Harvard Business Review
ANALYTIC SERVICES

Research Report

COMPETITIVE ADVANTAGE THROUGH DEVOPS

Improving Speed, Quality, and Efficiency in the Digital World

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The business benefits of DevOps are clear. In this survey, Harvard Business Review Analytic Services found that roughly two-thirds of respondents use DevOps, and they see benefits that impact their bottom line, including increased speed to market (identified by 70% of the respondents), productivity (67%), customer relevance (67%), innovation (66%), and product/service quality (64%).

We've also seen benefits at Google, where DevOps helped us build secure products used and loved by billions of people around the world. However, as head of DevOps practices at Google, I know firsthand how daunting implementing a new model can be, even if it's worthwhile. Customers constantly ask me, "How can I make DevOps a reality?"

Implementing DevOps can be really hard. Getting people to work differently doesn't happen overnight. Throughout our own journey toward embracing what's now known as DevOps practices, we learned critical lessons that we want to share with you:

- **Pilot a small project.** This provides a low-stakes opportunity to master key DevOps capabilities, such as building small, diverse teams with shared goals.
- **Implement end-to-end automation.** Not only does automation enable higher productivity, but it also frees up organizations to focus on what really matters—driving performance.
- **Use SRE best practices.** Start with site reliability Engineering (SRE) principles, because they help build collaboration, reduce waste, and increase efficiency.
- **Embed security within the software development process.** Over half of participants in this survey look for holistic approaches to improve security while automating the DevOps toolchain.
- **Be an open-source player.** Leveraging open-source tools and engaging in the community will help you stay abreast of the best solutions and practices and attract the best talent. According to a recent DORA study, 58% of businesses made extensive use of open source.
- **Build a culture that supports DevOps.** I emphasize this because the rest is worthless without it. When people feel they have each other's backs, they're more likely to take smart risks, more likely to create, and more likely to move faster. Trust boils down to these principles:
  - *Data-driven decisions:* Look at data from code, logs, and traces, and use that data to arrive at decisions.
  - *Transparency:* We choose sharing over secrecy and siloing. Everyone sees the same data.
  - *Shared goals:* We constantly collaborate so developers and operators are consistently working toward a common goal.
  - *No-blame policy:* By running blameless postmortem meetings in a safe environment built on trust, we learn from our mistakes. Because—let's face it—defects and coding errors happen when building software.
  - *Education:* Google, as with three-quarters of the top-performing DevOps teams in this survey, provides immersive, hands-on DevOps coaching and training, such as code labs and startup projects.

These examples—internally, with our customers, and in this study—all show that DevOps is worth the investment. There's something magical about understanding what makes people productive, collaborating with them, and then empowering them to deliver value. We hope you get as much out of this transformation as we did.

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EXECUTIVE SUMMARY

As the digital landscape rapidly evolves, companies that can respond quickly to customer needs have an advantage—and according to a recent survey, many are using DevOps to create this advantage.

A vast majority (86%) of the 654 respondents to a recent survey from Harvard Business Review Analytic Services say that it is important to their company to develop and put new software into production quickly. FIGURE 1 Indeed, principles and frameworks like agile, scrum, and DevOps—long part of the software developer lexicon—are making their way into the corner office.

Yet most companies have a long way to go to become leaders in this space. Only 10% of survey respondents say their company is very successful at rapid software development and deployment—these are the "leaders"—and many of those come from the technology industry itself. FIGURE 2 Sixty-one percent are "followers" that are only somewhat successful at rapid development and deployment, and 27% are unsuccessful "laggards." Leaders are nearly twice as likely as the average (53% versus 28%) to say they take a DevOps approach whenever possible. Another 32% do so for select projects.

DevOps is an approach to develop and run IT services faster and with higher quality through the adoption of agile and lean practices as well as automation. It started by combining the work of IT development and operations teams, but some companies have since expanded it to include anyone involved in taking an IT capability from idea to delivery of business value—including people from the lines of business. This contrasts with traditional sequential "waterfall" approaches to development. "It is trying to break down some of the silos and then looking at things from an end-to-end, lifecycle perspective," says Melissa Swift, leader for digital advisory at Korn Ferry.

DevOps affects the makeup of teams and how they work, communicate, and make decisions. It requires that teams be empowered to act with a high degree of autonomy. It works only when communication is open (within and between teams) and team members have a strong enough sense of psychological safety to take risks and make mistakes. For established companies, this often requires changing the fundamental culture of the organization. In this report, we explore what it takes to become a leader in rapid software delivery.

HIGHLIGHTS

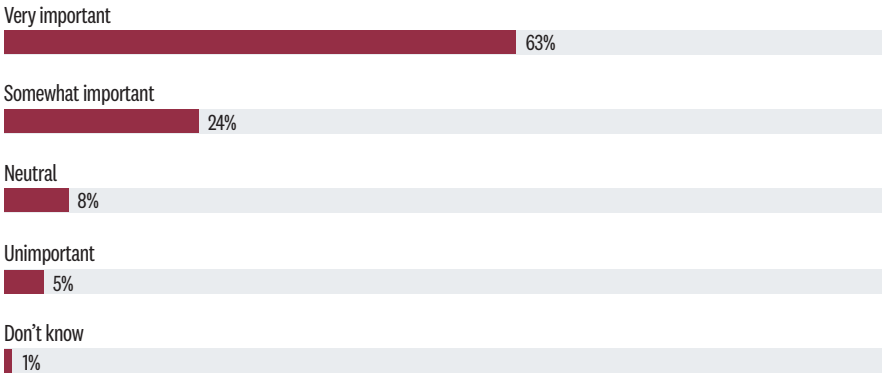
86%
OF RESPONDENTS SAY THAT IT IS IMPORTANT TO THEIR COMPANY TO DEVELOP AND PUT NEW SOFTWARE INTO PRODUCTION QUICKLY.

10%
OF SURVEY RESPONDENTS SAY THEIR COMPANY IS VERY SUCCESSFUL AT RAPID SOFTWARE DEVELOPMENT AND DEPLOYMENT.

FIGURE 1

FAST SOFTWARE DEVELOPMENT/DEPLOYMENT IS IMPORTANT

Importance of developing and deploying new software/applications quickly

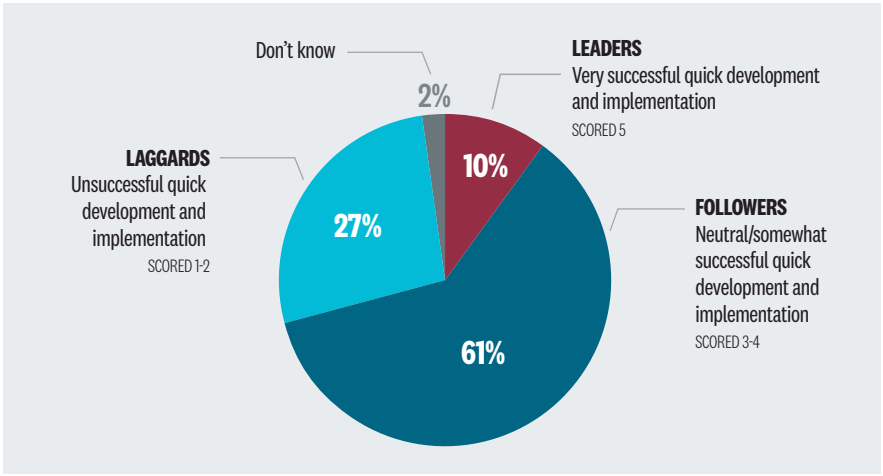


SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, SEPTEMBER 2018

FIGURE 2

ONLY A TENTH CLAIM MASTERY

How successful organizations are at developing and putting new software/applications into production quickly



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, SEPTEMBER 2018

Matching Speed with Quality

Among respondents who say rapid software delivery is important, 65% say changing customer expectations for digital capabilities is the top reason, far outpacing any other issue. They also named a general increase in the pace of business change (42%) and competitive pressures from both traditional and new competitors (32% and 31%, respectively).

Nearly half of all respondents (49%) say their organization releases software for customer- and employee-facing applications faster than in the past, with leaders increasing their speed at a more rapid pace than others. Despite these increases, respondents still aren't satisfied with the pace of delivery. Close to two-thirds of organizations (61%) want to achieve a release cycle of under three months, but only 27% are currently hitting this target. FIGURE 3 Leaders outperform by a factor of two, with 51% claiming release cycles of under three months. But even the leaders seek more speed, with 27% aiming for two weeks or less.

But velocity alone is not enough. Half of all survey respondents and nearly three-quarters of leaders say their organizations increasingly compete on the quality of their software—requiring software development models that increase speed while also maintaining quality. FIGURE 4

That's why DevOps is gaining such a large following, with close to two-thirds (61%) of respondents using it to some extent. By engaging the people who will use and maintain applications early and often while also involving developers in the operational aspects of running their systems, DevOps not only increases the likelihood that software will meet users' needs, but it ensures that quality is built in from the start, too. How this plays out varies from organization to organization.

THAT'S WHY DEVOPS IS GAINING SUCH A LARGE FOLLOWING, WITH CLOSE TO TWO-THIRDS (61%) OF RESPONDENTS USING IT TO SOME EXTENT.

At one large software-as-a-service (SaaS) company, DevOps teams include a product owner, a technical architect who understands the full end-to-end application, a software developer, an information architect, and an infrastructure architect, according to a program executive based in France.

At an enterprise software company that develops products for software developers and project managers, among others, "developers have to talk to operations to make changes work more fluidly," according to a senior program manager in Australia. "We use quads and triads—people who get together to make work happen." In her case, that process includes a product manager, a design lead, and the head of the scrum team. "We make the decisions about the direction we're headed in. It's basically a functional group to get the work done." This approach is replicated across other groups.

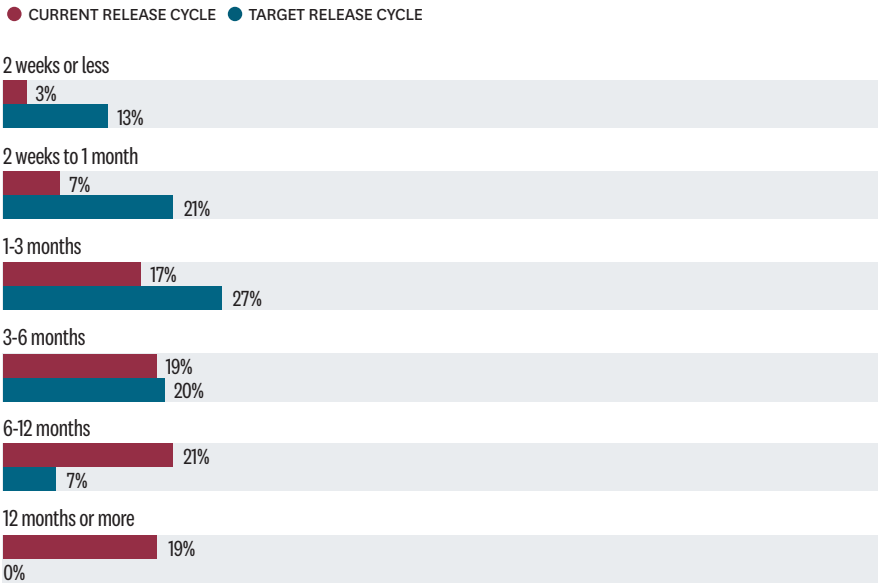
Meanwhile, development teams at a mobile communications company work closely with the operations center, according to a director of global digital business delivery based in South Korea. "The whole cycle—from design to development, verification, testing, release, and management of the service at the telecom provider—is tightly coupled," she says.

Given that full-cycle nature of DevOps, companies increasingly look to develop employees in multiple disciplines. A large global consulting and services company, for example, is focused on upskilling and cross-skilling employees. "A person should not be an expert in only one technology," says the program manager for innovation and intelligent automation in India. As a result, employees rotate across different areas to develop end-to-end knowledge of the process.

FIGURE 3

RELEASE CYCLES FALL SHORT OF TARGETS

Respondents stating their current release cycle versus target

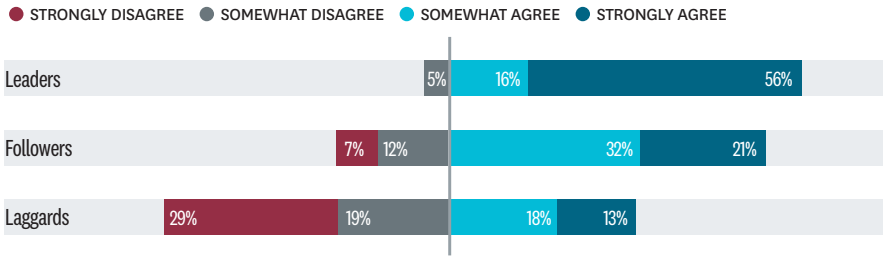


SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, SEPTEMBER 2018

FIGURE 4

LEADERS COMPETE ON THEIR SOFTWARE QUALITY

Respondents agreeing/disagreeing with the statement "Our company increasingly competes on the quality of our software"



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, SEPTEMBER 2018

DevOps Delivers Key Business Results

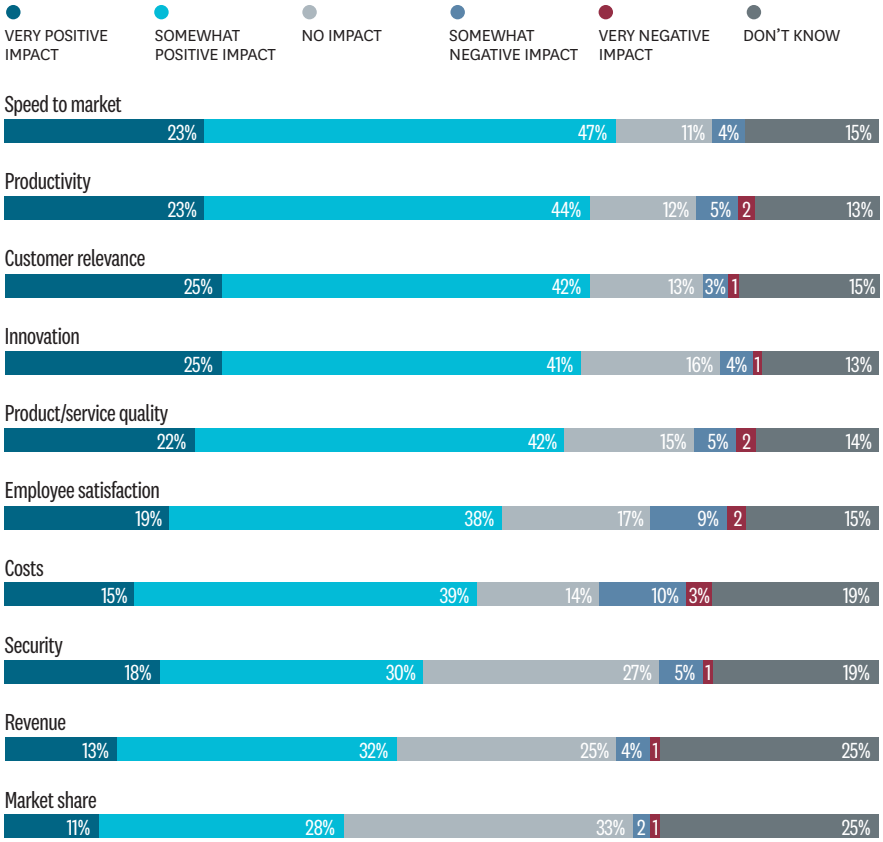
The benefits of DevOps are clear. Survey respondents who take this approach say that it has increased speed to market (named by 70%), productivity (67%), customer relevance (67%), innovation (66%), and product/service quality (64%). FIGURE 5

Leaders are more likely to take a DevOps approach, doing so at an 85% clip, compared with 66% of followers and 43% of laggards. Leaders are also twice as likely as followers and three times as likely as laggards to say DevOps is very important to their software development efforts (63% versus 30% and 23%, respectively) and to employ it wherever possible (53%, 30%, 15%) rather than only for select projects.

FIGURE 5

DEVOPS IS PAYING OFF

Companies use of DevOps impact the following



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, SEPTEMBER 2018

This greater commitment has led to better results. Leaders vastly outstrip the rest in reporting a very positive impact on all value metrics. FIGURE 6

DevOps generally incorporates agile and lean practices (small, self-governing teams working in sprints, limiting work in progress, delivering a minimum viable product) and some degree of automation. When that is the case, DevOps has proven to dramatically increase productivity. At the global consulting and services company, productivity increased 30% to 40% with the use of automation-fueled DevOps, according to the program manager. Next year, the company expects that figure to reach 50% or more.

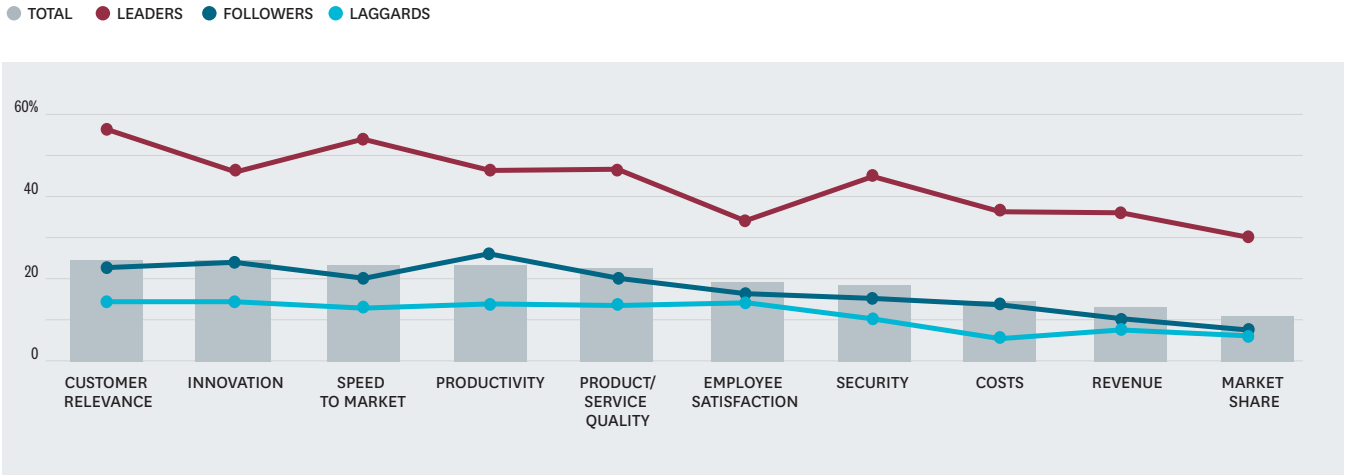
Executives must be careful not to let such numbers derail their DevOps efforts, people interviewed for this report cautioned. While in some cases a keen focus on productivity gains will be completely appropriate, in others it can hurt both speed and customer relevance, according to the director of business technology in charge of agile at a large, U.S.-based utility company. Business leaders who define their KPIs up front and communicate them to DevOps teams can avoid this risk. But when DevOps programs start out with a mission of customer focus and innovation only to later be co-opted in the name of productivity, it can demoralize those previously empowered teams.

"Productivity or optimization is turning into a dirty word for me," says Korn Ferry's Swift. "When you look at it through that flat lens, a lot of times you actually lose the agility you're trying to cultivate." She believes that having some slack time is essential to agility. "That's where you get those informal gains. People are having conversations on the fly, they're getting things right on the fly, they're making things better in real time. They're spending more time thinking about and interacting with the customer." When management focuses too heavily on productivity or optimization, she says, "it becomes 'How much more water can I squeeze out of the washcloth?' You lose some of the flexibility and

FIGURE 6

DEVOPS IS TRANSFORMING LEADER ORGANIZATIONS

Percentage of respondents saying their company's use of DevOps affected the following



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, SEPTEMBER 2018

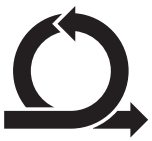
fluidity that were creating the gains in the first place." Swift believes that empowered, self-powering teams create their own intrinsic motivation, and "the further you can run on intrinsic motivation, the better off you are. Management tries to push things with extrinsic motivation, and it does slow down."

This is what happened at the utility company, where IT had created a digital innovation center of excellence three years before, taking a customer- and product-centric approach to developing mobile capabilities for its field force. "We focused on how we provide a totally different experience," says the director of business technology. "We took a design-thinking approach with end users, focusing on how to help them do their jobs." The results were impressive, with IT rolling out new capabilities "at a pace the business had never seen before." Response from the business was positive, creating more demand. But something important was lost in the process. "It became more about how to get hard benefits faster," says the director. "What had been a pull system, with the teams empowered, became more of a push system again, with senior leaders saying, 'Go do this first,' and with a focus on taking cost out."

These disconnects will happen less often as DevOps becomes more ingrained in organizations, penetrating silos not just within IT but also across the lines of business, and the goals of development efforts are more clearly defined and commonly understood up front. For an IT service provider, the ultimate business goal may be to increase reliability at lower cost. For a consumer-facing business, however, the goals may focus more on speed to market and customer relevance. Whatever the specific outcomes may be, the speed, quality, and approach organizations use to develop and release software applications have become business issues, not just IT issues, according to 80% of survey respondents. "We're seeing wonderful results where business has had that epiphany and realized that technology is everyone's work. It's not work they give another group to do," says Swift.

The Culture That Supports DevOps

Having the epiphany is just the beginning. Business leaders who seek to deliver value faster must first tackle challenges like outmoded organizational structures (silos) and

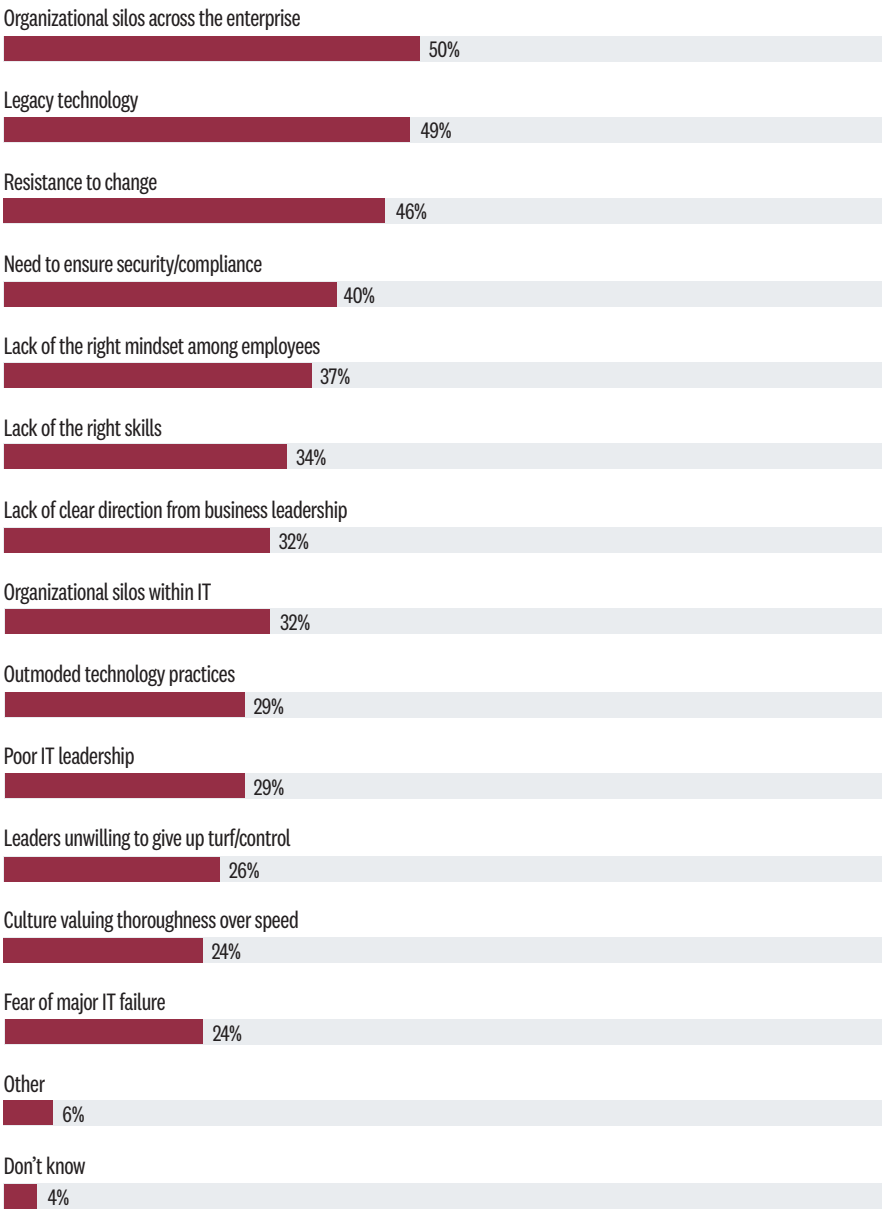


DEVOPS GENERALLY INCORPORATES AGILE AND LEAN PRACTICES AND SOME DEGREE OF AUTOMATION.

FIGURE 7

THE CHALLENGES THAT LIMIT FAST VALUE CREATION

Percentage of challenges preventing organizations from delivering value to market faster



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, SEPTEMBER 2018

legacy technology, and they must do so while overcoming resistance to change. FIGURE 7

Making DevOps work goes even deeper than that, requiring fundamental changes in people's mindsets and organizational culture. "DevOps is about genuine distributed ownership," says Swift. "Participants feel like owners and are empowered to act like owners."

Cultural transformation has been foundational to the utility company's faster delivery, according to the business technology director. This has included "standing up healthy teams that felt empowerment, psychological safety, and the ability to speak up. They have to trust that it's safe to go work in this new way."

That trust and sense of safety are key given the interconnectedness of DevOps work and the speed at which teams operate. The utility, which already has a strong culture of communicating and enforcing physical safety, created a psychological safety checklist that is reviewed at the start of team meetings.

Successful DevOps teams share some essential attributes, according to Nicole Forsgren, CEO and chief scientist at DORA (short for DevOps Research and Assessment). These include a high degree of cooperation both within teams and across former silos, using failure as an opportunity to learn, and continually experimenting to drive improvement.

DevOps requires a shift from a hero culture to a learning culture. "We're working with superintelligent people," says the senior program manager at the enterprise software company. "We need to give them permission to

"STANDING UP HEALTHY TEAMS THAT FELT EMPOWERMENT, PSYCHOLOGICAL SAFETY, AND THE ABILITY TO SPEAK UP. THEY HAVE TO TRUST THAT IT'S SAFE TO GO WORK IN THIS NEW WAY," SAYS KORN FERRY'S SWIFT.

step back and say, 'I don't know what that means,' to create a safe space for asking real questions without questioning their expertise."

There's a lot more direct communication with DevOps, says Swift. "You have to. If you don't put your hand up when you think something is going wrong, you're screwing up the whole process for the whole team."

Getting to this desired state from past ways of working can be hard. In fact, survey respondents say that managing this transition is the number one obstacle to faster software delivery they face. However, there are several things companies can do to help.

For instance, three-quarters (75%) of leaders provide immersive, hands-on DevOps training and coaching to product teams. FIGURE 8 A global defense technology company has set up a software center of excellence to train people in the concepts and practices of DevOps, according to a contract research and development lead at the company. Many companies employ DevOps coaches. These focus on everything from the specific methods used to what Swift calls "conscious evangelism for this way of working."

Evangelism and training are backed up with a shift from individual to team-based approaches to managing performance. The SaaS company includes both professional and personal goals in its appraisals, and these are developed and shared with colleagues. "This helps to build trust," says the program executive.

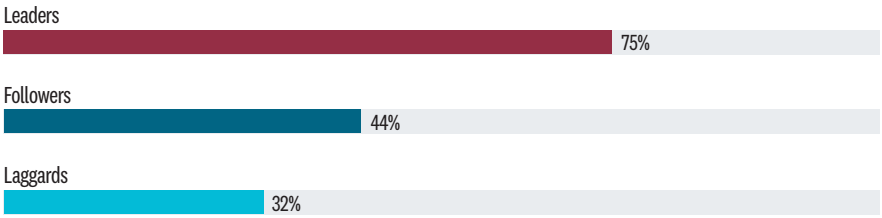
Of course, none of this will happen without C-level support, and that means understanding what DevOps is and what it entails.

There's a huge difference between leaders and laggards in executives' understanding of DevOps methods and terminology, with 65% of leaders, compared with only 7% of laggards, saying their business leaders have a good understanding. SEE SIDEBAR FOR A LISTING OF KEY DEVOPS TERMS. At companies that are planning to use DevOps, only 8% say their business leaders have a good understanding, meaning these executives must quickly get up to speed. FIGURE 9

FIGURE 8

LEADERS PROVIDE DEVOPS TRAINING

Percentage of organizations providing immersive, hands-on DevOps training

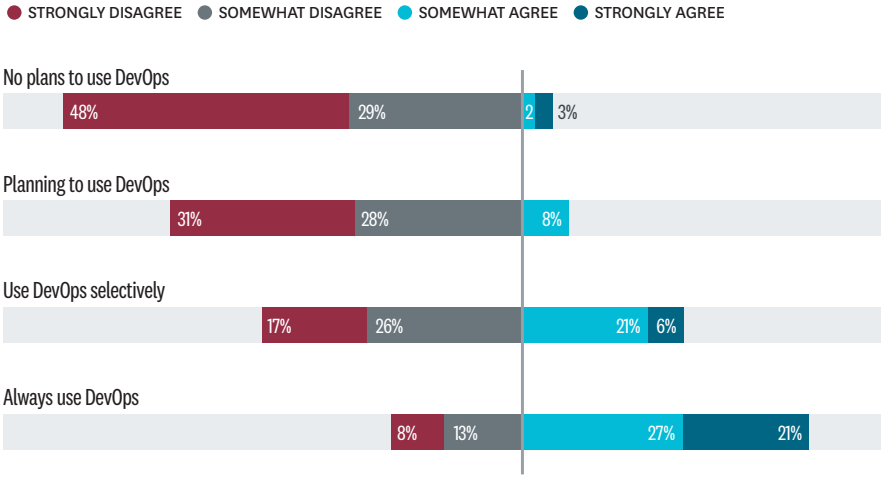


SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, SEPTEMBER 2018

FIGURE 9

EXECS PLANNING TO USE DEVOPS NEED TO GET UP TO SPEED

Respondents agreeing/disagreeing with the statement "Our business leaders have a good understanding of DevOps methods and terminology"



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, SEPTEMBER 2018

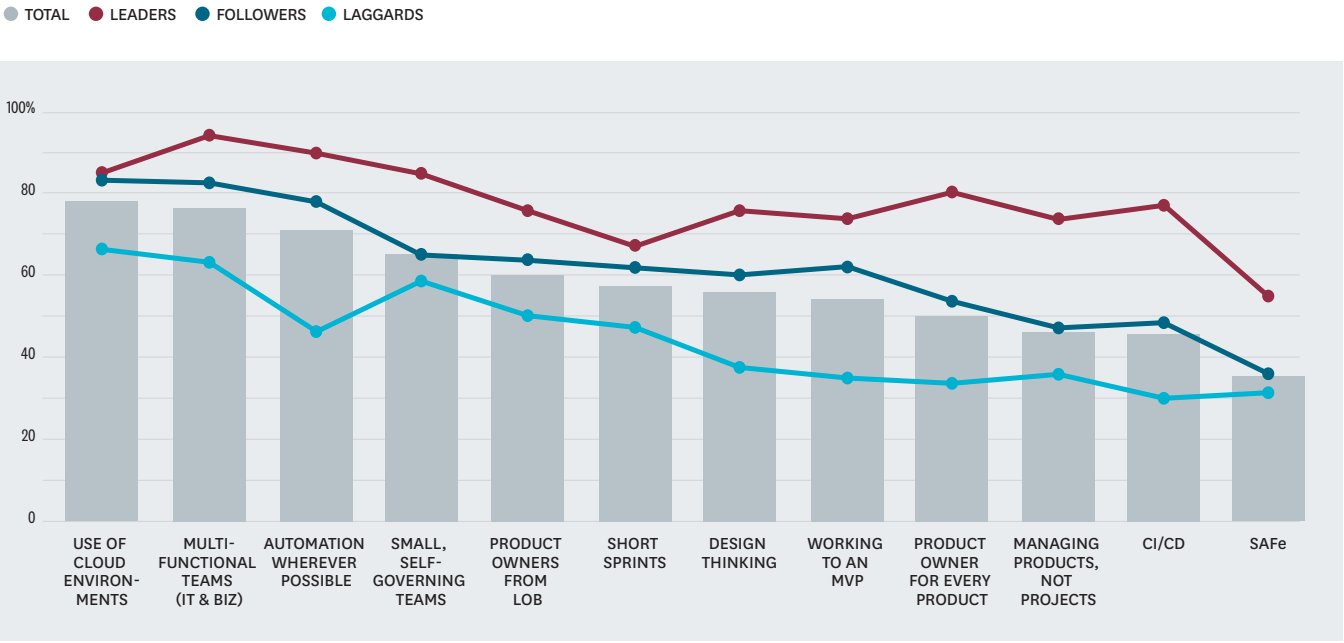
One of the most common mistakes that leaders without DevOps experience make is that they try to launch and run DevOps in an old-fashioned, command-and-control way. They say, "'My edict is you all work together now,'" says Swift. "It doesn't work. Leaders need to step back, give space, create a context, and let others critically engage in some of that day-to-day decision making."

The role of senior leaders is to set clear goals and objectives and to make their commitment visible. "The broader

FIGURE 10

LEADERS USE ADVANCED PRACTICES

Percentage of companies that employ the following practices in developing and releasing software



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, SEPTEMBER 2018

THE ROLE OF SENIOR LEADERS IS TO SET CLEAR GOALS AND OBJECTIVES AND TO MAKE THEIR COMMITMENT VISIBLE.

operating system of the organization will squash the new way of working unless people see leaders leaning in and role modeling the change," says the utility's business technology director.

Getting this right matters. DORA's research ties DevOps team empowerment directly to business results. "Letting teams experiment and find their own solutions drives strong outcomes," Forsgren says. "Giving them visibility into what the customer wants, what the customer needs, and if possible to the customer themselves drives good outcomes. We see that setting clear goals and objectives and then letting the teams use their expertise drives good outcomes." In DORA's research, that includes both commercial and non-commercial goals.[1]

Putting DevOps into Action

Business leaders who seek to increase their speed of software delivery use a variety of practices to do so.

Leaders are well ahead of followers and laggards in all, especially when it comes to automation and some of the more advanced practices, such as SAFe (the scaled agile framework)[2] and CI/CD (continuous integration and continuous delivery or deployment.[3] FIGURE 10 These practices hold the promise of shortening release cycles to the point where small changes are happening in an almost continuous flow.

The global consulting and services company breaks requirements down into microfunctions, with small, specialized teams assigned to each, explains the program manager for innovation and intelligent automation. These teams follow a Kanban-based sprint approach SEE SIDEBAR ON PAGE 7 and work very closely with the operations team, so deployment goes smoothly.

A global supplier of health IT solutions, services, and devices is moving toward a continuous delivery model. It has been using fully automated software builds for some time, but to really

increase the frequency of releases will require automated testing as well, says the head of technology and cloud operations strategy. "Automation is the basis to even think about a high frequency of releases," he says. However, to achieve this automation requires defining the software architecture very carefully. "This was the first major bottleneck we had to overcome," he recalls. He believes it will be years before his company will have fully automated testing, due to the complexity of the environment, with many different underlying client configurations and thousands of database tables within a given system.

The advantages of DevOps and more frequent releases go beyond speed to address reliability and resilience, according to Forsgren. "Think of your infrastructure as a Jenga tower—we're working with highly complex distributed systems," she says. "We need to anticipate that they will break, and so we build in reliability and resiliency as we go." The problem with delivering larger releases of code "that we push into production every six months or once every year, it's like a big ball of mud, as [renowned software developer] Martin Fowler calls it, that we have now propped on top of our Jenga tower. It will crash, and it will crash in massive, epic ways. We don't know which piece or pieces of that big ball of mud broke it," and so it takes longer to troubleshoot and fix the problem.

"Now instead, think of the Jenga tower, and we're pushing code every week, every day, putting Jenga pieces on top," she continues. "If something fails, it's much easier to figure out exactly which change caused the error. Debugging is simple, and getting that small change through our deployment pipeline is easy because it's very, very small."

To improve the likelihood that the Jenga tower will stand, many companies, including the defense technology company, incorporate security into their DevOps model rather than waiting until the end to run systems through a security check. "It is easier to build in strength and resiliency to the tower as we release small pieces every day, bit by bit," Forsgren says. "We can do this with smaller releases much more strategically."

Leaders are much more likely to be making appropriate investments in the security of their software and systems, with 66% strongly agreeing compared with 36% of followers and 23% of laggards. FIGURE 11

Suppliers that have made the shift to agile and DevOps face another challenge: integrating the new way of working into clients' legacy environment. "It can be a conflict to have continuous delivery on the

TERMS EVERY BUSINESS LEADER SHOULD KNOW

Agile A set of values and principles originally applied to software development (see the Agile Manifesto)[4] that includes such concepts as rapid, iterative development and delivery of viable working products; collaboration among cross-functional teams and their customers; and continuous improvement.

Scrum[5] An agile framework that incorporates small, self-directed teams working in (typically) two-week sprints, at the end of which a working product is delivered. Roles include a product owner who sets priorities and is accountable for results and a scrum master who manages the work.

DevOps[6] Combines development and operations groups and practices to improve speed and quality, blending development, integration, testing, release, monitoring, and management. Many practitioners believe DevOps is a key element in both agile and lean initiatives.

Lean[7] A set of principles to improve the delivery cycle. These include identifying value from the end customer's perspective; mapping the various steps in the value stream that contribute to the delivery of the product (and eliminating steps that don't add value); and increasing flow by eliminating bottlenecks. This makes it possible to shift from a push model of work to a pull model, further increasing efficiency.

Kaizen[8] The Japanese word for "improvement." In business, kaizen refers to activities that continuously improve all functions and involve all employees, from the CEO to the assembly line workers. It also applies to processes that cross organizational boundaries into the supply chain.

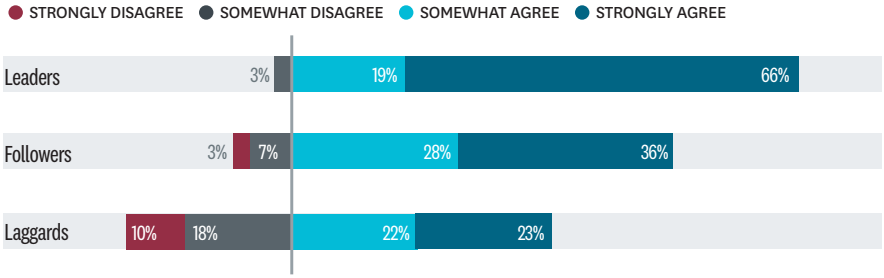
Kanban[9] A method developed in lean manufacturing to manage and improve work by balancing demands with available capacity and upgrading the handling of bottlenecks. The Kanban board is a tool to visualize the work so it can be managed more effectively.

Scaled Agile Agile by its nature is designed to make use of small teams. To scale that for larger, more complex, less predictable work requires connecting dozens or hundreds of teams so they can communicate, collaborate, and deliver in concert. Many organizations tap into the scaled agile framework (or SAFe)[10], which combines elements of agile software development, lean product development, and systems thinking. Related concepts are the team of teams[11] and scrum of scrums.[12]

FIGURE 11

LEADERS INVEST IN SECURITY

Respondents agreeing/disagreeing with the statement "We are making appropriate investments in the security of our software and systems"

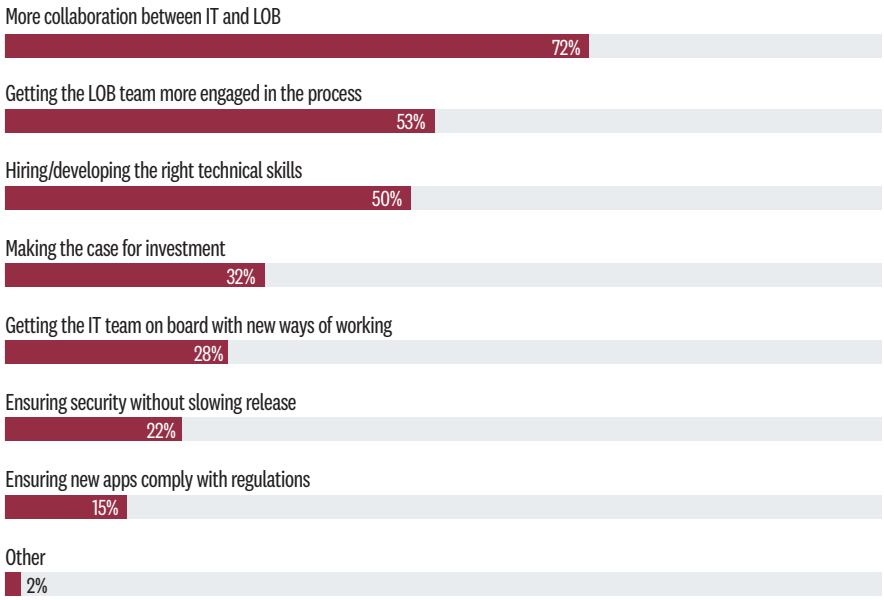


SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, SEPTEMBER 2018

FIGURE 12

COLLABORATION BETWEEN IT AND LOB IS CRUCIAL

To ensure quick, successful rollouts of new software/applications, respondents said business leaders should focus on:



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, SEPTEMBER 2018

front end," notes the chief operating officer at a European-based supplier of custom-built applications. This requires "fitting two kinds of delivery models to each other so what we deliver in an agile way is in sync with the customer's release plans." They use containerization and microservices to deliver into their environment.

Internally, there is one team for development and support. "It's a continuous cycle; software is never finished," the COO says. This improves quality, because "if a developer on the team knows they're going to have to support this, they're more quality-aware."

In addition, closer collaboration between IT and the lines of business (LOB) is a must. When asked about the most important areas for business leaders to focus on to ensure they are successful in rolling out new software/applications quickly, nearly three-quarters (72%) say it's more collaboration between IT and LOB and over half (53%) say it's getting LOB more engaged in the process. FIGURE 12

DevOps addresses this desire for more collaboration by involving users early. "It gets people out of their rabbit hole," says the software company COO. "Putting end users in the middle helps avoid old patterns of turf wars of the business blaming IT and IT blaming the business. If we ask, 'What does the user say?' we avoid a lot of the discussions about who's to blame and who's driving the process. The end user is driving the process."

Knowing which leader to involve and keeping that person engaged throughout the process can be challenging. "There's a lot of excitement at the beginning of the process," says the software company COO, "but as soon as something is running on a daily basis, C-level executives tend to delegate to someone junior. That becomes a problem when they delegate the role but not the decision power."

That's why one of the most important roles in a DevOps operation is the product owner and why it's critical to view what's being rolled out as

a product that is developed and managed over its lifecycle, not a project with a set beginning and end. Eighty percent of leaders have a product owner for every project, compared with only 33% of laggards. Increasingly, these product owners come from the LOB.

Conclusion

Forward-thinking CEOs and CIOs understand that their ability to develop and release software faster and to iterate quickly is essential to meeting rapidly changing customer expectations and market needs. They've also seen evidence of the dramatic improvements a DevOps approach can make in their company's productivity and cost structure. The ability to develop and deploy software quickly without sacrificing quality is mission-critical, but few companies do this really well right now.

With software so central to how a company makes money and operates, Forsgren asserts that executives need to flip how they view it, shifting focus from a cost to an investment. She uses an analogy to illustrate her point. "If you go speak to the investment team at a bank, sure, they're trying to shave a little bit off whatever their overhead is, but they're trying to invest as much money as they can so they can keep reinvesting. They aren't trying to invest less money. They're trying to invest more money to make more money."

To get real returns from DevOps, the effort has to be tied to a strategic priority, according to the COO at the custom software company. "You want to start small and scale quickly so it pays off quickly. The output needs to be important for the business—not just some HR tool. It has to have bottom-line impact, even if you start small," proving that bottom-line impact is what will garner top-management support.

Taking that a step further, team priorities need to be written in terms of business outcomes, says the utility company director. "You have to look at what's going to deliver the greatest value to the business," he goes on. "And then let the team prioritize their work in terms of business value. You need to get the team to internalize that, to own that way of thinking and build that muscle on their own."

ADOPTING DEVOPS IS NOT A TECHNOLOGY PROJECT. IT REQUIRES CHANGES TO STAFFING, ORGANIZATION STRUCTURE, PERFORMANCE MANAGEMENT, AND EVEN CULTURE.

While some organizations focus on the simplest value equation—dollars saved by decreasing the software lifecycle, with fewer person hours spent on development—it would be a mistake to stop there. Productivity is important, but returns also include faster time to market, customer relevance, innovation, and quality. Focusing exclusively on productivity can hamper the broader potential impact of DevOps efforts.

Adopting DevOps is not a technology project. It requires changes to staffing, organization structure, performance management, and even culture—in short, it can fundamentally change an organization. Companies investing in DevOps are seeing real value. Senior executives at leader organizations understand what DevOps is and requires. They promote and reward transparency, empowerment, and trust. And they model the right behavior, including knowing when to step back.

ENDNOTES

1 "Accelerate: State of DevOps 2018," https://devops-research.com/2018/08/announcing-accelerate-state-of-devops-2018/

2 Scaled Agile Framework, or SAFe, https://v45.scaledagileframework.com/what-is-safe/

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4 Manifesto for Agile Software Development, http://agilemanifesto.org/

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6 *The DevOps Handbook*, by Gene Kim, https://www.amazon.com/dp/B01M9ASFQ3/

7 Principles of Lean, https://www.lean.org/WhatsLean/Principles.cfm

8 Kaizen, Wikipedia, https://en.wikipedia.org/wiki/Kaizen

9 Kanban, Wikipedia, https://en.wikipedia.org/wiki/Kanban

10 What is SAFe? https://www.scaledagileframework.com/what-is-safe/

11 *Team of Teams, New Rules of Engagement for a Complex World*, by Gen. Stanley McChrystal, https://www.amazon.com/dp/B00KWG9OF4/

12 Scrum of Scrums, https://www.scruminc.com/scrum-of-scrums/

METHODOLOGY AND PARTICIPANT PROFILE

A total of 654 respondents drawn from the HBR audience of readers (magazine/newsletter readers, customers, HBR.org users) completed the survey.

SIZE OF ORGANIZATION

59% 10,000 OR MORE EMPLOYEES

30% 1,000-9,999 EMPLOYEES

10% 500-999 EMPLOYEES

0% 499 AND FEWER EMPLOYEES

SENIORITY

18% EXECUTIVE MANAGEMENT/ BOARD MEMBERS

33% SENIOR MANAGEMENT

34% MIDDLE MANAGERS

14% OTHER GRADES

KEY INDUSTRY SECTORS

17% TECHNOLOGY

15% MANUFACTURING

14% FINANCIAL SERVICES

8% OR LESS OTHER SECTORS

JOB FUNCTION

16% OPERATIONS/ PRODUCT MANAGEMENT

15% IT

10% SALES/BUSINESS DEVELOPMENT

9% HR/TRAINING

11% UTILITIES

8% OR LESS OTHER FUNCTIONS

REGIONS

37% NORTH AMERICA

26% EUROPE

23% ASIA PACIFIC

7% SOUTH/CENTRAL AMERICA

7% MIDDLE EAST/ AFRICA

Figures may not add up to 100% due to rounding.

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CONTACT US

hbranalyticservices@hbr.org