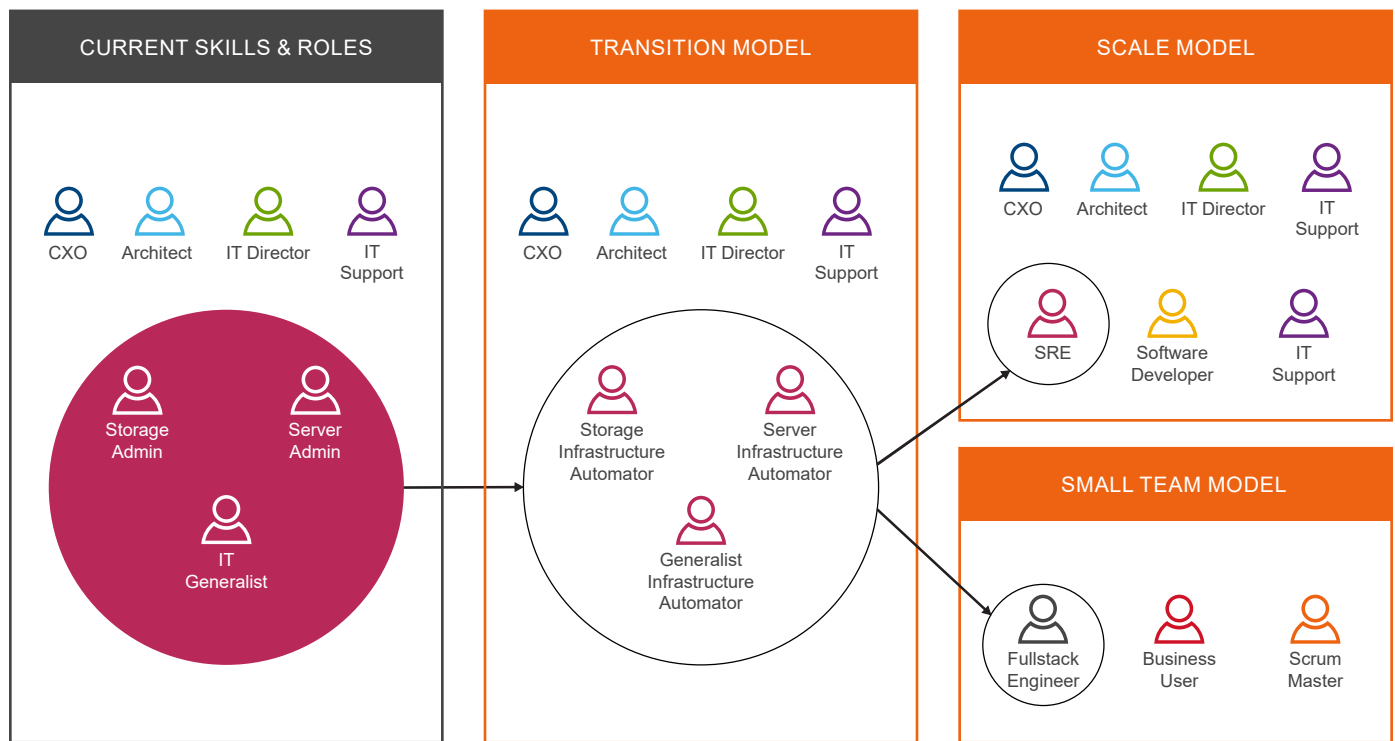


Figure 4: Example of a Scale Team Model with ownership breakout

In this model, organizations invest in the expansion of the skills of existing employees, including IT generalists, server and storage administrators. These infrastructure automation specialists bring a massive amount of organizational knowledge to the team and can often be paired with other engineers to enable more effective delivery of business value. Depending on the needs of the organization, the cross training may enable an infrastructure automation specialist to transition to a role of SRE or act as a full-stack engineer – or partner alongside one.

What is the difference between adopters and non-adopters

Of the 12 enterprises not actively engaged in infrastructure automation, the most frequently cited reasons are complexity of infrastructure, legacy applications, a gap in existing skill sets, or an inability to hire or bring in resources. Three of the enterprises were in the process of engaging consulting services to aid in moving towards enterprise automation.

The keys to success

When further researching the differences between those able to make the transition and those who were not, several critical components came to light.

Recognition of the value of automation

Organizations with successful implementations start with a clear understanding of the value DevOps and subsequent infrastructure automation can bring to the organization. Without the clear understanding of value, there appeared to be little chance that automation will be adopted even when skills and cost are not factors.

Tooling and ownership of architectural direction

While it may seem like a minor detail, it was frequently noted that choosing and aligning on a standard toolset early on – even if it requires expansion at a later date – is critical in enabling the teams to succeed. Organizations without standardization cited project failures and delays.

Training, reskilling and supplementation of knowledgeable resources

There is a massive advantage in using current employees with deep organizational knowledge and training and supplementing their skillset to move the organization forward. In several examples, enterprises were able to pair software developers and infrastructure engineers together to create more effective outcomes with high business value while growing the skill sets of the paired team members.

Organizational fluidity to support right-sized teams and projects

Enterprises who noted a healthy program often housed more than one team model within the organization and made plans for transition projects between organizational paradigms.

Conclusion

DevOps adoption is not a one-size-fits-all implementation initiative. This research identified three directional models of adoption, with Small Teams optimized for newly formed or small-scale projects, Scale Teams optimized for large projects and cross-projects, and Transitional Teams providing an important stepping stone in the DevOps adoption journey.

It is important to call out the exceptional work by enterprise teams that put in place effective training and transition initiatives to upskill their existing operations and IT engineers. They were able to improve their ability to provide infrastructure automation and transition employees into roles where they are able to implement continuous improvement and delivery of business value.

This white paper is for informational purposes only and may contain typographical errors and technical inaccuracies. The content is provided as is, without express or implied warranties of any kind.