

The automation advantage

Making legacy IT keep pace with the cloud



Contents

Executive summary	
It's time to accelerate your legacy IT	4
Section 1	
Overcoming the slowest common denominator	6
Section 2	
Who is ahead of the game?	14
Section 3	
Cloud automation challenges	28
Recommendations	
From Followers to Fast Movers	40

ABOUT THE RESEARCH

The analysis in this report is based on an online survey of 415 IT executives by Capgemini and Longitude.

Just over one-third of the respondents (34%) hold C-suite positions, and 66% are management-level IT employees. All respondents work in organizations earning \$500m or more in annual revenue, mainly in the financial services, consumer products, retail and distribution (CPRD), and power and utilities sectors.

Eight countries are represented in the survey sample: Australia, France, Germany, India, the Netherlands, Singapore, the UK, and the US, with 40% of the respondents from the US, 40% from Europe, and 20% from Asia-Pacific.

To complement the survey, we conducted in-depth interviews with the following executives:

Listed alphabetically by surname

Jens Ekberg

Vice President for Technology and Transformation, Securitas

Johan Esbjörner

Product Owner and Technical Lead for Cloud Center of Excellence, Husqvarna

Dave McJannet

Chief Executive Officer, HashiCorp

Jonathan Miranda

Manager, Cisco IT Infrastructure Group

Angelo Moccia

Vice President of Platform Development, Octo Telematics

Armando Salvatori

Head, Transformation and Competence Center Technology, Poste Italiane

Philippe Sersot

Deputy Chief Executive Officer, CA-SILCA (the IT services arm of the Crédit Agricole Group)

Alexander Stewart

Chief Executive Officer, Danieli

Anonymous

Head of Business ICT, international fashion house

EXECUTIVE SUMMARY

It's time to accelerate your legacy IT

Enterprises are seizing on cloud-native applications and DevOps to develop software continuously. The leaders are using their agility to achieve a first-mover advantage. To remain competitive, established enterprises can use cloud technologies to automate their legacy applications and IT operations processes, and keep pace.

Our 2017 research report, [Cloud native comes of age](#), showed that the proportion of new enterprise applications that are cloud native will more than double by 2020. Improving business agility was the top driver for firms adopting a cloud-native strategy. Those in the lead are characterized by more agile and continuous software development, more automated deployment of that software, and more integrated DevOps teams. They also report increased revenues as a result.

Traditional companies have IT estates that encompass a mix of cloud technology and “legacy” on-premises applications and infrastructure. Their challenge is to develop software at the same velocity and quality level as companies that were born in the cloud. Cloud-native development is part of the answer, but these companies will not operate at the speed of Silicon Valley startups overnight. They can take on some of the characteristics of their most agile competitors while defending their own market advantage if they:

- Invest in cloud-native development, both to replace legacy applications and build net-new applications
- Use cloud technologies to modernize and automate the legacy IT estate
- Develop a modern set of APIs to access the legacy estate
- Make a cultural shift to adopt DevOps principles.

Automation is a lever for acceleration in all areas of software development – both on premises and in the cloud. In this report, we evaluate the gains to be made from applying cloud automation to IT operations processes – especially those for infrastructure provisioning, configuration management, application testing, and application release.

Public cloud and PaaS platforms offer built-in tools that automate these tasks, but legacy systems do not. Automation of legacy technologies and processes therefore becomes essential to keep pace with the cloud, so that new software or features can move from development into production in minutes, even on traditional applications. We call this Enterprise DevOps.

We surveyed IT leaders from 415 large, established companies in North America, Europe, and Asia Pacific, at varying stages of applying cloud automation to their IT operations. Our research shows that the “Fast Movers” – the 20% that are most advanced in applying automation – are outperforming by a large margin the “Followers,” those at earlier stages of automation maturity, and are generating measurable benefits:

1. **Fast Movers are reporting better business results.** Automation has helped 75% of Fast Movers to boost overall revenue and profitability, as well as to change their business models. Even more, 86%, say that customer experience has benefited.
2. **Extensive automation is enabling Fast Movers to outpace other companies.** The Fast Movers are able to deploy new features more frequently than the Followers, giving them a first-mover advantage. The Fast Movers have automated more than three times as many infrastructure provisioning, configuration management, application testing, and application release processes as the Followers. The fastest 5% deploy code continuously.

3. **Fast Movers are restructuring to exploit their automation advantage.** 45% of Fast Movers are using automation to integrate development and operations teams more tightly. 59% have redeployed engineers onto higher-value activities such as new development, and 75% have used automation in attempting to change their business models – a strong indicator that they see it as much more than a cost-cutting and efficiency exercise.

Automation of the CI/CD (continuous integration/continuous delivery) pipeline is maturing to allow enterprises to provision infrastructure and deliver applications as if they were cloud native. Not only will this allow firms to improve their business agility, their freed-up resources will increase their capacity to innovate.

Read further to learn how some organizations are already reaping the benefits of their automation advantage.



Are you a Fast Mover or a Follower?

Answer some questions in our [Application automation maturity survey](#) to find out – and receive recommendations on how best to develop your automation advantage.

Overcoming the slowest common denominator

A discernible shift is taking shape in software development. As evidenced in our report [Cloud native comes of age](#), leading enterprises are building a large and growing proportion of their applications in the cloud.

These cloud-native leaders develop and deploy software faster than their peers. Not only have they achieved high levels of velocity and agility, but they have the business returns to show for it: 84% of cloud-native leaders say this shift has led to increased revenue and lower operating costs, and 81% say it has improved their ability to deliver business model innovation.

Some firms, of course, are cloud-native by birth, having been founded online. Most, however, maintain traditional on-premises applications and infrastructure, even if they are expanding their cloud-native estates. Some firms will retain at least some of their legacy estate¹ for a long time to come. The inflexibility of these applications often makes them the slowest common denominator.

To avoid being held back and to keep pace with their cloud-native rivals, these companies need to pursue a strategy that includes migrating applications to the cloud, building cloud-native applications, developing modern APIs (application programming interfaces), modernizing legacy technology, and embracing DevOps principles and culture. But in both the legacy world and in the cloud, there is one lever that consistently delivers acceleration: automation.

Cloud automation – automation of the activities involved in provisioning infrastructure and managing applications in the cloud – also allows companies to manage traditional applications and infrastructure in a more competitive, agile, and scalable manner. The result is that new code can move from development into production in minutes, even in traditional applications. The velocity of software development and deployment increases across the estate, improving business agility. This is Enterprise DevOps.

What is cloud automation?

Cloud automation eliminates the manual tasks involved in infrastructure provisioning, configuration management, application testing, and application release. These tasks have traditionally been carried out by IT operations teams.

Cloud automation is delivered using cloud-based tools, but applies to legacy as well as cloud-native applications, and can be executed in any cloud environment.

By accelerating application delivery, it enables an Enterprise DevOps culture and approach.

Why companies must accelerate, automate, and innovate



Jean-Marc Defaut

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In an era of continuous technological disruption, enterprise IT departments everywhere are striving to make businesses more competitive. This means increasing their capability to deliver software rapidly, and fostering innovation while reducing cost.

Cloud-native development offers one way for established enterprises to innovate and scale new services at pace. But the business imperative for acceleration is not limited to new cloud-native applications. Established enterprises have large numbers of inflexible legacy applications that pre-date the cloud. Some are back-end systems; others underpin the enterprise's differentiation in the market. Many of these applications need to be accelerated. Furthermore, business velocity depends on a degree of synchronization between them.

The answer is to automate the tasks and processes in the application release train, across application layers; whether front end or back end, cloud native, or legacy ERP. How should you start?

Establish the target service model and define KPIs

How quickly and how often will you need to deploy new code or features in a given business service? What would be the minimum acceptable deployment success rate, and how quickly will you need to restore service in the event of an outage? These kinds of business objectives will determine what to automate.

Create the automation layer

The goal is to set up an industrialized and frictionless assembly line that deals with continuous integration, continuous deployment, continuous delivery, and continuous testing. This should cut across all application layers needed to accelerate your business services. To achieve this, you should consider a combination of application release management, configuration management and orchestration tools, and/or a cloud-management platform.

Build an Enterprise DevOps culture and approach

Enterprise DevOps is about delivering more, better, and faster, but with less. Automation is an essential ingredient, but so are people and processes. The first stage in the cultural shift is to improve collaboration between development and operations teams; but IT and business stakeholders also need to collaborate more closely to translate innovative business ideas into new features or services.

¹ We use the term "legacy" throughout this report to denote applications and application infrastructure that organizations maintain on premises, and not in the cloud.

For the whole business – not just IT

The automation of IT operations serves far more than just IT objectives; companies now see it as critical to the success of their business. “If we don’t spend time on automation today, we may be out of business in five years,” says Johan Esbjörner, Product Owner and Technical Lead for the Cloud Center of Excellence at Husqvarna, a Swedish manufacturer of outdoor power products. “We’ll be too expensive and our time to market will be too long.”

Others see cloud automation as a way to innovate their business models. “We are driving an ‘intelligent security’ strategy –fundamentally rethinking the way we do business,” says Jens Ekberg, Vice President for Technology and Transformation at Securitas, a Sweden-based security services firm. “That raises the bar for technology, and automation is a major element in our strategy.”

“We want to enable an increased focus on developing new services and reducing our time to market, by shifting our cost structure and driving synergies from our global organization.”

Jens Ekberg
Vice President for Technology and Transformation, Securitas



Cloud automation impact

A group of companies who we call automation “Fast Movers” – the top-performing 20% in our survey – are achieving clear business returns today from automation, and considerably more than the 20% of firms at the other end of the scale – the “Followers.”

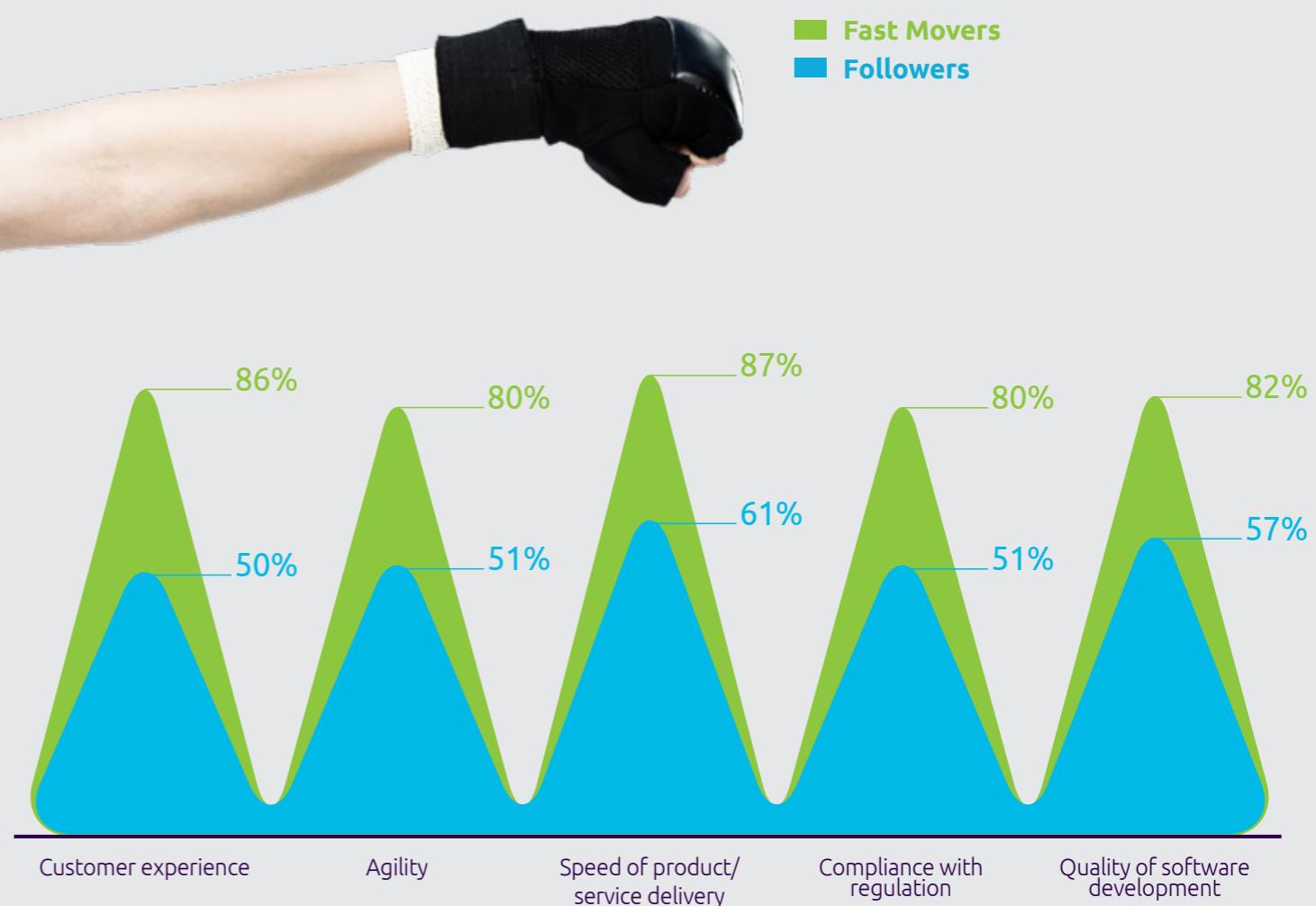
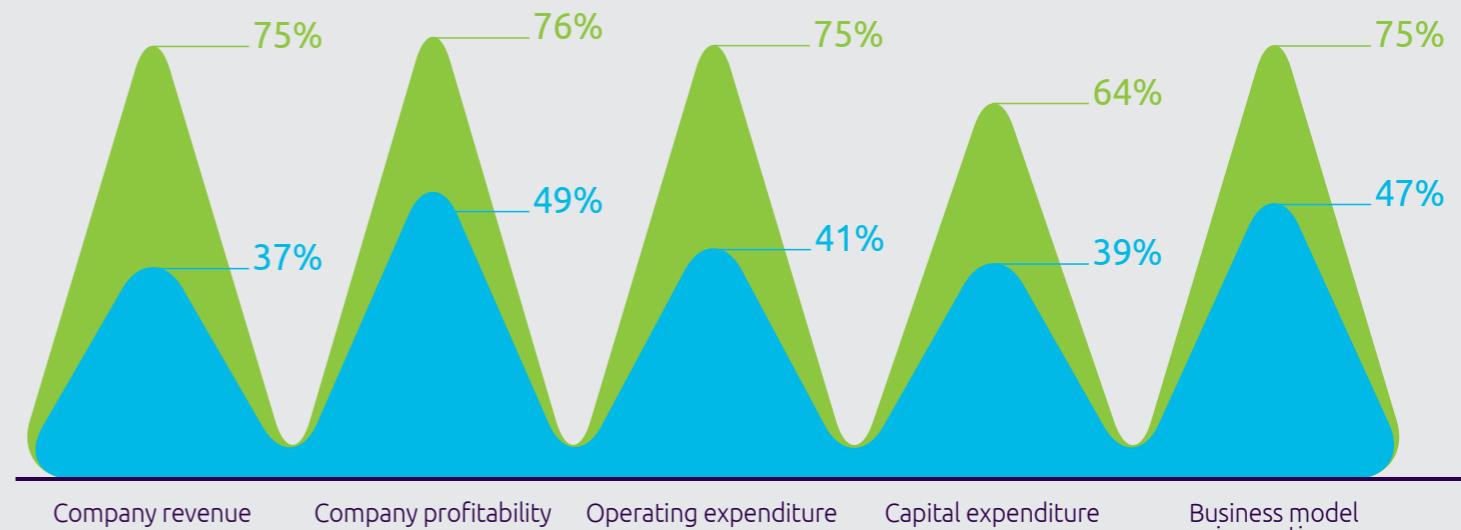
Of the Fast Movers

- 75% say automation has led to increased revenue for the business.
- 76% say the same about overall profitability.
- 86% say automation has helped to improve the customer experience.
- 84% say their company’s agility has improved.
- Another 75% have been able to use automation for business model innovation.

The Fast Movers are also achieving significant operational gains from automation, which we will detail below. But first, what precisely makes them Fast Movers?



Figure 1. The automation advantage: share of survey respondents reporting a positive automation impact on indicators of business performance.



75% of Fast Movers

have achieved higher revenue growth with automation

"We're building a multi-cloud environment – one private and two public clouds. We'll decommission as much of our legacy software, servers, and storage as possible. Then, we plan to give our [external] business customers cloud access to 'application building blocks.' We'll create a platform where they can upload and play with their own data without us building custom reports for them."

Armando Salvatori
Head, Transformation and Competence Center
Technology, Poste Italiane



73% of Fast Movers

have automated application testing processes (nearly four times that of Followers)

"The best performers will probably deploy 20 times a day, because they're making incremental changes each time, not massive ones. The rate of change is extraordinarily high, but the size of each change is very small. In that sense, these firms are massively de-risking their operations."

Dave McJannet
Chief Executive Officer, HashiCorp

Who is ahead of the game?

We have defined the Fast Movers according to three attributes which emerged from the survey:

Duration

They have been automating for longer than the rest. For example, they launched their initial efforts to automate application deployment 3.5 years ago on average, compared with 1.9 years ago for Followers.

Coverage

Fast Movers have automated a substantially higher proportion of infrastructure provisioning, configuration management, application testing, and application release processes than the others (see below).

Budget

Each of their automation projects has a dedicated budget. Unlike Followers and the rest of the surveyed companies, Fast Movers do not rely on the annual IT operations budget to finance projects.

The Fast Movers' advantage stands in stark contrast over other groups as we compared their progress with automation (Figure 2).

For example, compared to Followers, Fast Movers have automated:

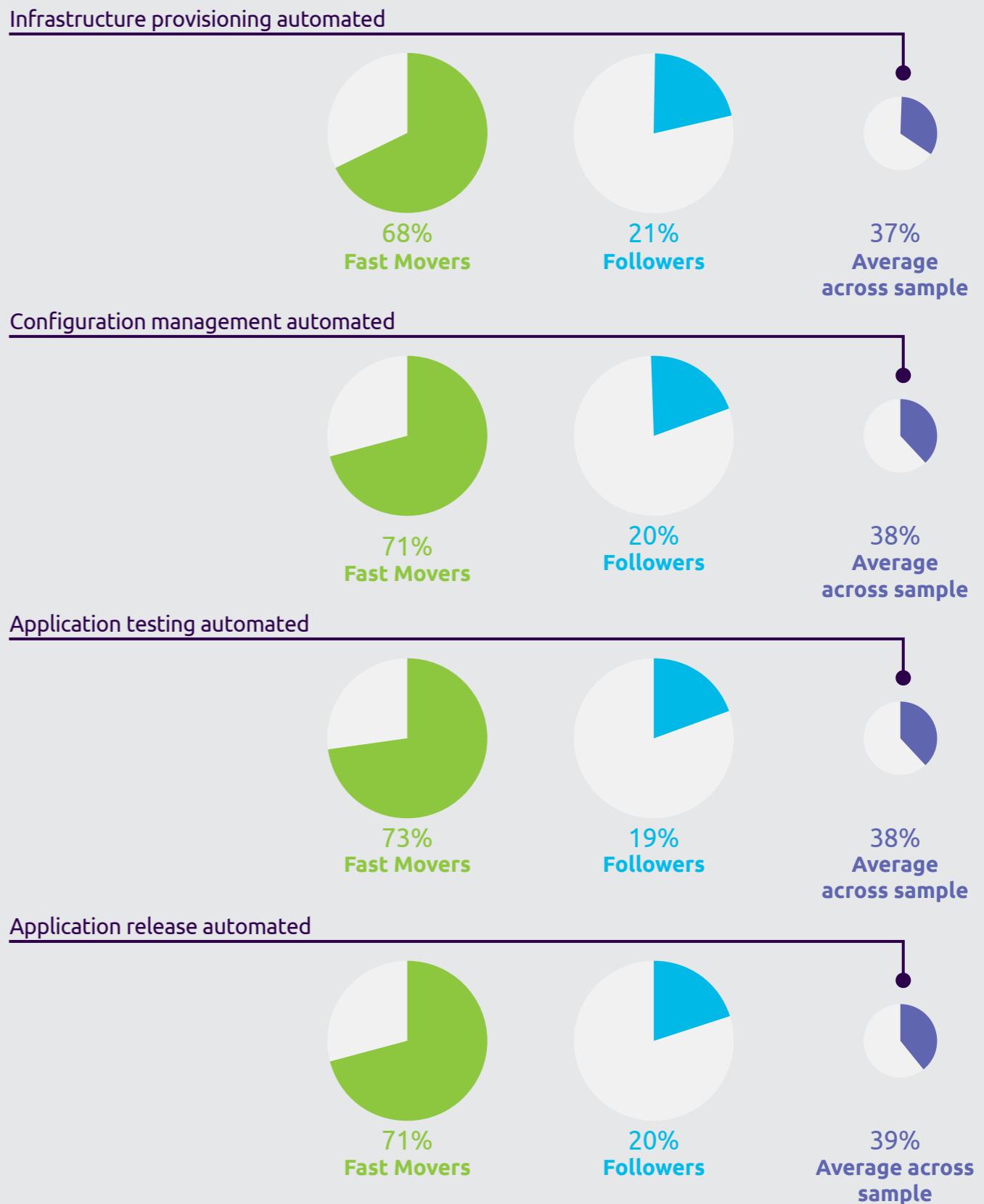
- 3.2 times the number of infrastructure provisioning processes
- 3.6 times the number of configuration management processes
- 3.8 times the number of application testing processes.

"Scalability and reducing time to market are important goals of automation for us. We also want to free up the resources that we have to enable us to really start to change the way we deliver IT services and focus more on business outcomes."

Jens Ekberg

Vice President for Technology and Transformation, Securitas

Figure 2. Extent of automation by respondents' organizations.



Automation is for the bold



Frédéric Cruchet

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The automation Fast Movers identified in the survey are not just fast, they are bold. Here is some of what makes them so – practices that companies earlier in the automation journey can learn from:

Their motivations for automating

Cost reduction and improved compliance may be drivers for some Fast Movers, but by far the most important gains they seek are the freeing-up of resources to focus on higher-value activities, and faster deployment of applications and provisioning of infrastructure.

Their plans for structural and process change

Almost half of Fast Movers aim to allow business units to access public cloud services independently, and to use automation to further integrate their development and operations teams and advance DevOps in the enterprise. Many also aim to reduce the number of application platform managers in their teams. (See Figure 6, page 33.)

Their willingness to cede control

Fast Movers understand that automation involves sacrificing some flexibility in processes when manual intervention is removed from them. It also requires sacrificing a degree of control, which is demonstrated by those survey respondents planning to give freer rein to business units to self provision resources in the public cloud.

Their trust in cloud security

Can IT leaders be sure that security and compliance requirements are not compromised in any way when they devolve control in this way? Cloud infrastructure and automation tools are robust enough to ensure this, but today's business leaders must be confident that their security safeguards are watertight.

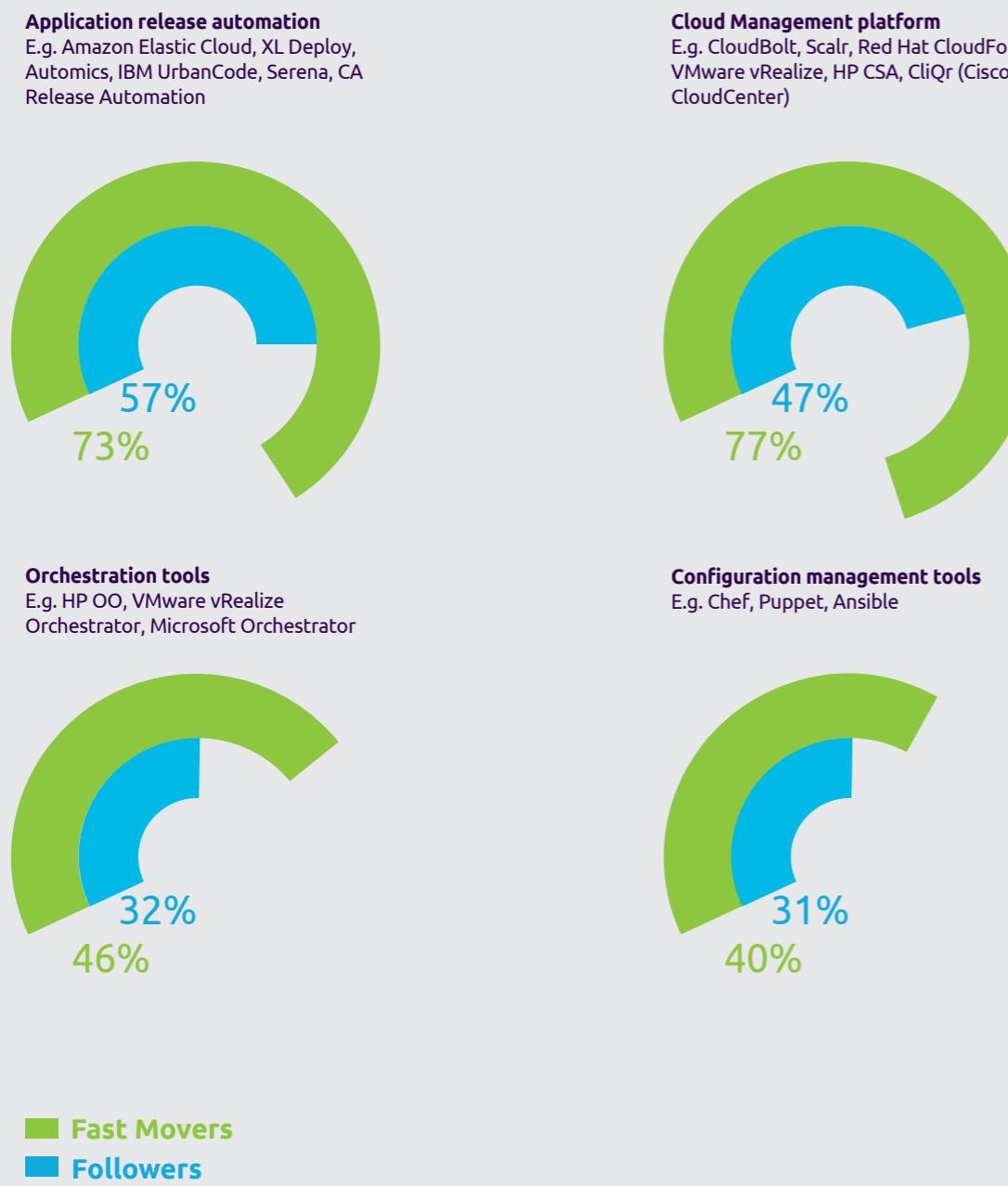
Boldness from IT leaders is vital to get the most from automation. Automation decisions can be hard to undo, so clear motivation and plans for change are important to succeeding first time. Committing to continual re-automation is also critical, because conditions in the cloud change extremely rapidly.



Cloud automation tools

Fast Movers are also much more likely to be using automation tools, including those for application release, infrastructure provisioning, and orchestration, and to have implemented a cloud management platform.

Figure 3. The automation tools used by respondents' organizations.



“One benefit of adopting a cloud management platform has, of course, been cost reduction. But it’s also helped improve our image within the company. We provide the platform, and our customer can directly provision the infrastructure. Now SILCA is viewed as a mature subsidiary able to provide internal customers with a mature cloud solution.”

Philippe Sersot
Deputy Chief Executive Officer, CA-SILCA (the IT subsidiary of the Crédit Agricole Group)

An abundance of opportunities and tools



Clifton Menezes

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The Fast Movers in the survey are achieving superior results from their automation initiatives, with the most advanced exploiting new tools to deploy code continuously. These tools now enable not just automation of builds and deployments, but also end-to-end automation across the entire development life cycle – all the way to production deployment.

The Fast Movers' success highlights what is possible for companies:

Most processes can be automated

Even for legacy applications running on-premises, most elements of the CI/CD (continuous integration/continuous delivery) pipeline can be automated. This is because, once automated, on-premises infrastructure has many of the characteristics of the cloud, including a high degree of virtualization and relative independence from hardware constraints through abstraction.

Infrastructure as code is the enabler

How rapidly can developers provision a server to host a new application in production? Lengthy traditional provisioning processes can derail efforts to automate application deployment pipelines. But infrastructure as code (IaC), offered by most cloud vendors today, allows an end-user to provision a virtual machine in seconds. The same is possible for any type of infrastructure, including a virtual private cloud or an API gateway.

Serverless technologies are taking center stage

The industry has started thinking beyond the need to provision virtual machines. Serverless means that the infrastructure on which an application will be run is provisioned by the cloud platform; developers don't have to think about provisioning at all. Arguably, serverless coupled with IaC can lead to a "no-ops culture," or at least help break down the traditional silos between development and operations teams.

The levels of automation described here are not limited to cloud-native companies. Even those with large legacy estates and multi-cloud environments can implement continuous delivery and release and one-click infrastructure provisioning.

PaaS makes this possible for both cloud-native and traditional applications. Our report [Cloud native comes of age](#) showed that companies making the shift to cloud native devote roughly one-quarter of their total cloud spending on PaaS today, and plan to boost their investment in it substantially, to 44% of the total, within three years. These firms' traditional applications, if migrated, will also benefit from the automation functionality conferred by their PaaS.



Stepping on the accelerator

The Fast Movers' automation advantage translates into superior operational performance.

For one thing, they operate at high velocity. As Figure 4 shows, they deploy code twice as often as the Followers. They can provision a raw virtual machine in half the time, and mid-size, multi-tier application infrastructure in less than half the time needed by the Followers.

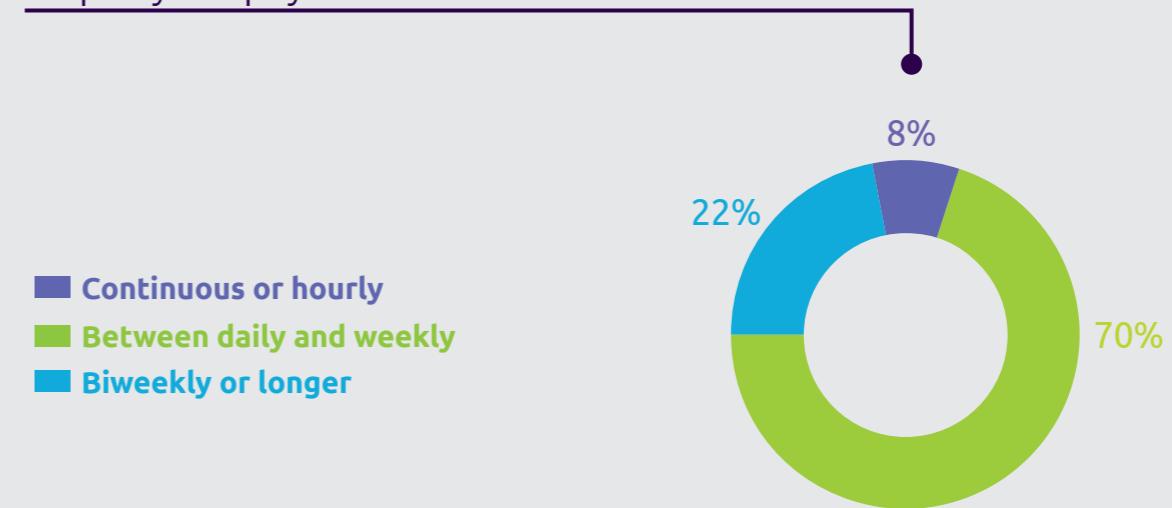
There is an even more select group in the survey – representing 5% of the Fast Movers – that achieves exceptional performance. These few deploy code continuously (another 7% of Fast Movers do it hourly); they also need between five and 30 minutes to provision a raw virtual machine, whereas the majority in the survey need four hours or longer.

5%
of Fast Movers
deploy code continuously

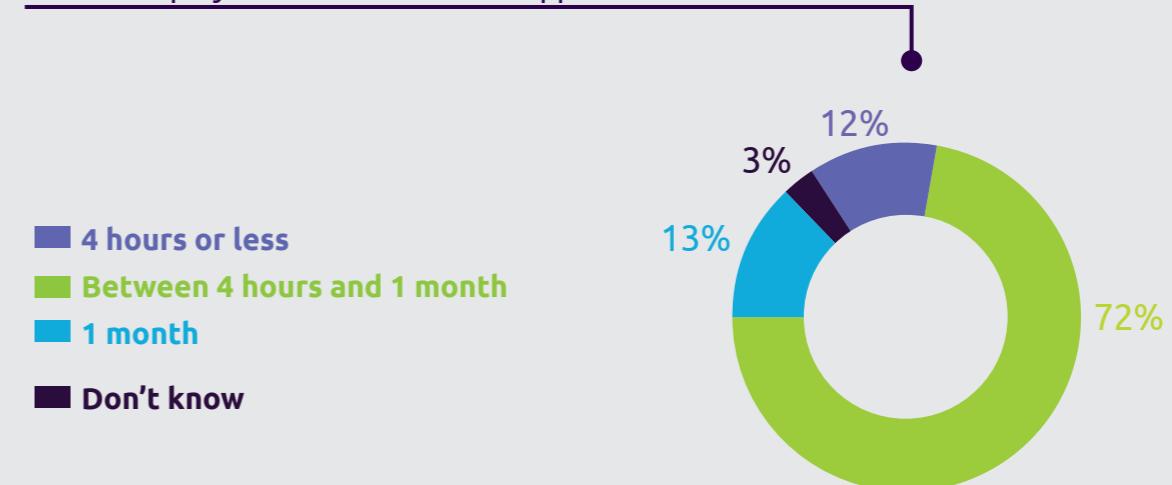


Figure 4. Selected deployment times (share of respondents, average of overall sample).

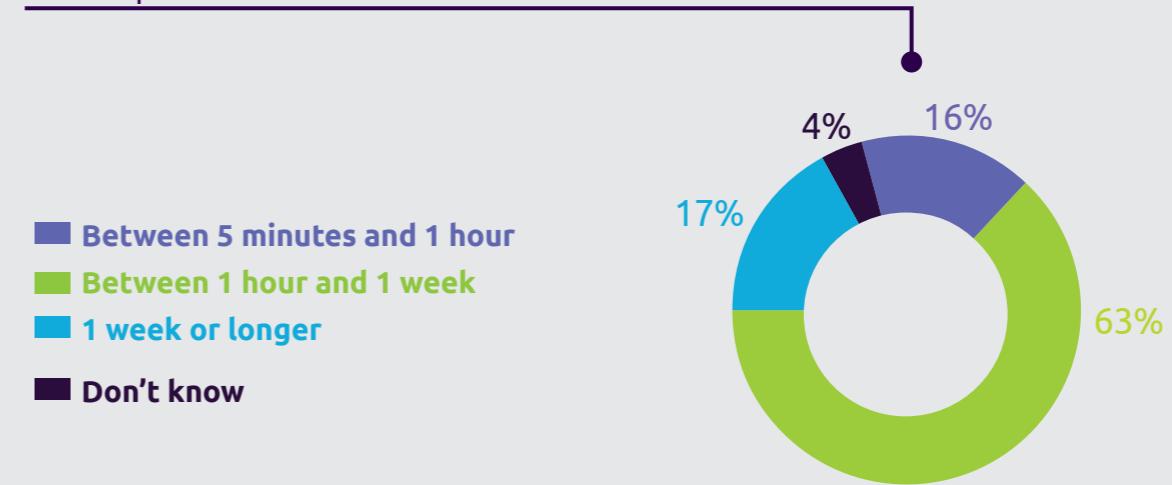
Frequency to deploy new code



Time to deploy a mid-size N-tier web app



Time to provision a raw virtual machine



Cisco: AI and the future of automation

Enabling developers and users throughout the organization to self-provision application resources is a core element of most automation strategies.

But some companies are thinking ahead to the day when no human involvement will be necessary. Cisco Systems, the networking equipment provider, is one of them.

According to Jonathan Miranda, manager of its IT Infrastructure Group Resource, provisioning at Cisco is now almost completely automated. "The next step," he says, "is to transition our systems from being automated to being intelligent." This means that, rather than having users provision with the click of a button, as is the case today, the applications will themselves start thinking about when they need capacity and when to pull the triggers. A combination of artificial intelligence (AI) and technologies such as containerization creates these capabilities.

There are three elements to the AI approach to self-provisioning, says Miranda. The first two are machine learning. "We collect data from every single system and every single variable that is needed for provisioning," he says. "Then we move on to deep learning, where we draw patterns from the data."

The last element is AI techniques, he says: "How does the system respond to these patterns? How does it respond to the different variables, such as changes in market conditions, in financials, or in business strategies?" Miranda calls this capability "policy-driven provisioning," where the policies that each of the services provides are embedded directly within the application, which dispenses with the need for human intervention.

While these capabilities require enormous power and capacity for data analysis, they are not limited to firms of Cisco's size. All major cloud service providers are building AI capabilities into their Platform-as-a-Service and Infrastructure-as-a-Service offerings. Intelligent, AI-driven resource provisioning may for most companies still be in the future, but it is not a distant one.



Octo Telematics automates to tackle cloud complexity

There are not many cloud platforms that are connected to 20 million vehicles. If the technology team at Octo Telematics, an insurance analytics provider, meets the targets in its business plan, that will be the number of Internet of Things (IoT) devices (embedded in automobiles) its new cloud platform will connect to in about two years.

Angelo Moccia, the Italian firm's Head of Platform Development, acknowledges that this presents some difficult application and infrastructure management challenges. But he says that automation is one of the enablers to meet them.

One such challenge is integration across cloud and legacy platforms – and not just its own. The company's 60 insurance company customers connect to its systems as well, regularly transmitting and receiving telematics data as well as other information, such as changes to their customers' policies.

So Moccia's team is continuing to improve the automation of application deployment. "With 60 customers making frequent changes," he says, "we are having to deploy weekly or more frequently." And automation removes the risk of manual errors altogether. "It has also allowed us to be quicker at putting new functionalities into production." The company is also automating configuration management and infrastructure provisioning, using tools from its cloud providers.

Moccia emphasizes that Octo Telematics' competitive advantage has rested on the depth and richness of the telematics data it exchanges and analyzes for its customers.

The volumes of data it collects from the current 5.4 million IoT devices will grow enormously in the next few years, as will its customers' demands for more powerful analytics. The company's cloud infrastructure and applications, along with those in its legacy estate, will need to be robust enough to meet those demands. And it will eventually need to meet another challenge, as the company plans to enable its customers to work directly on its cloud platform themselves.



Cloud automation challenges

The differences in automation maturity and performance between Fast Movers and Followers may be pronounced, but the two groups face many of the same constraints.

Paramount among these is security. IT leaders face considerable pressure from CEOs and boards to ensure that technology initiatives do not introduce new vulnerabilities. In the survey, both Fast Movers and Followers cite security concerns as their number-one automation challenge. It is especially acute for the financial services firms, which face particularly stringent compliance requirements.

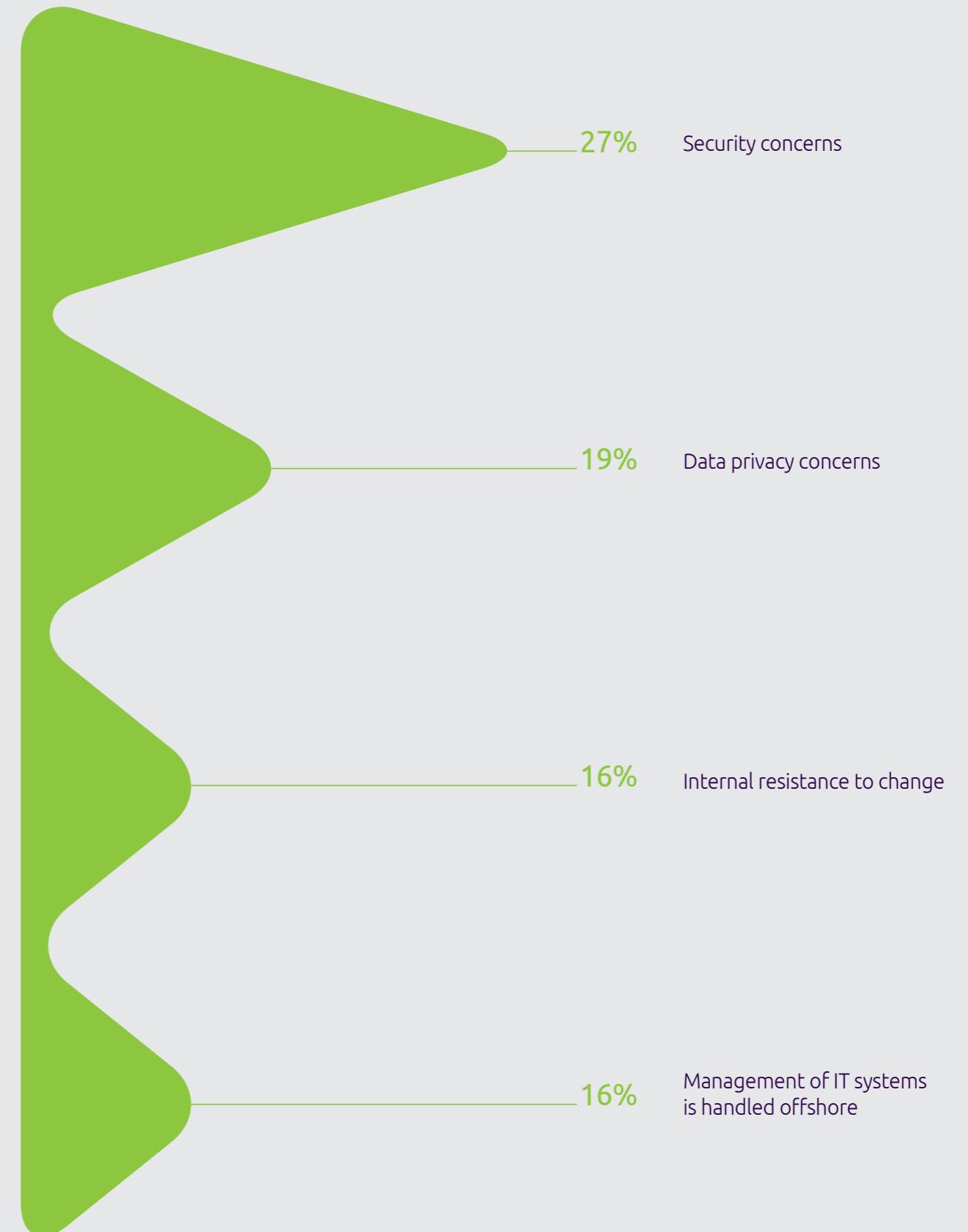
Some of the IT executives in the study make clear, however, that automation tools can bolster application and data security more than they compromise it (see “Safeguard deployment with security as code”, p. 32, and “Automation means tighter security for iconic fashion brand”, p. 30).



“As we release a lot more of our automation to production, there’s a checklist that our engineers need to check off in terms of their security. It is paramount. It needs to become part of the culture itself as we continue to develop.”

Jonathan Miranda
Manager, Cisco IT

Figure 5. The toughest obstacles to automation of IT operations processes (top responses).



Automation means tighter security for an iconic fashion brand

Security concerns are both a challenge and a driver of automation. In the survey, Fast Movers and Followers alike point to security as the foremost challenge they encounter in their automation projects (a large number of Fast Movers also cite data privacy concerns.) IT teams at some companies, however, see improved security as a motivation for automation.



One international fashion house recently embarked on a large-scale migration of applications to the public cloud. According to its Head of Business ICT, at the end of the four-year process the company's environment will be hybrid: mostly public cloud, but with some applications run in a private cloud and some remaining on premises.

Automation has not yet begun, but the management realizes it will need to start within the next couple of years to be ready for the new environment. When it does, he says, security will be the first set of processes to be automated. The brand has on-the-ground operations in over 20 countries around the world, including a large number of stores in Asia. Those operations present a particular challenge because of disruption of services due to the government Great Firewall and packet filtering activation. Cloud applications with server installation outside China are affected by unforeseen local government security checks.

"We need to automate security checks for user applications," says the head of business ICT, explaining that automated alerts, for example, can trigger immediate actions to close a breach emerging overnight in Asia rather than waiting for morning in Europe to respond manually. Through automation, he says, "we can definitely improve the security of our user-level environment."

Safeguard deployment with security as code



Franck Greverie

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For years, CIOs and other business leaders worried that migration of their applications and data to the public cloud came with security risks. Many still worry. Here are two reasons they should not:

Cloud provider diligence

The major public cloud providers have all put in place multiple security layers and rigorous processes to safeguard their clients' cloud assets. At the same time, clients retain control of what security they choose to implement to protect their own content, platforms, applications, systems, and networks.

Security as code

Business leaders should also be thinking about automating their security processes in relation to these assets. Using a security-as-code (SaC) and infrastructure-as-code (IaC) architecture to automate security processes ensures that they will be high quality and virtually risk-free. In these architectures all security resources are developed in a code and deployed through a CI/CD pipeline.

Deploying SaC/IaC automation correctly will allow you to achieve:

Better “security by design”

The team's best architects can create the security blueprints included in the standardized catalog of services.

Better quality checking before deployment

Security code can be checked before it is used. This prevents a team from rolling out vulnerabilities into their environment instead of fixing them. Whether it is a security vulnerability or a syntax error, the earlier it can be caught, the tighter the security.

Automation of the deployment

This means “security by design” is consistent across the organization. When there is a new security or infrastructure architecture to provision, a standardized catalog of services can include a security architecture that is entirely in line with the company's security policy.

The human dimension of automation

Internal resistance to change also hampers all of the surveyed companies, whether they are Fast Movers or Followers.

Change resistance is particularly acute on the operations side. Four in 10 firms in the overall survey say their engineers and operators assume that automation means their jobs are at risk.

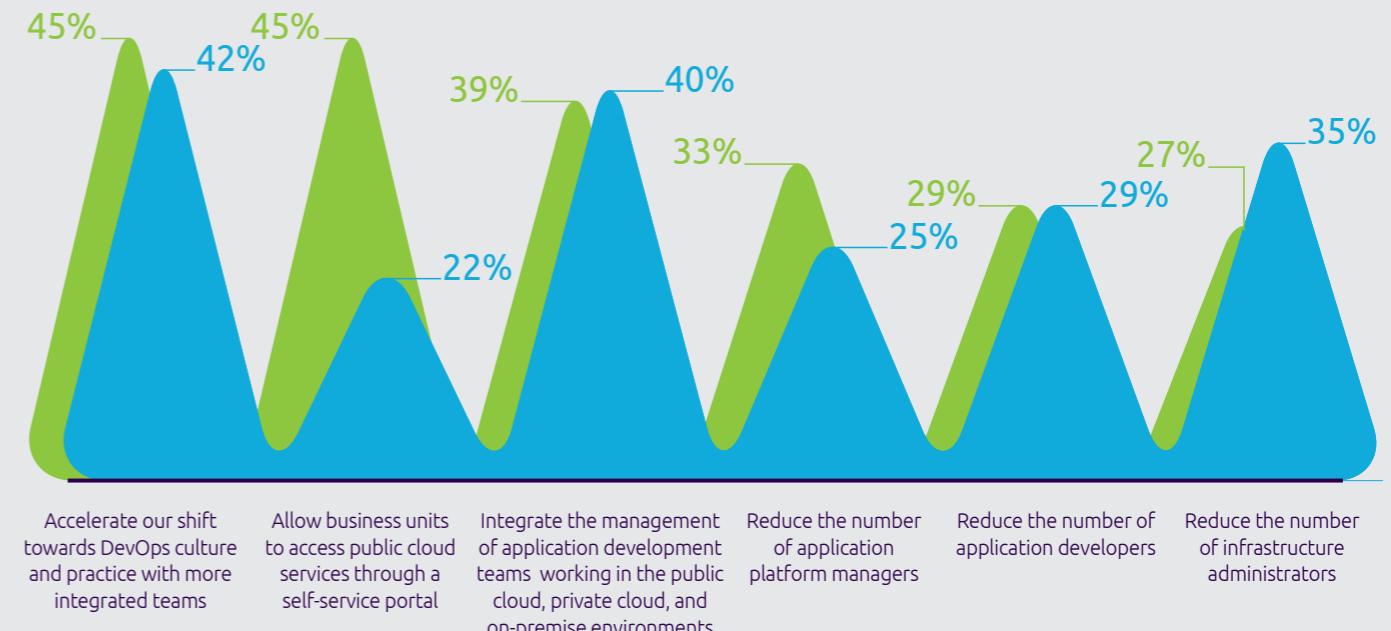
Six in 10 Fast Movers (59%) say, however, that they have successfully redeployed engineers to focus on new development rather than to eliminate headcount. Indeed, many are taking advantage of automation to streamline the structure of their teams in line with their DevOps strategies. (See “Restructuring teams at CA-SILCA, Securitas and Cisco” p. 34.)

59% of Fast Movers

have redeployed engineers to focus on new development

Figure 6. Changes anticipated as a result of automation.

Fast Movers
Followers



Restructuring teams at CA-SILCA, Securitas, and Cisco

The benefits of cloud automation stretch well beyond greater velocity, reliability, and accuracy. If companies can capitalize on their gains in these areas to redeploy developers and engineers on higher-value activities, increased innovation is one valuable prize. The Fast Movers in our survey understand this: the majority (59%) have redeployed staff as a result of automation. So have three companies whose executives spoke with us for the report.

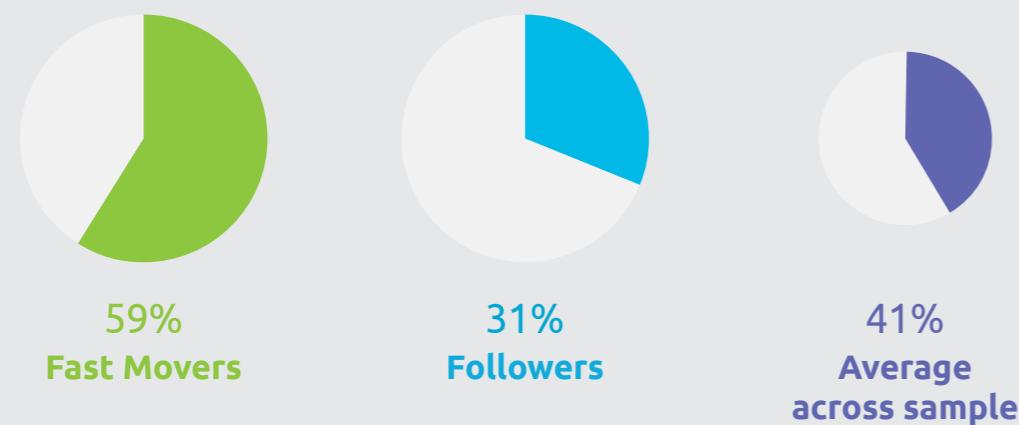
At CA-SILCA, the IT services arm of the Crédit Agricole Group, the restructuring approach is characterized by specialization and autonomy. "Automation has led to a new way of working for us," says Philippe Sersot, the unit's Deputy Chief Executive Officer. He explains that three new small autonomous teams have been created to push innovation. One team focuses on internet access and hosting. Another focuses on big data and the community cloud, automating the infrastructure resources that are shared by the different parts of the Crédit Agricole Group. A third team pursues the DevOps agenda. "Our earlier structure was too centralized," says Sersot. "Now, all the infrastructure teams are in charge of automating their tasks."

Securitas, by contrast, has combined automation with a degree of centralization. Jens Ekberg explains that his relatively new business unit was established to manage a centralized hub – a "center of excellence to deliver more streamlined services." Part of this, he says, "entails enabling the people we have within IT to focus on more business outcomes and customer value."



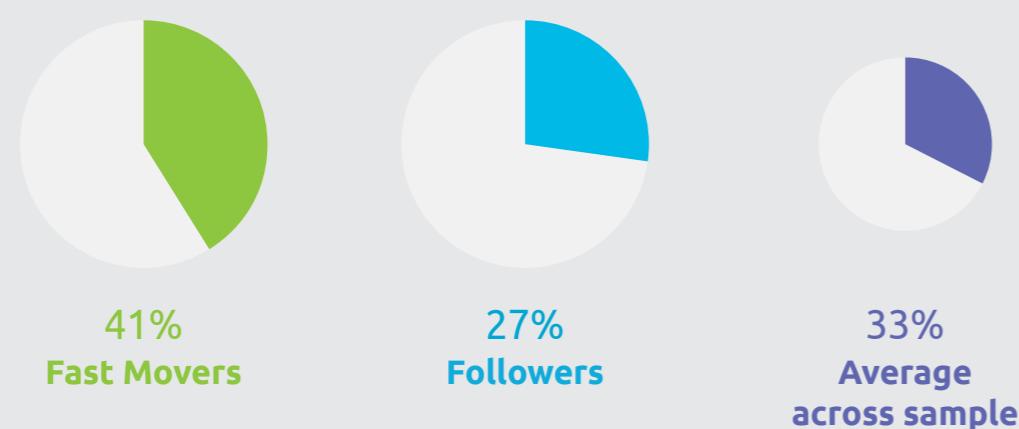
Cisco's technology team underwent a major structural change in 2017, according to Jonathan Miranda. It involved shifting from a matrixed to a vertical organization. "Now, all of our architects, designers, engineers, and management work within the same pillar, and are expected to drive and define everything with software at the core," he says. "Aside from the speed and innovation advantages the new structure confers, we no longer have to fight over resources."

Figure 7. Share of respondents agreeing: “We’ve redeployed engineers to focus on new development as a result of automation, rather than eliminate headcount.”



Complexity poses an additional challenge for companies, even for the most advanced. Many struggle, for example, with navigating the variety of automation tools and approaches that are available to them. As Figure 8 suggests, the more a company automates, the greater the degree of complexity is likely to be.

Figure 8. Share of respondents agreeing: “We want to automate more, but we are hamstrung by the difficulty of understanding the myriad number of tools and approaches that could be used.”



How can barriers be dismantled?

Firm support from the CEO and CFO is indispensable to the success of an automation strategy.

Nearly 60% of Fast Movers (nearly double the proportion of Followers), for example, maintain that internal resistance to automation can be overcome relatively easily through more effective communication from senior management.

Securing external help is also effective. This includes engaging external consultants to help review the current state of DevOps automation tools, build an automation roadmap or to manage the implementation of automation initiatives.

The injection of new blood and upskilling of existing staff are other necessary ingredients for change. Very few Fast Movers (8%) say they lack the skills necessary to succeed with automation, which is also the perspective of most of the executives we interviewed. Reorienting engineers and developers to work effectively in a largely automated environment is challenging, but these Fast Movers are showing that trying to instill a DevOps culture helps to make it easier.

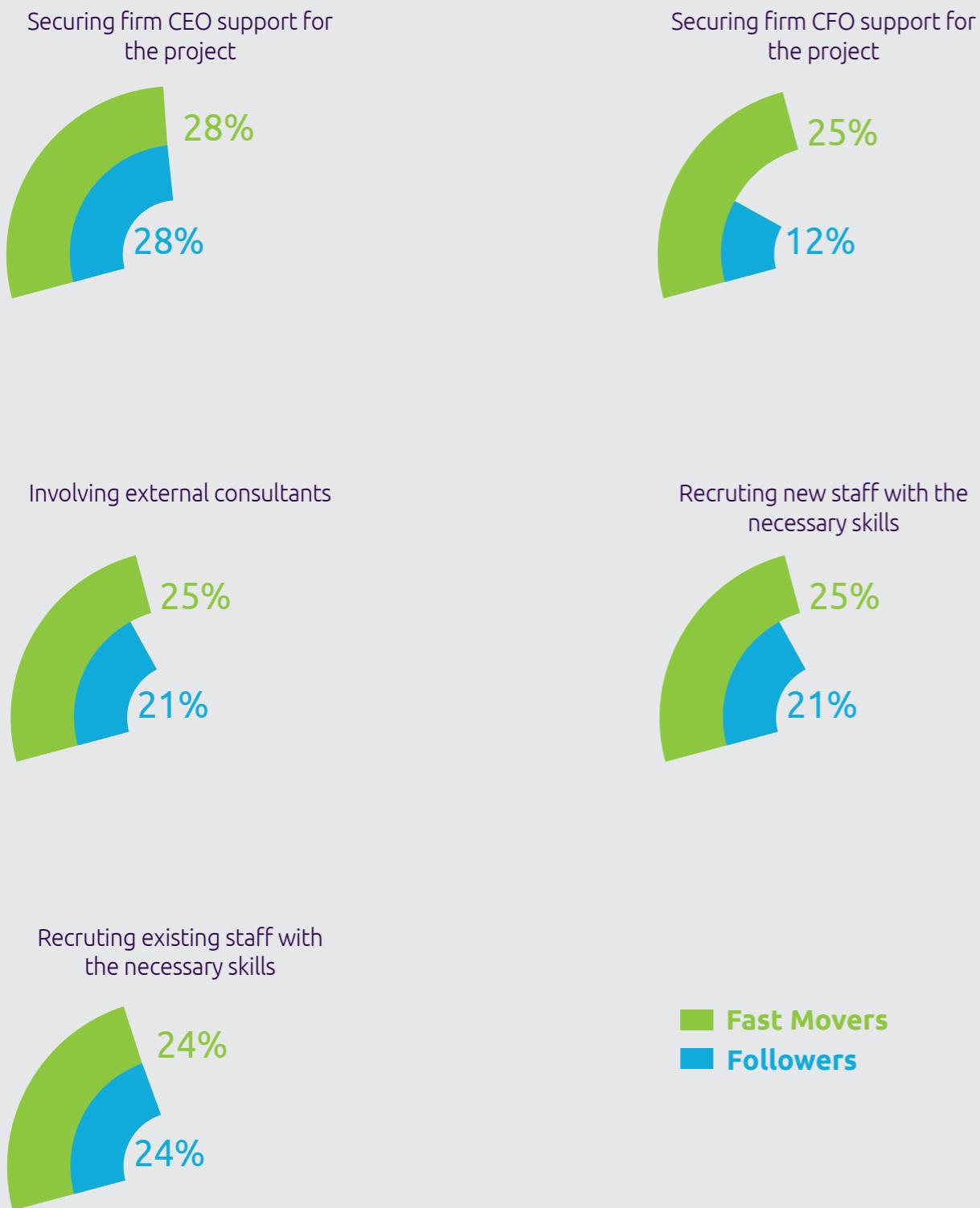
**59%
of Fast Movers**

**say better communication
from senior leaders can
overcome internal resistance
to automation**

“We hire people based on their ability to learn and their capacity for change, as opposed to what they know at the moment. That’s also the way we’ve retained much of our talent. We have a lot of leaders among the engineers who say, ‘Why don’t we challenge the status quo? Why don’t we do this differently?’ That mindset has really helped us through this change.”

Jonathan Miranda
Manager, Cisco IT

Figure 9. The most effective ways to overcome automation obstacles (top responses).



EXPERT PERSPECTIVE

How can teams use their freed-up resources?



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"Freeing up resources to focus on higher-value tasks" can sound like a management cliché, but automation done well makes it a reality. Here are three valuable uses of developer and engineer time once their manual tasks begin to be automated:

Write more and better code

In a typical organization, developers probably spend less than half their time being developers. Freed from testing and waiting for infrastructure to be provisioned, they can create more and better code (for example, re-architecting for microservices with DevOps for greater agility and acceleration). This also means they can innovate more – for example, by embedding machine learning into their code. The major cloud providers have made machine learning easy to work with; now, developers can get up to speed on APIs and quickly drop them into their applications.

Expand QA testers' coverage

Quality assurance (QA) staff spend much of their time today waiting for testing environments to be provisioned. Once testing and provisioning are automated, testers can significantly increase their coverage. Few companies today can say that they test more than 70% of their applications; once automation tools are put to work, that becomes possible. It also means that testers can reduce the amount of leakage of defects into production. If an organization decides it does not need more coverage, QA resources can be redeployed without too much difficulty to tasks such as managing test environments or even to application development.

Empower infrastructure "brokers"

Even engineers who have spent years managing legacy infrastructure can become more effective with automation. It will require some dramatic changes in skillsets for engineers to be able to make their way around a hybrid and multi-cloud environment, and not everyone will make the transition. But retrained operations staff can become brokers of virtual infrastructure, for example, rather than caretakers of hardware. Their job will be to make the lives of developers and QA testers as easy as possible.

RECOMMENDATIONS

From Followers to Fast Movers

Cloud automation and DevOps are key to accelerating delivery and improving competitiveness. How can IT leaders develop their automation advantage?

1. Define the automation strategy to meet business objectives.

No technology initiative can truly succeed unless it is designed to meet bigger, predefined business goals. It is important to measure targeted outcomes via meaningful metrics.

Define KPIs for speed and agility, and develop your automation strategy to align to them. Over-engineering your automation approach to exceed those KPIs will lead to additional cost and complexity.

The benefits to be gained from automation depend on the business usage of each application. Rapidly changing applications that provide differentiating business capabilities will benefit most from being rewritten as cloud-native services. Non-differentiating applications that still need to evolve quickly should be considered for refactoring, while other non-differentiating applications should be replaced with SaaS, or simply rehosted.

When evaluating applications, consider both their technical architecture and their value and criticality to the business. Frequency of change, availability requirements (uptime), and predictability of usage (scalability) should all be considered when determining how applications should be deployed.

2. Leverage Platform as a Service for automation and acceleration.

Platform as a Service (PaaS) is an enabler of cloud-native development, but the automation capabilities of PaaS can also accelerate traditional applications.

PaaS improves time to market by facilitating continuous integration and delivery. It allows developers to move from concept to code in minutes, and use instant self-service provisioning. It reduces the cycle time of operations through automated failure response, self-healing, and recovery, while the platform can be upgraded independently of the applications it supports, without downtime. It improves productivity by eliminating undifferentiated heavy lifting, and confers push-button control of the entire application stack, so that IT teams can manage services, not servers.

IT leaders can evaluate three main strategies when selecting a PaaS:

- Public PaaS: Leveraging public cloud providers for developing applications (e.g. AWS Elastic Beanstalk or Microsoft Azure)
- Traditional PaaS: Leveraging open-source platform technologies (e.g. Pivotal Cloud Foundry). Generally, this is cloud-provider agnostic and can run on any cloud
- Custom PaaS: Leveraging containers and orchestration technologies (e.g. Docker, Kubernetes, and Mesos).

Public PaaS is a logical choice for startups, organizations that have minimal IT support to manage application landscapes or environments, or those that need a cost-effective way to build vertical proofs of concept. Traditional PaaS will suit organizations looking for a cloud-provider agnostic model,

as long as they have an enterprise support model to manage custom workloads, while custom PaaS can be used to cater to unique and complex organizational requirements.

Key considerations in selecting a PaaS include:

- The degree of flexibility required to choose between cloud providers
- The business transformation capabilities needed
- Preference for an "out-of-the-box" versus a "do-it-yourself" approach
- The level of investment that can be made – both time and cost.

Legacy applications can benefit from your investment in PaaS without necessarily being rearchitected. Selecting and implementing the right pattern for each application – co-existence, lift and shift, refactoring, replacing or transforming – will help accelerate delivery of new software for both legacy and cloud-native applications.

Most PaaS tools come with security built in. If you are using a PaaS without this functionality, then automating within a security as code architecture is the best way to reduce errors and vulnerabilities. The gains from automating deployment and provisioning will be diluted if securing applications remains a largely manual process.



3. Automate the provisioning of infrastructure and the entire CI/CD pipeline.

CI/CD does not apply only to container-based microservices. The core tenets, including versioning, build, and testing apply to both modern and legacy applications. However, legacy applications – where code base changes tend to have more dependencies and a larger blast radius – can pose greater automation challenges.

The IT industry today lacks a single automation tool that can flexibly abstract, natively integrate, and seamlessly support a wide range of both cloud and legacy services. Existing automation investments, vendor relationships, and technology footprints can inhibit the adoption of new CI/CD automation tools. The appetite for ROI and risk can also vary significantly between divisions in the same organization, making rationalization or enforcement of a single tool difficult to implement. Therefore, enterprises will need to use multiple tools to automate the CI/CD pipeline.

IT leaders should evaluate cloud-based CI/CD automation tools according to their ability to shorten the development cycle, maximize release velocity, and detect defects early and effectively. Tools should minimize violations of service-level objectives, and should not incur high costs for change management and overall support.

Typically, enterprises need the following capabilities:

- Versioning – e.g. GitHub, GitLab, Bitbucket
- Configuration – e.g. Chef, Puppet, Ansible
- Provisioning – e.g. Terraform, Chef, Puppet, Ansible
- Code repository – e.g. Artifactory, Nexus, Docker Hub
- Build tools – e.g. Jenkins, Bazel
- Deployment – e.g. Spinnaker, Jenkins, Bamboo.

Key considerations when selecting tools include:

- Whether your preference is for commercial only, or open source with optional commercial support
- Ease of integration with other platforms and tools in your ecosystem
- The availability of developer support in the market, and the general trend in usage of the tool
- The tool's release cycle and adaptation to new technologies.

One common CI/CD pipeline that serves as the baseline for all deployment scenarios will be easiest to support and manage. Supporting multiple deployment toolchains leads to increased maintenance costs and minimizes code, automation, and processes reuse. However, additional tools and processes can be incorporated into the standard deployment cycle to meet specific application requirements.

Given the complexity of this type of automation, a longer implementation timescale is advisable. Start with small non-critical applications and do not be afraid to fail at first. Leverage experienced resources to save time and avoid costly mistakes.

4. Build the governance model, processes, and culture for DevOps.

Automated provisioning and application release automation are critical enablers of Enterprise DevOps, but DevOps is more than a technology movement. It is a holistic culture and practice that demands a governance model, skills, and ways of working that differ radically from those associated with waterfall development.

IT leaders need to drive behavioral and cultural changes to achieve a DevOps culture. This means that alignment of the IT delivery process through behavioral and cultural standardization should be a higher priority than standardizing tools. It is important for the team to embrace baseline DevOps best practices irrespective of the underlying toolset or technologies. The behavioral and functional aspects should be defined as a maturity model backed by a roadmap. Tools and technologies can then help automate and standardize these processes and outcomes.

In our report [Cloud native comes of age](#) we outlined how IT leaders can start to build up a DevOps culture and practice:

- Beginning with a small-scale pilot or proof of concept before scaling up
- Adapting the operating model to facilitate closer collaboration between development and operations teams, and between IT and the business
- Building an innovation culture through testing and learning.

Incubating and expanding a cloud center of excellence (CoE) is an excellent way to manage this transition while minimizing risk and allowing for gradual skills transfer. Initially, the CoE may be responsible for a new pilot or non-critical project, with additional applications (both new and existing) being added to the cloud service portfolio over time. In the ultimate target state, the CoE will manage the majority of enterprise applications.

To deliver this transition, IT leaders will need to lay the foundations of their cloud operating model and map out an agile and people-centric transformation plan. Detailed design of the operating model should show what DevOps practices will mean in the enterprise, with new roles and KPIs for both IT and business teams. Change readiness and implementation planning can make the transition into the targeted design smoother and faster. It will often be essential to hire experienced senior talent, as well as re-training existing resources to operate in the new paradigm.





About Capgemini

A global leader in consulting, technology services and digital transformation, Capgemini is at the forefront of innovation to address the entire breadth of clients' opportunities in the evolving world of cloud, digital and platforms. Building on its strong 50-year heritage and deep industry-specific expertise, Capgemini enables organizations to realize their business ambitions through an array of services from strategy to operations. Capgemini is driven by the conviction that the business value of technology comes from and through people. It is a multicultural company of 200,000 team members in over 40 countries. The Group reported 2017 global revenues of EUR 12.8 billion.

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