Progress® Chef®

Continuous Delivery For the Continuous Enterprise

WHITEPAPER

Contents

Executive Summary

Organizations that build distinctive skills as digital businesses will be the leaders in the coming years and will outperform their peers, industries, and markets.

Digital business is always open In order to succeed in the digital world businesses must be able to continuously deliver value through the software they deploy. To lead in this world, they must deliver that software at speed, with efficiency and low risk.

For organizations not born in the digital age, this requires:

- **Operating in a hybrid reality.** Adoption of cloud computing models and cloud-native application architectures that spur agility and lower operational costs associated with operating its existing portfolio of applications.

- **A shift to product-led development teams.** A product orientation that drives innovation, breaks down organizational silos and overcomes cultural barriers and skill gaps.

- **A move to automated pipelines and DevSecOps**. Automation enables teams to accelerate the delivery of software and shift more of the responsibility for security left into the development process and minimize tool sprawl and tool chain complexity.

Delivering software at speed in the midst of these shifts requires a consistent approach to delivering infrastructure, application, and compliance automation regardless of the IT environment.

Chef helps enterprise IT teams supporting large and complex environments to continuously deliver applications and infrastructure that are secure by design to any environment.

Digital Transformation is Key to Long-Term Viability

Every industry is being disrupted by the demands of the digital marketplace. Traditional approaches to business no longer work as they don't meet the expectations of the market and are ripe for disruption by more nimble competitors. Leaders in digital transformation are accepting that digital (or the 'app') is the new customer interface and are focused on delivering experiences to that interface. It is those improved customer experiences that drive net revenue and profit growth, which means developing and delivering more applications faster.

Digital Maturity, Revenue Growth, and Profit Margins

Net revenue growth		Net profit margin
15%	Lower Maturity	15%
31%	Medium Maturity	31%
45 %	High Maturity	43 %
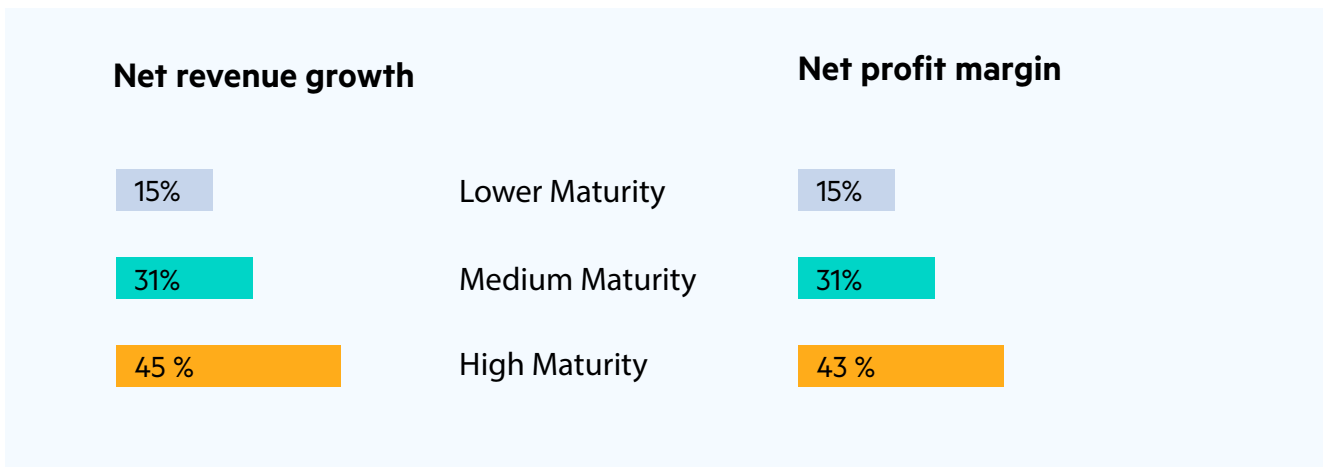
Source: Deloitte Insights, 2020 Digital Transformation Survey

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"In this year's report (Deloitte Insights Digital 2020 Digital Transformation Survey), we dig deeper into the factors that could link greater digital maturity with superior financial performance. Our broad conclusion: Digital maturity's impact on financial performance comes from enabling improvements in efficiency, revenue growth, product/service quality, customer satisfaction, and employee engagement—as well as by prompting a greater focus on growth and innovation."

Also highlighted in the report by Deloitte were compelling real world examples related to key performance drivers. These included:

- **Efficiency:** Guardian Life migrated more than 200 applications to the public cloud and saw associated costs for running those applications drop 20 to 30 percent.

- **Revenue Growth:** Chipotle upgraded its mobile app so that customers could more easily customize orders and saw its digital sales increase by more than 100 percent year over year in the following two quarters.

- **Product/Service Quality:** Rolls-Royce analyzed sensor data from jet engines in order to improve their fuel efficiency. This enabled them to offer subscriptions to lease jet engines in addition to selling them outright.

Adoption of new technology is not enough on its own. In addition, leaders must change the culture and the way the teams responsible for delivering those applications work together and deal with increasing security concerns.
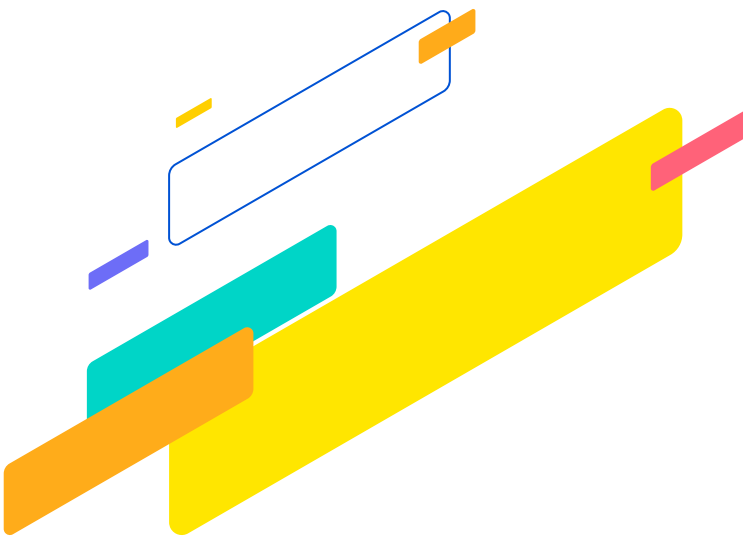
Top Challenges Organizations Face when Using and Deploying Containers
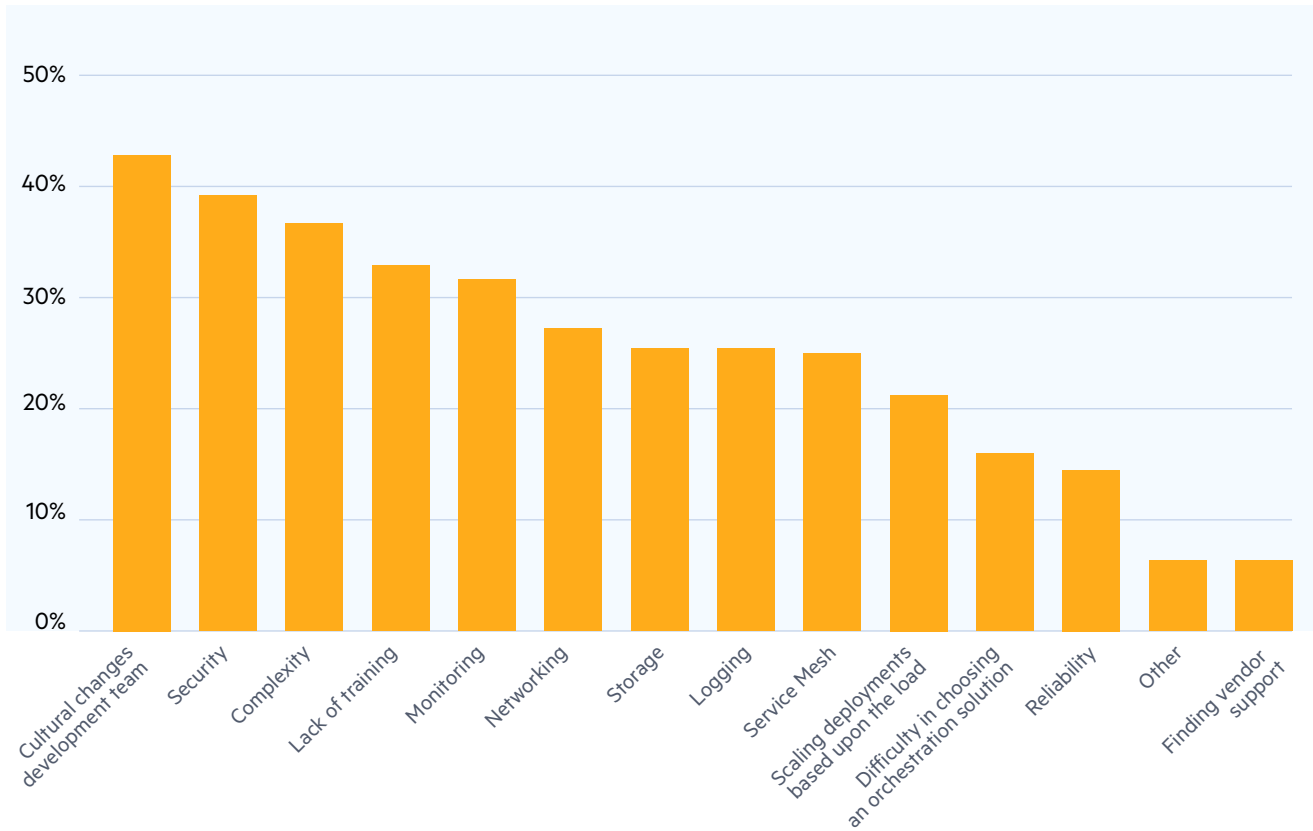
Source: 2019 CNCF Survey Results

"Cultural challenges with the development team remain the top challenge in using/deploying containers (43%). Security (40%) and complexity (38%) remained high on the list."

CNCF

**So what are these digital leaders doing?**

Navigating Complex Technology Changes

For any reasonably sized business, modern applications are being designed for web-scale applications and consumer level experiences. These requirements mean a design point that involves multiple technology shifts:

For organizations not born in the digital age, this requires:

- **Accepting Hybrid as the New Reality:** Modern application architectures are distributed, not monolithic. They are composed of collections of API calls, multiple data sources, microservices and run in multiple runtimes. They use at least one facet of the cloud such as storage or cloud bursting and can span multiple geographies and multiple clouds.

- **Scaling Agile Development and Product Driven Teams:** They break down organizational silos and align resources with a common purpose and end-to-end knowledge of the supported applications all while maintaining costs and standards via Centers of Practices (COPs).

- **Enterprise Wide Adoption of Automated Pipelines and DevSecOps:** The only way to deliver changes at scale and ensure security in distributed systems is to put automated controls in the pipelines so that every time a new build is checked in (not only the code, but also its dependencies, dockerfiles, secrets, etc.), it is audited.

Digital leaders are embracing repeatable, scalable automation across the whole portfolio for software production and development as a key component in every shift.
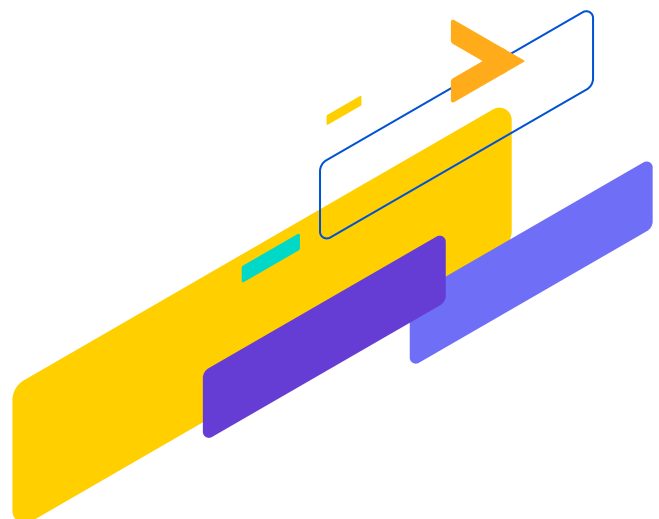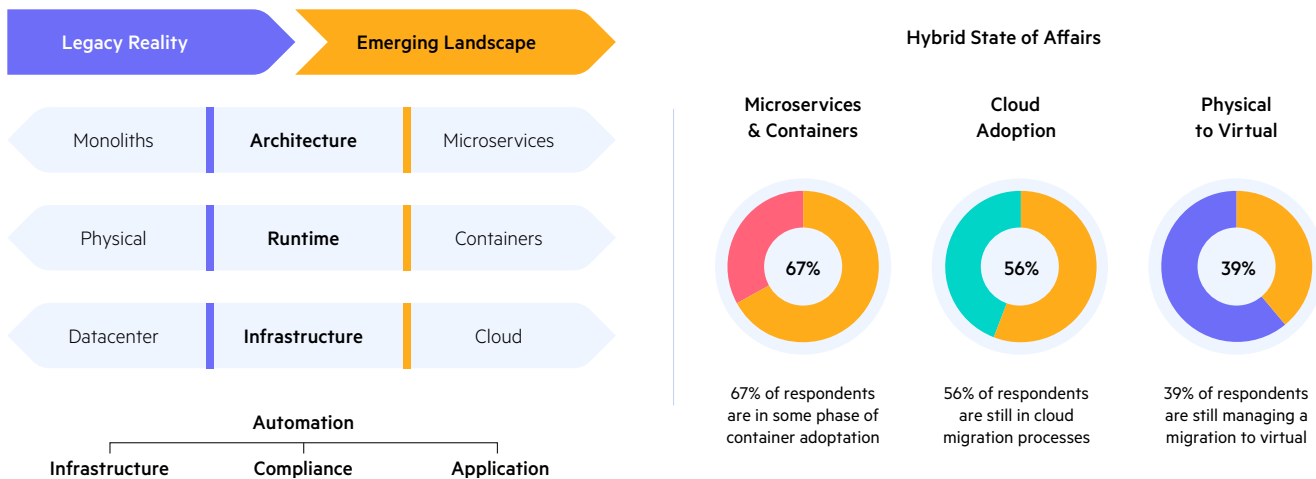
Accepting Hybrid as the New Reality

Digital leaders embrace modern application architectures and leverage the efficiencies of the cloud. The reality is that few companies have a portfolio that consists solely of modern applications and equally the legacy portfolio must continue to perform and integrate with the modern portfolio. This is confirmed by a 2020 study from IBM and Forrester which states:

> "With the expectation that 50% of critical workloads will run on premises or in an internal private cloud in the next two years, this survey (Forrester Study: The Key to Enterprise Hybrid Multicloud Strategy) identified how engaging in a hybrid strategy can be important for overall business health."
>
> **IBM Systems**

The Hybrid Tech Management Reality

Legacy Reality		Emerging Landscape
Monoliths	**Architecture**	Microservices
Physical	**Runtime**	Containers
Datacenter	**Infrastructure**	Cloud

Automation

Infrastructure — Compliance — Application

Hybrid State of Affairs

Microservices & Containers	Cloud Adoption	Physical to Virtual
67%	56%	39%
67% of respondents are in some phase of container adoption	56% of respondents are still in cloud migration processes	39% of respondents are still managing a migration to virtual

Source: Chef Survey 2017

Leaders are finding ways to manage their infrastructure, application, and compliance concerns with consistency.

Scaling Agile Development and Product Driven Teams

Applications cannot get to customers quickly without cooperation between all the stakeholders in an organization in a way that delivers quality at speed. The collective set of Agile and DevSecOps techniques are representative of a cultural and process shift away from siloed organizations toward integrated teams.

Silos are difficult to break down. A longstanding point of friction for software development is that operations teams see risk reduction and stability as their goals while development teams feel they must innovate and deliver new features quickly. The business typically wants results fast, and so consequently, developers have become the new "kingmakers." They take control by circumventing their IT departments and creating their own instances in the cloud.

Governance and testing comes after the fact, which slows down production releases, or if not managed correctly could lead to real risk in the future.

Cross-Functional Teams More Efficiently Manage Change
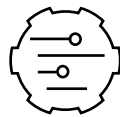
17% more likely than application teams to release changes to production on an on-demand basis.

23% more likely than infrastructure teams to do so

24% more likely than security teams to do so
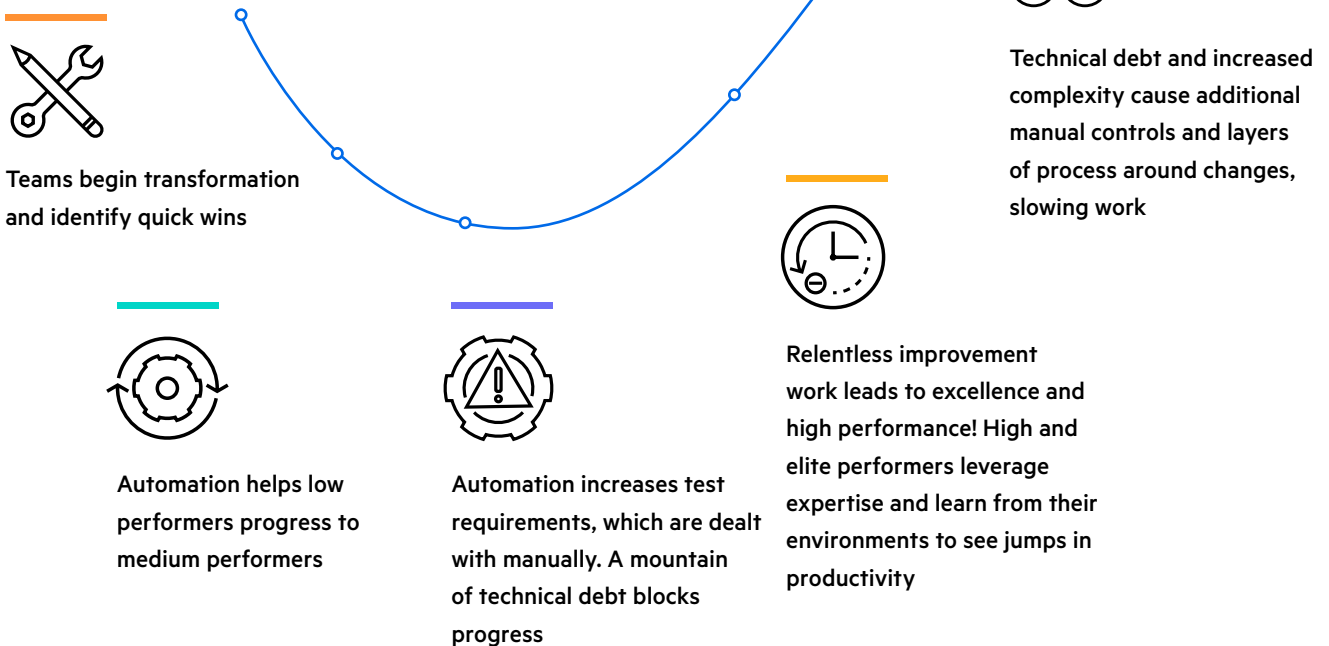
Source: Chef Survey 2017

Leaders are fully integrating development, operations, security and business teams into closed loops for maximum effect, and offering services which enable and encourage innovation.

Enterprise Wide Adoption of Automated Pipelines and Devsecops

The move to automated pipelines Continuous Delivery (CD) typically starts with agile Dev teams working on new or well-funded systems. But without an enterprise wide approach and ability to scale continuous delivery across all applications, organizations will struggle to maintain digital leadership. No application is an island. Every application is subject to change, whether it be code changes, patches to the OS, changes to the supporting databases or changes to the infrastructure it is running on. Without a regulated pipeline to deliver changes quickly across all systems, organizations expose themselves to unforeseen risks and escalating maintenance costs.

No matter how new or well-funded an application is today, it will soon become one of many other applications that have to be secured, patched, updated, and maintained as part of an organization's IT estate. The "J-Curve of Transformation", included in the "The State of DevOps 2018, Dora Report", visualizes the challenges large, complex organizations face when automating delivery pipelines. Teams first target high profile projects and quick wins, and then see a drop-off as they're faced with mounting complexity and technical debt.

The J-Curve of Transformation: Transformation Efforts are Slowed as a Result of Complexity

Teams begin transformation and identify quick wins

Automation helps low performers progress to medium performers

Automation increases test requirements, which are dealt with manually. A mountain of technical debt blocks progress

Relentless improvement work leads to excellence and high performance! High and elite performers leverage expertise and learn from their environments to see jumps in productivity

Technical debt and increased complexity cause additional manual controls and layers of process around changes, slowing work

The counter balance to the move to autonomous product driven delivery teams is DevSecOps

Adopting DevSecOps practices is a critical step for organizations to speed up their software delivery while reducing their risks. DevSecOps entails a close collaboration between Development, Security, and Operations to integrate best practices into the software delivery process, including embedding automated security and compliance testing in the software development lifecycle (SDLC)
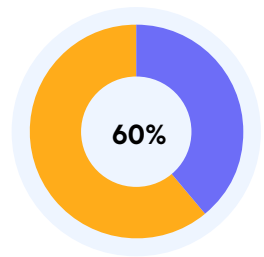
Adoption of DevSecOps Drives Successful Outcomes

59%

90%

60%
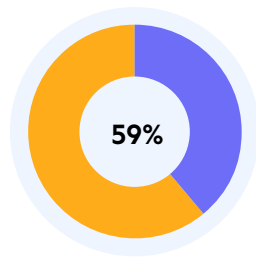
59% of respondents believe integrating security into the software development lifecycle (SDLC) is crucial for their organization's success
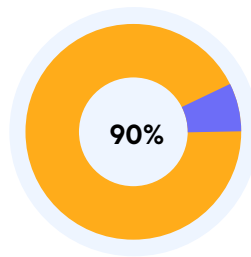
Nearly 9 out of 10 DevSecOps adopters found security to speed up — or at worst have no impact on — software delivery

60% of organizations believe that adopting DevSecOps reduces the risk of breaches

Source: 2020 Chef Security Compliance Survey

2020 Chef Security Compliance Survey Results

Integrating Security into DevOps Speeds Delivery and Reduces Risks

View Report →

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Delivering the Continuous Enterprise

Companies can deliver on all of these challenges through Continuous Delivery (CD). Businesses that embrace CD across infrastructure, applications, and compliance outperform their competitors. They deliver their software faster, manage risk better, and are more assured of the software's security and stability.

An organization's ability to deploy software is highly correlated to business outcomes. In the book ACCELERATE authored by Nicole Forsgren, Jez Humble, and Gene Kim some interesting connections between "deployment pain" and achieving key "business outcomes" are drawn.

The Relationship Between Software Deployment Obstacles and Business Outcomes

"Dev/test teams have little visibility into what deployments are like." (low performers)

- Barriers hide work of deployment
- Isolate developers from the downstream consequences of their work
- Deployments fail

"Deployment problems are caused by a complex, brittle deployment process"

- Software not written with deployability in mind
- Complex, orchestrated deployments
- Manual changes
- Config drift/unknown state
- Multiple handoffs between teams/silos

Source: Accelerate: The Science of Lean Software and DevOps: Building and Scaling High Performing Technology Organizations, by Jez Humble, Gene Kim, Nicole Forsgren, Released March 2018

Chances are, the poorer your software deployment processes are, the poorer your overall IT performance is. The poorer your overall IT performance is, the less likely your organization is then to hit its digital goals and perform well in the market.

Driving Key Digital Performance Metrics

Ultimately in order to judge the success of any major enterprise initiative it has to be measurable. As related to software delivery and operational performance, one of the most well known systems of measurements is provided by DevOps Research and Assessment (DORA) group. For the past 6 years the DORA group has established 4 key metrics for helping companies assess the state of their digital performance:

- **Deployment frequency:** How often a company releases software to production.

- **Time from commit to deploy:** What the average length of time it takes between committing a change to a version control system and deploying that change to production.

- **Change failure rate:** The percentage of changes that result in poorer service or require remediation such as a patch or a rollback.

- **Mean time to resolve:** How long it takes to restore service when such a failure occurs.

Aspect of Software Delivery Performance* Elite	Elite	High	Medium	Low
Deployment frequency For the primary application or service you work on, how often does your organization deploy code to production or release it to end users?	**On-demand (multiple deploys per day)**	**Between once per day and once per week**	**Between once per week and once per month**	**Between once per week and once per month**
Lead time for changes For the primary application or service you work on, what is your lead time for changes (i.e., how long does it take to go from code committed to code successfully running in production)?	**Less than one day**	**Between one day and one week**	**Between one week and one month**	**Between one month and six months**
Time to restore service For the primary application or service you work on, how long does it generally take to restore service when a service incident or a defect that impacts users occurs (e.g., unplanned outage or service impairment)?	**Less than one hour**	**Less than one day***	**Less than one day***	**Between one week and one month**

Aspect of Software Delivery Performance* Elite	Elite	High	Medium	Low
Change failure rate For the primary application or service you work on, what percentage of changes to production or released to users result in degraded service (e.g., lead to service impairment or service outage) and subsequently require remediation (e.g., require a hotfix, rollback, fix forward, patch)?	0-15%	0-15%	0-15%	46%-60%

Source: 2019 Accelerate State of DevOps Report

But there is an inherent problem with these metrics. Pockets of organizations may be doing well while others are still struggling. Moving beyond traditional DevOps adoption metrics requires an enterprise level focus on delivery and movement beyond individual application delivery systems.

Evolving Focus from Operations to Developer Productivity

Companies that adopt continuous delivery tooling and agile delivery methodologies break down silos and create teams that are product focused and vertically integrated. With vertical integration, everyone works together toward the business objective. But it is not enough just to change reporting structures.

Modern cloud-native architectures combined with agile delivery practices fundamentally change the way applications are built and delivered.

The wide adoption of Micro-Services, Agile development practices and drive towards Test Driven Development (TDD) has shifted traditional responsibilities from operations teams onto development. Developers working in Agile sprint cycles need ongoing access to "production like build environments" in order to test their work effectively before being released.

If not properly addressed this can create a number of challenges. When overloaded developers start cutting corners, less is documented, less is tested, more adhoc fixes are applied, organizational changes lead to the accrual of technical debt, and deployments become more difficult. The opposite of the original intent happens. Development environments drift further and further out of sync with production environments. More failures occur, which causes continuous rework and burden on developers.

In order to prevent this operational teams must evolve into developer services teams that focus on automating and offloading these tasks from developers. For instance, a developer services team can create a self-service portal that grants developers the independence to quickly spin up their own pre-configured instances that are verified to comply with all company information security policies. Such portals make development faster while at the same time decrease risk, because the instances are known quantities that are in sync with operational standards, as shown by executable tests. Centers of Practices (COPs) then share best practices across the organization enabling enterprise wide adoption and scale.

Walmart Accelerates Prototyping and Drives Better Customer Experiences

The Intelligent Retail Lab (IRL) is a technology incubator inside of Walmart dedicated to harnessing the power of computer vision, machine learning and artificial intelligence to help customers shop smarter. By experimenting with these new capabilities in IRL, they'll explore how to make shopping better now and into the future.

Challenge: Developers were spending weeks to months of their time rebuilding and configuring software packages for testing versus working on new innovations.

Solution: The supporting DevOps team at Walmart leveraged Chef Habitat to implement build and configuration automation that enabled developers to package their software within minutes. Developers could then focus on solving customer service related problems and not fighting with the technology.

Impact: IRL is now able to use Chef Habitat to fully automate almost all applications and dependencies in its cutting-edge AI environment, enabling development at velocity.

"As we encountered unique software build lifecycles for some of these more challengingpieces of computer vision, artificial intelligence, and machine learning software, we found that Chef Habitat provides unparalleled flexibility and customization. Nothing else does what Habitat does."

Jeff Moody, DevOps Manager at the Intelligent Retail Lab by Walmart

Learn more about IRL by Walmart

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Embracing DevSecOps and a Shift-Left Approach

High-performing digital performers scale both speed and quality by shifting compliance into the software development process as part of their daily work, rather than retrofitting security at the end. With "shift left" testing (testing that integrates information security earlier in the development lifecycle, or to the left on the project timeline) developers are more likely to find errors before reaching production.

DevSecOps highlights the need to include security practices from the onset, where developers essentially "shift security left" and code with security in mind from the beginning. With the addition of codified security into the process the DevSecOps teams are able to automate repeated security or compliance assessment and validations into their delivery pipeline.

Code provides the path forward to trust and velocity. Using code to describe the desired outcome and associated policies eliminates miscommunications and makes deliverables unambiguous. Automated pipelines ensure repeatability across multiple teams at scale.

Unifying Dev, Sec, and Ops with Config Management and Compliance Automation

Cerner's health technologies are dedicated to creating smarter and better care for individuals and communities. Cerner assists clinicians in making care decisions and assists organizations in managing the health of their populations.

Challenge: Cerner was using manual processes to maintain the life cycle of systems and deliver healthcare IT solutions at scale.

Solution: Cerner deployed Chef solutions to ensure security and compliance of underlying platforms and to automate their configuration management.

Impact: Through Chef, Cerner is able to fully automate its infrastructure compliance and security, facilitating collaboration across Development, Security and Operations, bridging true DevSecOps to life.

"The coded enterprise is the delivery of business value as code. It's great if we can automate things, but ultimately that has to be tied into a business value, into the results that we desire."

Kyle Harper, Lead Engineering Manager, Cerner

Learn more about Cerner's use of Chef solutions

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# Continuous Delivery with Chef Enterprise Automation Stack

Continuous delivery accelerates the rate at which companies can promote software across environments. More testing is done during the build phase with the idea that the sooner you can find and fix defects, the faster teams can release quality applications. But scaling continuous delivery across all applications, all change events, and all environments is not easy; it requires an integrated tool set that can be used across an ever-increasing number of technologies in rapidly growing environments.

Chef Enterprise Automation Stack is an automation platform for DevSecOps teams to build, deploy, manage, and secure any application running on any infrastructure:

- **Align teams** via a common set of tools and processes

- **Embed compliance testing** in every stage of the technology lifecycle

- **Enable consistency, velocity, and security** in application delivery to any infrastructure

Chef Enterprise Automation Stack is powered by four core Chef projects: Chef Automate, Chef Infra, Chef Habitat and Chef InSpec.

The Chef Enterprise Automation Stack
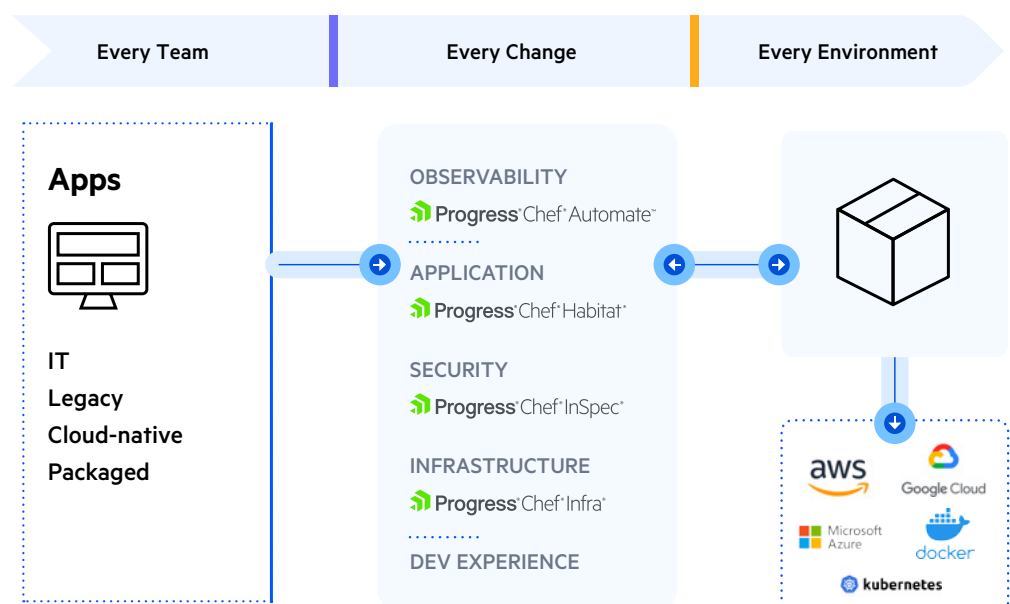
The Chef EAS platform. Learn more at Chef EAS product Page

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- **CHEF AUTOMATE** enterprise dashboard and analytics tool enabling cross-team collaboration with actionable insights for configuration and compliance and an auditable history of changes to environments.

- **CHEF INFRA** infrastructure automation capabilities to configure and remediate any number of systems across desktop, cloud and private data center environments.

- **CHEF HABITAT** automation capabilities for defining, packaging and delivering existing and modern applications such as those that are in containers and composed of microservices.

- **CHEF INSPEC** automation capabilities to define and continuously test and enforce security and compliance standards on-prem and in the cloud.

Redefining Application Delivery

The old way of siloing knowledge across build, release, and operations teams coupled with complex pipelines and processes results in failed deployments and wasted efforts. Instead, the modern way is to start by defining everything an application needs to be built, run and maintained into a single application manifest.
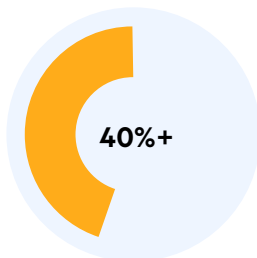
This application definition process creates a codified operational runbook. The runbook is then packaged into a single immutable artifact that can be consumed by any pipeline and deployed to any environment.
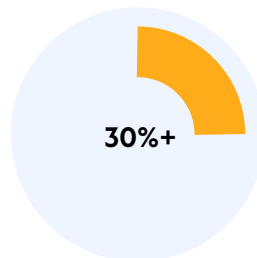

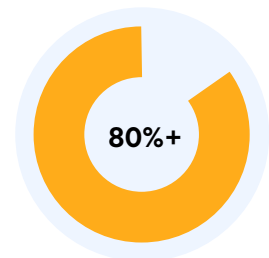Application · Build Instructions · Configuration Instructions · Relationships · Dependencies · Run-Time Instructions
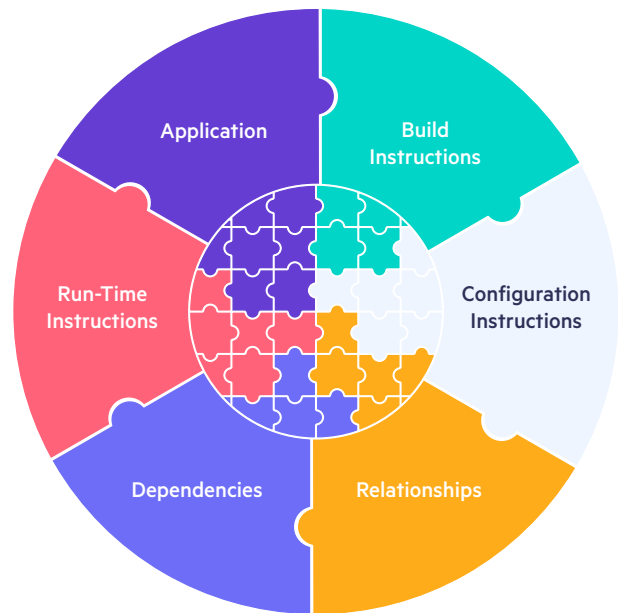
Application Definition Typical Results
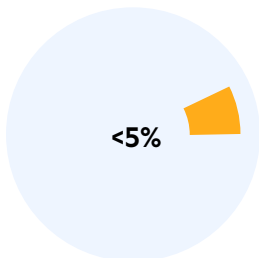
<5%
Release failure rates <5%

40%+
40%+ reduction in scripting for other automation tools

30%+
30%+ reduction in number of tools used to build and deploy applications

80%+
80%+ reduction in manual processes/gates

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Learn more about application definition.

Progress®

Recommendations

The pursuit of outperformance in digital transformation for a business means:

- Embracing Agile development DevOps practices as foundational to cultural transformation.

- Accepting a hybrid reality across multiple dimensions: cloud, containers and architecture.

- Re-defining application delivery by adopting a shift-left approach to software packaging and deployment that aligns to the new world of product driven application teams.

- Quantifying the outcomes of DevSecOps as improvements in Speed, Efficiency and Risk management across their entire application portfolio.

- Applying Continuous Delivery practices across all applications and environments to deliver software at speed.

→ **Learn more about Chef's approach to Continuous Delivery**

About Progress

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