



DEVOPS



Background

The world is being transformed in fundamental ways with software and communication technologies. As bits reshape and pervade the atoms, connecting us and the world around us, most businesses find themselves in a struggle to survive, to transform themselves and to be relevant in the times to come. Design thinking led approaches are gaining ground, helping businesses uncover unknown problems and solve the known problems, as part of their transformation journeys. Majority of these transformation journeys are software led. The software applications deliver high quality capabilities in a cost effective manner that keep the businesses ahead through demonstrated Speed and Agility. This paper looks at the role of DevOps in driving Agility, its leverage across a variety of technologies and the Infosys recommended approach in its adoption.



Overview

There are three significant trends that are reshaping every industry today, and each of them, by itself, has the potential to disrupt existing ways of making technology and business choices. Enterprises need to invest in all of these to continue to stay ahead of existing competition, as well as likely new entrants.

1. New Platform Dynamics: In addition to cloud, the exponential increase of computing power with capabilities like in-memory computing, has given every business and IT department the power to cost-effectively automate significant pieces of their operations, and build web-scale applications. In the past, the cost of this infrastructure, and the complexity of developing the necessary software, prevented most organizations from making these investments. This is now changing with the availability of elastically scalable commodity

hardware, and automated and self-healing software. In addition to scale, these infrastructures are based on open standards, are supported by multiple vendors, and provide business and IT the necessary agility to cost-effectively experiment with new applications.

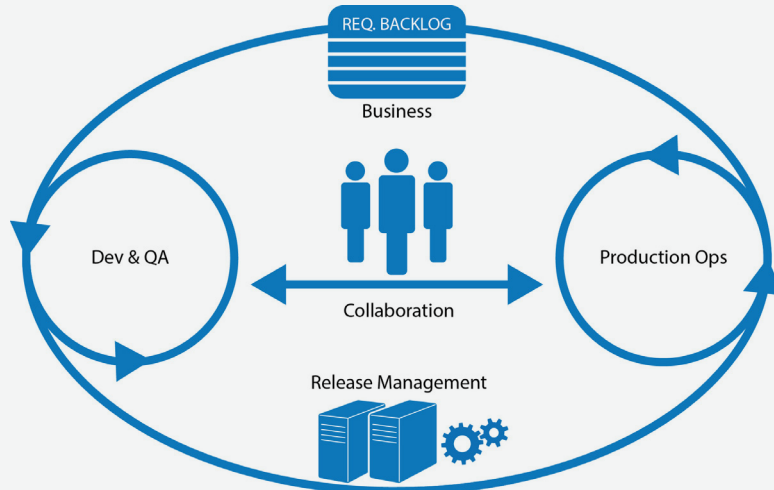
2. Data and Algorithms: Businesses always had access to data, but not much was being done to derive the necessary insights from this data. In addition to not having access to skilled talent (e.g. data scientists) to derive meaning out of this data, the cost of storing and processing all the data to derive the necessary meaning and correlations was prohibitive. However, as outlined above, this is now rapidly changing, and companies that don't make the necessary investments in platform, talent and the necessary data-driven culture are likely to be at a disadvantage over time.

3. Smart, Connected Products: The advent of smart, connected products, and the adoption of 3D printing is likely to redefine the entire product value chain – from design, manufacturing, delivery and sales, to servicing, and finally feedback from customers. It is conceivable that large parts of this value chain will be completely digitized, with the final personalized product being delivered directly to the end user.

The above trends require IT to create a portfolio of new applications (systems of engagement) that provide excellent user experience, can rapidly evolve as the needs of the business evolve, and can scale to support hundreds and millions of end users. In addition, these new applications need to co-exist, and in several cases, extend the capabilities provided by existing enterprise applications such as SAP and Oracle (systems of record).

DevOps Adoption

DevOps is about enabling rapid delivery of capabilities to the end consumers, which requires collaboration across the software delivery value stream that includes teams spanning across business, development, QA, and infra & ops. This entails embracing a set of capabilities that deliver speed (faster development & frequent releases), quality (stability & resilience in production) and value. Software tools are an essential part of DevOps and the key to orchestrating these capabilities seamlessly across this software delivery value stream.



DevOps adoption entails building a set of capabilities across various functions in the organization in terms of people, processes, and tools. This will help IT to stay agile and deliver at the speed which business demands. Infosys believes that

there are certain key capabilities that are a necessary minimum for a successful DevOps implementation; these are - Rapid Prototyping, Continuous Integration, Service Virtualization, Functional test automation, Containerization, Environment

Management, Monitoring & Dashboards. As an organization matures in the adoption of these capabilities and practices, additional capabilities can be taken up in a phased manner.

Organization change management

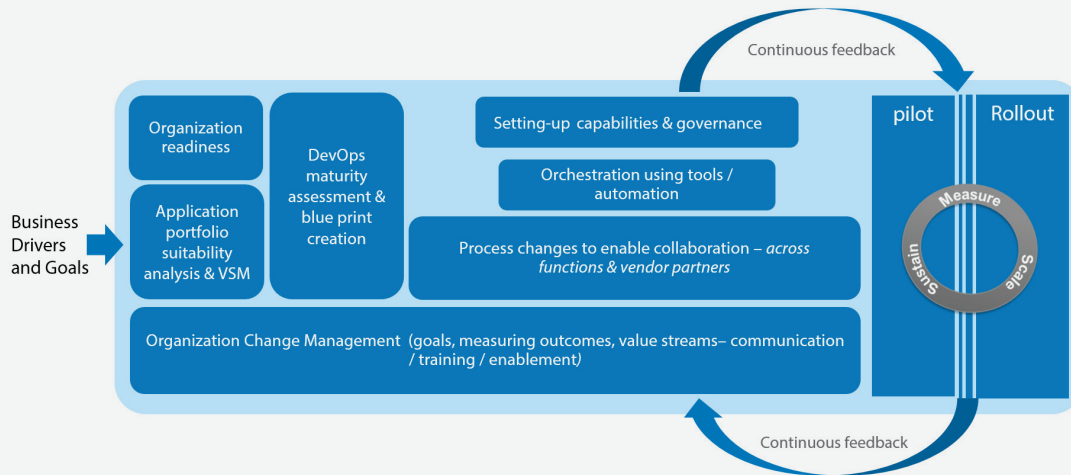
Incremental requirements, Incremental development, incremental deployment

Business	Dev	Test	Infra	Ops
Automated acceptance test	Version Control	Functional test automation	Database deploy	Incident management tools
Rapid prototyping	Code quality Analysis	Test Management	Infrastructure layer	Support analytics
Agile	Code Coverage	Test Data Management	Environment management	Monitoring & Dashboard
Big room Planning	Unit test automation	Service Virtualization	CD automation	Predictive monitoring
Lean	Build automation	Performance test automation	Release management	Self healing
	Artificat repository	Security test automation	Containerization	
	Continuous integration	Progressive test automation	On demand infra	
	Agile		Infra-as-code	
	Feature toggle		Just enough infra	
	Incremental design			
	Mico services			

DevOps Journey

1. Assessment and roadmap definition

DevOps journey typically starts with the organization readiness assessment. As DevOps impacts many functions like dev, test, business, ops, infra; it is important to align the stakeholder towards adoption of changes in their way of functioning, governance or technology implementation that will come with any DevOps adoption. Combined with a DevOps maturity assessment it serves to setup right expectations within an organization or portfolio under consideration.



Second important step is to perform portfolio suitability analysis. This will help in understanding the technology constraints, existing policies and goals for the portfolio / applications.

Outcome of the maturity assessment and suitability analysis is used to create the right roadmap for DevOps adoption with due consideration to the organization readiness. A typical roadmap will include a minimum viable program and the 'what-how-when' of DevOps implementation.

2. Organization change management

Organization change management (OCM) is an integral part of DevOps adoption, and runs in parallel through all phases of the adoption journey. OCM includes focusing on redefining the roles and performance measures for successfully driving the people transformation across dev and ops teams. It also includes defining goals for the DevOps teams, setting up governance, metrics, creating enablement programs, etc.

3. People and process transformation

Based on the varied nature of applications, all applications may not immediately adopt all the DevOps practices. Thus applications will be at various stages of their DevOps adoption, and that will also define the various ways in which people transformations may happen in the organization. As a first step, you may want the separate dev and ops teams to start interacting more and subsequently, you may have the dev and ops personnel working as one team. Throughout this journey, it is important that dev team gets enabled on operations, test team focuses on test automation and ops team enriches their skills in dev and automation. The required process changes will have to be carried out to reflect the new ways of working.

4. Technology and Tools considerations for DevOps

Technology and Tools consideration plays an important role in DevOps

adoption after organizational and process changes. Some of the key aspects to be considered are:

- a. Though tools implementation and CI-CD (Continuous Integration - Continuous Delivery) form the basis for the DevOps journey, it is important to also look at the application architecture changes required for DevOps adoption. In case of new development of an application, the architecture should be designed to support modularity, virtualization and should be based on micro-services architecture. This is to ensure that frequent and smaller releases can happen. Aspects like feature toggles should be considered in the design phase, and supported by the architecture for higher efficiencies. Similarly for renewal and maintenance of existing applications, architectures should be enhanced to support features like predictive monitoring, building a persona and metrics based dashboards to facilitate

easier tracking, analyzing and fixing of issues. The architecture of the applications should also be upgraded to support integration of DevOps tools. This will ensure one-click deployments and faster releases to meet the business demands. At the same time, process changes such as parallel development, test driven development, behavior driven development, adoption of best practices towards build, test deployment and security need to be thought through during the design phase.

- b. Tools ecosystem plays a key role in the automation and orchestration of the capabilities to deliver software at the desired speed and quality. It's important that the core DevOps toolset and the overall approach spans across teams, business units and applications and

incorporates the understanding of how each tool amplifies the gains and supports the other tools in the DevOps ecosystem. While there is no one size fits all with respect to DevOps tooling, the importance of a standardized toolset that brings together underlying best practices and process efficiencies driven by robust version control, code quality, continuous integration, delivery etc. cannot be underestimated.

Some of the key aspects of tools and automation are assessing as-is state of tooling, analyzing gaps, selecting appropriate tools, deciding build progression policies, orchestrating capabilities using selected tools and rollout of a pilot implementation before wider rollouts. Selection of tools depends on several factors like integration possibilities with upstream and downstream tools, migration

efforts, scalability along with typical considerations of open source, licensing costs etc. A phased manner of choosing the tools and starting with the foundational areas of version control, configuration management is important to drive the basics in place and get initial successes. Further teams can get on to adopting tooling for rest of the DevOps practices like Continuous Delivery, Deployment and Monitoring.

The tools available are vast with significant number of tools across various functions that have gained a high level of maturity. However Open Source Software (OSS) is maturing and gaining predominance in the industry due to rapid innovation, better quality, improved security & availability of commercial support. Below is an illustration of the key elements in a DevOps tools chain :



Infosys Capabilities in DevOps

Given the growing demand to implement DevOps capabilities in our projects and our client organizations, Infosys has built strong capabilities in this space and our client engagements on DevOps are increasing at a rapid pace.

Services Offered: With its rich experience and pool of DevOps consultants and tools experts, Infosys offers the below services

1. **Consulting:** A dedicated consulting team focuses on DevOps consulting and provides consulting services that span across readiness assessment, roadmap definition & transformation, scalable DevOps, DevOps process consulting & blue printing.
2. **Execution:** Backed up by a large talent pool that has specialized capabilities on tools and CI-CD implementations, we implement DevOps capabilities across our projects. Various services

offered to our clients include tools & products evaluation, implementation of tools and accelerators (Infosys IP), continuous delivery set up and organization change management.

Tools & Accelerators

1. **The Infosys DevOps dashboard:** This dashboard helps provide unified view of all the tools used by Dev and Ops teams in DevOps life cycle. It also provides the application health report against the metrics
2. **Infosys DevOps Platform (IDP):** This platform helps rapid onboarding of applications on continuous delivery pipeline. This can help significantly reduce the implementation time in a varied tooling landscape.

The continuous delivery platform combined with a comprehensive dashboard provides significant benefits:

- A centralized platform available as-a-Service that reduces project teams effort for set up & administration
- Enhances compliance & automates several validations - code analysis, unit testing, code coverage, code obfuscation, FOSS compliance, etc.
- Operational Intelligence across all environments
- Prevention & reduction of application staging errors in multiple environments (Dev / QA / Prod.)
- Significant reduction in cycle time through automated build & deployment

Implementation of this solution has shown a minimum of 20% improvement in time to market and quality gains.

Technologies Supported



SDLC Support






Key Features

- Deskill CI/CD configuration
- Integrates Infosys custom, OSS & Commercial tools
- Scriptless - Simplified Onboarding of applications
- Extensible - to integrate additional tools
- Centralized hosted platform

Client Case Studies

Benefits from DevOps implementation vary based on the maturity levels that the organizations are currently at – however they are significant at each stage of the adoption. In our experience we have seen major improvements in cycle time and quality across various stages of DevOps implementation.

Driver	Infosys Solution	Results
Automation helped release faster but maintaining frequent releases was challenging...	 Focus on Integrated Teams Integrated Dev & Ops Teams, common goals, processes & metrics are aligned	83% improvement in time to market
Partial automation was not sufficient to meet aggressive time-to-market demands...	 Achieving end to end automation Setup continuous delivery pipeline: On demand provisioning and release automation	>80% deployment time reduction 30% YoY growth in Online revenues
Moving to agile development was not enough. Manual interventions impacted software quality...	 First step towards DevOps Adopted automation in Agile programs: Continuous integration & test automation, to start with	25% reduction in cost of quality 40% cycle time Improvement

For more information, contact askus@infosys.com



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