Digital Darwinism: Driving Digital Transformation with DevOps and Continuous Delivery

CloudBees®

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Executive Summary

The need for innovation has never been greater. The success of Google, Facebook, Amazon, Microsoft and Apple — five of the eight largest and most successful companies in the world — is largely due to their ability to rapidly develop and deliver innovative software. Conversely, former market leaders like Borders, Blockbuster and Kodak buckled because of their failure to recognize disruptive technologies quickly enough. Competitors and new market leaders emerged by innovating rapidly, rendering these once dominant brands irrelevant.

Today, many conservative banks have been outpaced and outmaneuvered by cutting-edge financial services companies like Capital One, Bank of America, HSBC and ABN AMRO. Taxi companies have been decimated by Lyft and Uber, hotels threatened by Airbnb and HomeAway and IT hardware vendors diminished by Amazon Web Services. The list of casualties goes on. It's a phenomenon referred to as Digital Darwinism, where fast innovators thrive and laggards wither.

Leading companies have embraced the era of digital transformation. Even industries that typically lag along the software development adoption curve, such as government, healthcare, education, utilities and non-profit organizations, are differentiating with software. It's clear that companies succeeding in digital transformation through software innovation are winning new markets and new customers.

The economics of digital transformation and the integral role of software have given rise to modern development and delivery practices focused on rapid innovation and automation. DevOps, a portmanteau of development and operations, has emerged as a modern practice that sparks innovation and drives competitive advantage. DevOps gives organizations the ability to develop and deliver software faster and more efficiently—enabled by automated processes such as continuous integration (CI) and continuous delivery (CD).

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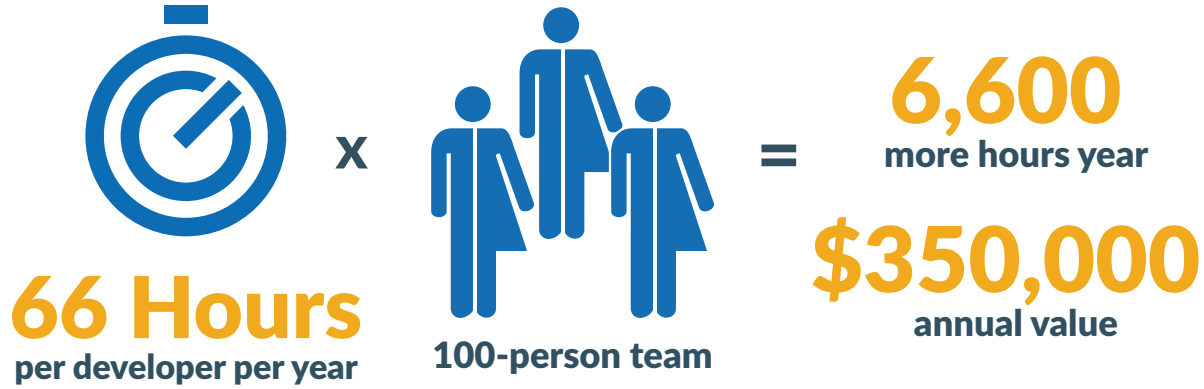
A CloudBees assessment of more than 100 enterprises revealed that continuous delivery enables an average efficiency gain of 66 hours per developer per year. For a 100-person team, this efficiency equates to 6,600 more hours to invest in innovation; an estimated annual value of $350,000.



Successful companies today are becoming more competitive by delivering new applications, services and capabilities faster, more securely and with higher quality than ever before. To achieve this goal, a growing number of organizations — across all industries and geographies — are embracing DevOps and continuous delivery. This powerful combination accelerates application delivery while improving communication, integration and collaboration between development and operations teams — a change that involves the transformation of people, process and technology.

This whitepaper from CloudBees includes aggregate results from more than 100 business value assessments of enterprises in all stages of DevOps and continuous delivery adoption. It also includes case studies and industry research to bear out the positive impact of a DevOps transformation and continuous delivery processes. The purpose of this whitepaper is to underscore the principles behind DevOps and continuous delivery, as well as the proven financial benefit and business value they provide.

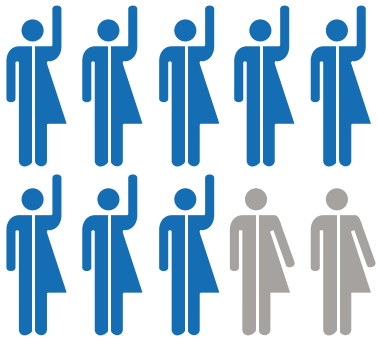
Why DevOps? Why Now?

Today, virtually every company is a software company, whether it recognizes it or not. Widespread use of mobile and the internet have changed how enterprises connect to customers. The customer experience is largely driven by software — making speed, quality, functionality and an intuitive user interface the differentiators. Corporate leaders expect development teams to produce high-quality, highly-secure, agile applications that are instantly available on multiple platforms with a seamless user experience.

In this software-centric era, successful implementation of continuous integration, continuous delivery and DevOps helps organizations surpass competitors, dominate their industry and remain a leader. DevOps, continuous integration and continuous delivery — three milestones on the path to organizational improvement — are closely related and interdependent:

- **Continuous integration** is a critical step in automating software delivery pipelines. With continuous integration, developers continuously and automatically integrate code changes. After a developer checks in code, it is immediately verified by an automated build-and-test process. With continuous integration, developers find and fix issues with their code more quickly, speed up the development process and gain back time for innovation and higher-value tasks.
- **Continuous delivery** is a process by which software is always in a release-ready state and can be promoted to a production environment when the organization wants it to be. To achieve continuous delivery, teams automate the entire delivery pipeline, including testing and even deployment, if desired. The result? More frequent, incremental releases with fewer errors.
- **DevOps** is the cultural transformation inside organizations that aims to break down silos, automate key processes and spark cross-team collaboration so that all stakeholders in the software delivery process are aligned toward the shared objective of delivering quality software rapidly, reliably, consistently and repeatedly.

Organizations have many good reasons for beginning their DevOps journey with continuous delivery, but certain trends stand out. Hurwitz & Associates recently completed a study[1] of 150 top IT decision makers, 77 percent of whom reported either companywide or business unit implementation of continuous delivery.

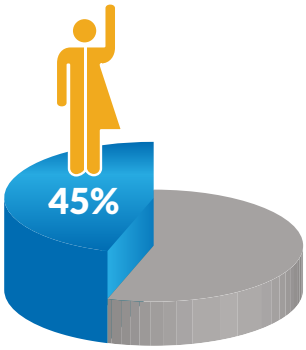


77%

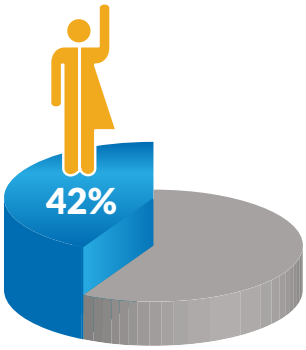
reported either companywide or business unit implementation of continuous delivery

[1] DevOps Survey Results: Why Enterprises Are Embracing Continuous Delivery, CloudBees and Hurwitz & Associates, December 1, 2017 (Reference: https://www.cloudbees.com/blog/devops-survey-results-why-enterprises-are-embracing-continuous-delivery)

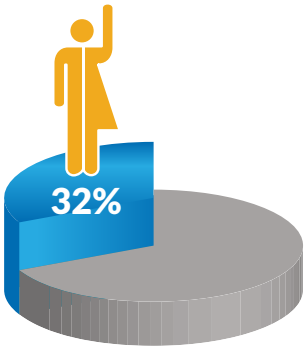
When asked to identify the top business challenges that led them to change their development process in favor of continuous delivery, the top three challenges cited were:



» More than 45 percent cited the need to improve product and service capabilities as a major driver for implementing continuous delivery.

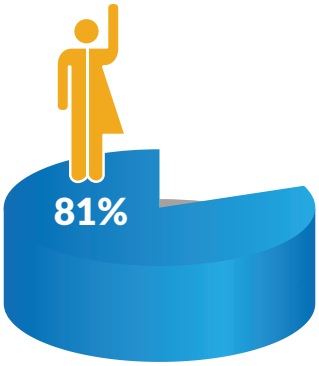


» More than 42 percent reported keeping up with competition as a key reason for implementing continuous delivery.

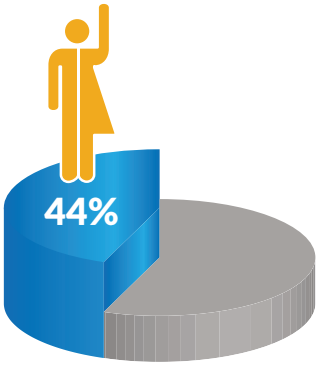


» Almost one-third (32 percent) said that a top impetus for implementing continuous delivery was meeting (or exceeding) customer expectations.

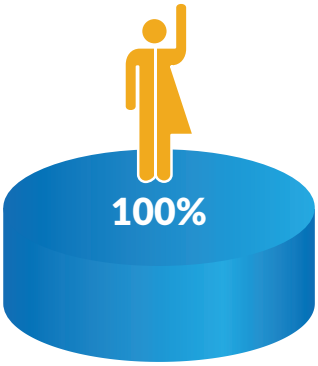
Hurwitz & Associates also asked survey participants how implementing continuous delivery has impacted their business.



» 81 percent said continuous delivery brings value to customers and delivers on business goals.



» Approximately 44 percent reported significant improvements in increasing customer value and meeting business objectives.



» Equally important, none of the 150 study participants reported a decline in goal achievement as a result of implementing continuous delivery.

The benefits of DevOps are also underscored by an independent CloudBees analysis, which looked at 100 companies that practice DevOps. This analysis shows that although software developers want autonomy and creative freedom, they also need manageability, support, scalability, standardization and stability. Developers want the tooling and libraries they are familiar with, but they also want the system to function reliably and integrate well with the work of their colleagues.

The CloudBees analysis reveals that DevOps-focused organizations are moving:

- Development toward a distributed service model, with a central services team, and away from independent teams and non-standardized model.
- From a binary-user model to role-based access user model.
- From on-premise to cloud.

The days of lone developers using disparate development platforms and tools is coming to an end.

The assessment analysis also reveals that, today, regulation and compliance lag behind other business drivers for continuous integration and continuous delivery. While some industries have already long been feeling this heat (financial services, pharmaceuticals, utilities, to name a few), the priority for many other industries will likely focus more on IT as the pressure for these regulatory and compliance-related requirements increases.

Software Factories

There are historical examples of the radical change that has emerged. Henry Ford is often credited as the inventor of the modern assembly line. In the plant, workers created components in a long, connected process and Ford linked those separate stages with conveyor belts. Workers no longer created an entire batch of widgets that remained stored until they were ready to be used in the next stage in the manufacturing process. Instead, a long, continuous stream of components was manufactured and assembled. Production stages were broken down and synched to the speed of the conveyor belt. Efficiency rose and production costs dropped dramatically. Ford became the industry frontrunner, reducing the time it took to build a car from 12 hours to 93 minutes—an 87 percent improvement.

For laggard organizations, managing the software development lifecycle is an extremely manual process—much like the one Ford initially implemented in his factories. To write, build, test, deploy and deliver software requires hundreds or thousands of hours of labor, with major gaps between handoffs from developer to quality assurance to operations. The gaps double when the code is sent back for fixes. Continuous delivery reduces and eliminates these gaps, and the associated costs, by changing the process from manual actions to automated software factories. Continuous delivery is the industrialization of software. It wasn't until about a century after Henry Ford had automated the continuous delivery of cars that the tech industry figured out how to apply the same concepts to software.

Ford became the industry frontrunner, reducing the time it took to build a car from 12 hours to 93 minutes — an 87 percent improvement.

Challenges and Obstacles

Even organizations that clearly recognize the business value of adopting a continuous delivery and DevOps approach may face a variety of potential stumbling blocks. One of the most prevalent challenges is the difference between what developers and operations professionals prioritize and value most — and the traditional development practices and silos that amplify those differences.

Development is concerned with speed and agility, while the IT operations team is focused on quality and stability. As a result, organizational barriers exist between the development team creating new software and the operations team responsible for pushing changes into production. Some of those barriers are by design, even though they often bog down processes and create tension between the teams. Most organizations tend to be risk-averse, not wanting to compromise quality or security for the sake of speed. Legacy software development processes and tools were designed to reduce risk and ensure quality, not for optimizing speed and agility.

> *DevOps isn't a process for an elite group of developers, it rests on everyone's shoulders.*

Many DevOps challenges are rooted in corporate culture and cannot be overcome with technology. In DevOps, culture is as vital as process and tools. To this end, buy-in becomes the chief objective (and potential blocker) for a successful DevOps transformation. The buy-in obstacle is magnified when software development crosses teams, departments, business units, management teams and even companies. That's why senior management support isn't optional, it's required. DevOps isn't a process for an elite group of developers, it rests on everyone's shoulders.

Building a DevOps Culture

DevOps is about more than tools. It's a culture of collaboration and shared goals, which eliminates finger-pointing and promotes teamwork, with everyone working together in support of the same outcome — reliable software quickly, and frequently, delivered to production.

People, processes and tools are the DevOps Trinity and must be aligned. The entire team must embrace the alignment before transformation can begin. No amount of tooling can overcome a lack of cultural alignment. To achieve success in DevOps, the three planes of the DevOps Trinity need to be connected, upstream, downstream and across the organization. Truly successful and sustainable DevOps organizations cannot thrive without all three components.

The three planes of the DevOps Trinity are:

» **People and Culture:** Interaction between operations and development teams evolves into collaboration. Key to this change are trust, honesty and responsibility. Stakeholders have mutual goals and the empathy needed to achieve them.

» **Process and Practices:** Processes become increasingly programmable and dynamic. Predictability, efficiency, security and sustainability of operational processes supports this objective.

» **Tools and Technologies:** Toolchains replace single tools. The common elements of the toolchain include applications for coding, building, testing, packaging, releasing, configuring and monitoring. Some categories are more essential in a DevOps toolchain than others, especially continuous integration (build) and infrastructure as code (configuration) tools.

How Successful DevOps and Continuous Delivery Add Business Value

In addition to increasing software quality and development speed, continuous delivery dramatically improves the efficiency of development teams. Continuous delivery benefits software development in much the same way Ford enhanced auto manufacturing with the assembly line. An automated pipeline, based on continuous delivery processes, converts the latest software changes into code that has been built, tested and is ready to be deployed. If it is working efficiently, the assembly line provides feedback on errors in the latest code more rapidly, with a “fail fast” mindset, massively reducing the cost of development and delivery.

As mentioned earlier in this whitepaper, the CloudBees assessment revealed that continuous delivery enables an average efficiency gain of 66 hours per developer per year. For a 100-person team, this efficiency equates to 6,600 more hours to invest in innovation and is an estimated return of $350,000 annually, to the organization. The CloudBees analysis includes companies that represent a variety of sizes, industries and regions. These organizations employed an average of 1,530 developers on 11 teams, ranging in size from 25 developers across three teams to 25,000 developers across 714 teams.

Consider the returns extrapolated across companies of all sizes, as shown in the chart below:

Number of Developers[2]	Efficiency Gains ($)/Year	Efficiency Gains (Hours)/Year	Development Days Gained/Year	Development Weeks Gained/Year	Full-Time Equivalent (FTE)
1	$3,500	66	8.25	1	-
25	$87,500	1,650	206.25	41	-
100	$350,000	6,600	825	165	3.2
500	$1,750,000	33,000	4,125	825	16
1,000	$3,500,000	66,000	8,250	1,650	32
5,000	$17,500,000	330,000	41,250	8,250	160
10,000	$35,000,000	660,000	82,500	16,500	320
25,000	$87,500,000	1,650,000	206,250	41,250	800

[2] As used here, the term "developers" encompasses dev, test, ops and admin.

DevOps organizations have demonstrated the value of aligning stakeholders around shared objectives while integrating and automating key development processes. Market leaders that have adopted DevOps and continuous delivery throughout their organizations—companies such as Netflix, HP, Capital One, American Airlines and MasterCard—have thrived in myriad ways by embracing these practices.

Enabling Rapid, Continuous Innovation and Faster Time to Market

Having shared objectives and a common understanding among development and operations, enables cross-team collaboration, breaks down siloed behavior and develops a culture of responsibility, improving effectiveness and speeding time-to-market.

Capital One

"We see numerous advantages to CI and CD with the CloudBees Jenkins Platform, including shorter time-to-market, improved quality through repeatable processes and a reduction in the cognitive load on our developer community, who are now focused more on the software they are creating and less on the pipeline that creates it."

Brock Beatty
Director, Software Engineering
Capital One

Results:

- 90% of pipeline automated
- Deployment frequency increased 1,300%
- Engineers focused on application development, not infrastructure
- Quality and security ensured through repeatable processes

Improving Collaboration and Productivity

DevOps and continuous delivery create new opportunities for cross-team collaboration, improved productivity, streamlined maintenance and more efficient operations. Organizations spend less time on unplanned work and rework, and significantly more time developing new features and writing new code.

Accenture

"Using CI/CD, we merged build and deploy jobs and empowered our developers to perform self-service deployments. As a result, these build and deploy times have been reduced by more than 75 percent."

Ravish Pathak
Technology Consulting Manager and DevOps Practice Lead
Accenture

Results:

- Production deployment time cut by more than 90%
- Environment set up time decreased by 96%
- Development build and deploy times reduced by more than 75%
- Downtime for deployments reduced by 100%

Reducing Risk

By integrating tools and automating testing and other processes, organizations ensure higher quality, fewer errors and better security while benefiting from faster application development and delivery. More secure applications are built in less time.

Suramericana

"With the CloudBees Jenkins Platform, we've implemented consistent, repeatable processes that run through automated regression suites every time a developer commits or before each deploy. That repeatable process not only produces better quality, more secure software, it enables us to deliver it faster."

Jennifer Pérez
Software Developer and DevOps Implementation Analyst
Suramericana

Results:

- Deployment time reduced from two weeks to two hours
- Defect counts cut by about 75%
- Thousands of deployment hours saved

Improving Employee Satisfaction and the Ability to Attract and Retain Top Talent

Talented software developers are worth their weight in gold. There simply aren't enough to fill the available jobs and recruitment is expensive. Attracting talented developers and keeping them happy is a key business objective for many organizations. With DevOps, new developer onboarding is faster, and creates an environment where employees are inspired and motivated, keeping retention high and encouraging recommendations to peers.

Allianz

"The consistency of our CI/CD development environment helps us to respond to business needs flexibly by easily moving developers between teams…recruitment is much easier and new employees get started much faster now."

Adam Rates
Head of Strategy and Architecture
Allianz

Results:

- Project startup times cut from days to minutes
- Reliable development and build environment established
- Staffing flexibility and scalability improved

Strengthening Brand and Creating Loyal Customers

When an organization innovates continuously and responds quickly to rapidly changing market demands and customer expectations, it becomes a trendsetter, being first to offer new features and capabilities. Excellent service creates loyal customers who are "sticky" and less inclined to switch to a competitor when the next new, shiny app comes along.

WatchGuard

"We can't afford to be complacent about what we have already offered; it's about what else we have to offer our customers. Having a healthy CI/CD pipeline based on CloudBees Jenkins Enterprise has really helped us stay competitive, maintain the level of quality that WatchGuard is known for and deliver new products with a high degree of confidence."

Jack Waters
Senior Vice President of Engineering
WatchGuard

Results:

- Competitive advantages strengthened
- Large-scale projects completed in weeks instead of months
- Teams onboarded 95% faster (in four hours versus two weeks)
- Security lapses avoided
- Enterprise support gained

Increasing Revenue and Reducing Costs

The CloudBees assessment also shows DevOps can save companies millions of dollars per year in development costs. They innovate more rapidly, with better software delivered quickly.

Electronic Arts

> *"I can't imagine how we could ship the games we do in the time frames we ship them if we hadn't really bought into this CI methodology."*
>
> Joshua Nixdorf
> Technical Director
> Electronic Arts

Competitive Advantage

DevOps and continuous integration/continuous delivery processes sharpen competitive edge through continuous innovation and faster time to market. Organizations today must quickly develop new software features and capabilities, add a new twist to an old idea, or respond to competitors' innovations with something comparable or better. With DevOps and continuous integration and continuous delivery, organizations stay competitive, or even leapfrog ahead.

ABN AMRO

> *"With CI/CD, we are able to respond to competitive threats more quickly and introduce new innovation on an ongoing basis."*
>
> Stefan Simenon
> Head of Centre of Expertise Tooling and Software Development
> ABN AMRO
>
> Results:
> - Release frequency increased 600%
> - Build times cut by 70%
> - Testing time reduced by 75%
> - Velocity increased 100%

Business leaders are recognizing IT as a strategic asset, as quality software and rapid response to shifting market and customer demands become more critical. Shortening application delivery times, improving software quality, and quickly adapting to change — all with security, availability and compliance — is the competitive advantage organizations seek. Organizations that fail to pursue and embrace these advantages will soon find themselves risking extinction.

Conclusion

Companies rise and fall, fortunes are won or lost, based on whether or not innovation via application development is at the forefront of business goals. How effectively are organizations utilizing developers? How quickly are they releasing quality application updates and innovative features? Are they meeting the ever-changing needs of customers faster than competitors?

It's clear that agile programming is not enough. Agility without stability is not going to cut it. Similarly, stability without product quality will not move the needle. It takes speed, agility, stability and quality to get the job done — all possible through a DevOps culture and continuous delivery. These two, perhaps better than anything else an organization can do, return clear, quantifiable business value.

We've entered a new era of tremendous opportunities and risks. Thriving in the midst of Digital Darwinism requires new ways of thinking and working, and of aligning existing teams and scaling up new ones. DevOps, with a foundation of continuous delivery, drives revenue and saves costs on a massive scale. It is where the digital transformation starts — and where survival or extinction reigns.

Learn More

Read the Whitepaper
The Business Value of Continuous Delivery

Assess the State of Your DevOps Environment
Assessing DevOps Maturity Using a Quadrant Model

Learn About the Modern Technologies Necessary for Continuous Delivery
The DevOps 2.x Toolkit

Learn more

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CloudBees, Inc.
4 North Second Street | Suite 1270
San Jose, CA 95113
United States
www.cloudbees.com
info@cloudbees.com