

RACONTEUR

Future of Enterprise IT



NGINX

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NGINX, Inc. is the company behind NGINX, the popular open source project trusted by more than approximately 400 million sites. We offer a suite of technologies for developing and delivering modern applications. The NGINX Application Platform enables enterprises undergoing digital transformation to modernise legacy, monolithic applications as well as deliver new, microservices-based applications. Companies like Netflix, Starbucks and McDonald's rely on NGINX to reduce costs, improve resiliency and speed innovation. NGINX investors include Blue Cloud Ventures, e.ventures, Goldman Sachs, Index Ventures, MSD Capital, NEA, Runa Capital and Telstra Ventures.

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With senior IT managers balancing competing demands to enhance business performance while also containing spend, this report explores how enterprises can harness the power of microservices and other innovative technologies in order to boost their efficiency.

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PLANNING

Preparing for digital in an uncertain economy

With technology budgets shrinking, IT bosses should prioritise spending by focusing on what matters most to the business

Duncan Jefferies

In recent years, IT spending has reached heights not seen since the heady days of 2007, when terms such as quantitative easing were practically unknown to the general public. According to Gartner's latest forecast, global IT spending will reach \$3.8 trillion in 2019, an increase of 3.2 per cent from 2018. This is hardly surprising given that many companies are still in the midst of digital transformation. But the rate of spending growth is down on last year's figure of 6.2 per cent.

This reflects the slowdown in the global economy. The ongoing trade war between the United States and China has stoked fears that another financial crash could be on the horizon, as have massive student loan and corporate debt bubbles, which would cause havoc in multiple financial markets if they popped. And of course there's Brexit, which could plunge the UK into a full-blown recession.

So how should IT leaders prepare for a possible economic downturn? And if the worst does happen, can they still deliver digital transformation on a budget?

The first thing to note is that digital transformation is often the fuel for increased revenue, so drastically reducing IT spending is a surefire way to slow business growth long term. That's particularly true for fintech businesses, which have raised huge amounts of investment over the past decade - \$39 billion in 2018 alone, according to CB Insights.



3.2%
projected increase
in global IT spending
in 2019, according
to Gartner

Gartner, 2019

Mobile payment solutions, regtech, automation, blockchain and cryptocurrencies, and alternative lending platforms have all shaken up the staid financial sector. The big banks now spend astronomical sums in a bid to keep up with agile fintech companies such as UK-based TransferWise. JP Morgan, for example, committed to spending \$10.8 billion on technology in 2018.

For those operating in this space, and potentially looking to form partnerships with some of the big banks, slashing the IT budget simply isn't an option. Like enterprises in any industry that is embracing digital transformation, they'll need to do more with less if the economy takes a tumble. But with the right mindset, a reduced budget doesn't have to spell the end of ambitious plans.

Firstly, the switch from ownership to services provides an opportunity to unshackle enterprises of all shapes and sizes from costly managed systems. This, in turn, frees up finance and resources that can be redistributed to other projects or areas of the business. Spending reviews can also highlight areas where the company is currently overpaying for IT services, for example forking out for unnecessary software licences and maintenance fees, and ultimately create a leaner, more efficient IT infrastructure.

Alan Zucker, founding principal at Project Management Essentials, says digital transformation also "screams for the adoption of agile development practices, particularly when budgets are tight". The agile principle of focusing on delivering value is a critical first step in this process.

"IT and business leaders should develop a prioritised backlog of areas and functions that should be digitalised," says Mr Zucker. "The backlog should be ordered from the most important, or the area that will most benefit from the transformation, to the least."

This will help the entire organisation focus its efforts on what is most valuable. "The digital transformation should also be



delivered incrementally and iteratively,” Mr Zucker explains. “Plans should be made to deliver increments of useable functionality at least once a month. By breaking the massive project down into small increments, we are ‘eating the elephant one bite at a time’.”

Such an approach can reduce the time and financial slippages that often bedevil big IT projects, which should also be comprehensively reviewed when spending is constrained to see if any of them could be delayed or cancelled.

“Many organisations already make do within tight IT budget constraints,” says Peter Tsai, senior technology analyst at Spiceworks, a professional network for the IT industry. “As a result, IT departments are often unable to implement every tech initiative they would like to. And if IT budgets were to shrink, IT departments would need to get even more strategic with the money they have by focusing on what matters most.”

According to Spiceworks data, because myriad cybersecurity threats take advantage of the out-of-support tech commonly found in the workplace, top priorities among IT departments include upgrading ageing computer hardware and software.

“As a result, many organisations are spending on the essentials, dealing with the biggest

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While the latest and greatest technology is nice to have, securing computer networks is of the utmost importance

Peter Tsai

Senior technology analyst, Spiceworks

\$39bn

Investment raised by fintech businesses in 2018

CB Insights, 2019

risks before investing in new, shiny objects such as artificial intelligence, virtual reality and 3D printing,” says Mr Tsai. “In other words, while the latest and greatest technology is nice to have, securing computer networks is of the utmost importance.”

A chief information officer (CIO) should ideally discuss the IT budget with all stakeholders, including end-users and the chief financial officer, before presenting it for review. Not only will this help to identify the essential from the nice-to-have and therefore where savings can be made, it can help the CIO build alliances across the enterprise. Ultimately, it's these alliances, together with a strategic approach to budgeting, that will help IT departments weather any economic shocks and continue the vital business of digital transformation. ●

CUSTOMER EXPERIENCE

Architecting the path to customer experience

Microservices-based architectures are giving enterprises the agility and scalability to deliver customer experiences championed in the digital economy, but the resulting tool sprawl and complexities are driving an urgent need to consolidate and simplify

Ben Rossi

The digital economy has fuelled an increasingly competitive environment for businesses and a race to keep up with fast-changing expectations around customer experience. As organisations seek modernisation, microservices-based architectures have emerged as an enabler for better performance, scalability and the journey to digital transformation.

The strong desire among businesses to be agile has made microservices architecture a popular software development technique, enabling products and services to not only be built quickly, but also to evolve easily, according to customer needs. This is achieved by breaking up development teams into smaller squads that work at a faster pace.

For example, the functionality of a modern ecommerce site in a monolithic environment is delivered by a single web application, but with microservices it would build each sub-component as its own discrete service. This means customer sign-ins, shopping carts, loyalty programmes and customer ratings can be built as independent microservices that are assembled and delivered as a single website.

By slicing an application into smaller services, companies can scale up certain functions to meet demand without having to scale everything else. While monolithic applications need to join multiple pieces together to bring a new feature to market, the same can be achieved with microservices by independently updating only a small portion of the application, which drastically increases the velocity of product enhancements.

"The customer benefits are huge too," says Sidney Rabsatt, vice president of product management at NGINX. "If part of the application breaks, fixing it doesn't require you taking the whole application offline; it just continues to work. Most importantly, customers get to see the freshest face of the company. Typically, the main driver for deploying microservices is making sure customers are always able to get the best possible experience."

While microservices architecture is enabling many companies to deliver a better customer experience in the digital age, it can also bring complexities and organisational challenges. From a people perspective, companies need teams that understand how to work independently and how to build and maintain contacts with each other.

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Companies can scale up certain functions to meet demand without having to scale everything else

Sidney Rabsatt

Vice president of product management, NGINX

3m

NGINX instances are deployed in production microservices environments

Those teams also need to be able to understand how to uncover and handle dependencies that the individual services have with each other, as well as maintaining the necessary compliance. There is a minimum level of security, control and authentication needed; the hygiene checks that must be completed in order to ensure every service that's part of the application is meeting the requirements of the business.

In microservices, traffic that used to be self-contained within the monolithic application spills over on to the network. This east-west traffic, as it's known, flows between different, discrete services and is independent of the traffic sent back to the user.

"Microservices hold a lot of potential, but, at the end of the day, folks need to evaluate whether this is right for them," says Mr Rabsatt. "Microservices-based architectures aren't just something you start doing; you need to be organised to be able to support them. The hardest thing is making sure the organisation is appropriate to handle it, both from a development perspective and from an operational perspective.

"It's hard enough to build a microservices-based architecture, but then when it comes to operating it you have a more complex set of dependencies that need to be deployed, understood and managed. Troubleshooting also becomes a concern. If something fails, how do you know where it failed, what impact it has on your application overall, and how to fix it? There is a lot of complexity that comes into play."

As organisations begin to run into these challenges, the tendency can be to patch over the issues by deploying lots of point tools that solve different parts of the problem, resulting in tool sprawl, growing fragility and even more complexity. A great deal of expertise and interdependencies are required for just the operational environment, let alone the application itself.

NGINX provides a unified set of capabilities that eliminate tool sprawl and make modernisation through microservices environments a lot simpler. By not placing any constraints on the environments on which its customers can run, and integrating with their existing tooling, NGINX gives organisations the freedom and flexibility to architect the applications in whatever way they want and without requiring countless different solutions.

A gradual, pragmatic start to deploying a microservices architecture will provide strong results in the long run. Most companies will begin by gaining experience in how to build and operate the app, layering on more functionality later as it grows in complexity. Rushing to achieve a fully microservices-based approach will only exacerbate the complexity.

The result is a hybrid model among many organisations that are taking time before they move on to purely microservices applications, driving a need for east-west networking solutions as well as unified capabilities, ensuring all the components of the applications are properly connected, regardless of whether they are legacy or modern.

"Through offering many infrastructure-level capabilities, we provide a lot of richness in how organisations can deploy microservices and ensure traffic gets to services securely and

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The main driver for deploying microservices is making sure customers are always able to get the best possible experience

Sidney Rabsatt

appropriately," says Mr Rabsatt. "Organisations need intelligent solutions that pool together and unify far more of these delivery capabilities. We essentially provide a nice single solution to manage the complexity of the communication between the various services.

"Organisations will build their applications and solutions such as NGINX will be the intelligent delivery mechanism for them. Capabilities need to be carried out with the intent of the enterprise. We'll make sure the solutions are deployed where they need to be, that they're scaled to the extent they need to be and that customers ultimately see the exact experience the organisation wants to deliver." ●

For more information please visit nginx.com





INNOVATION

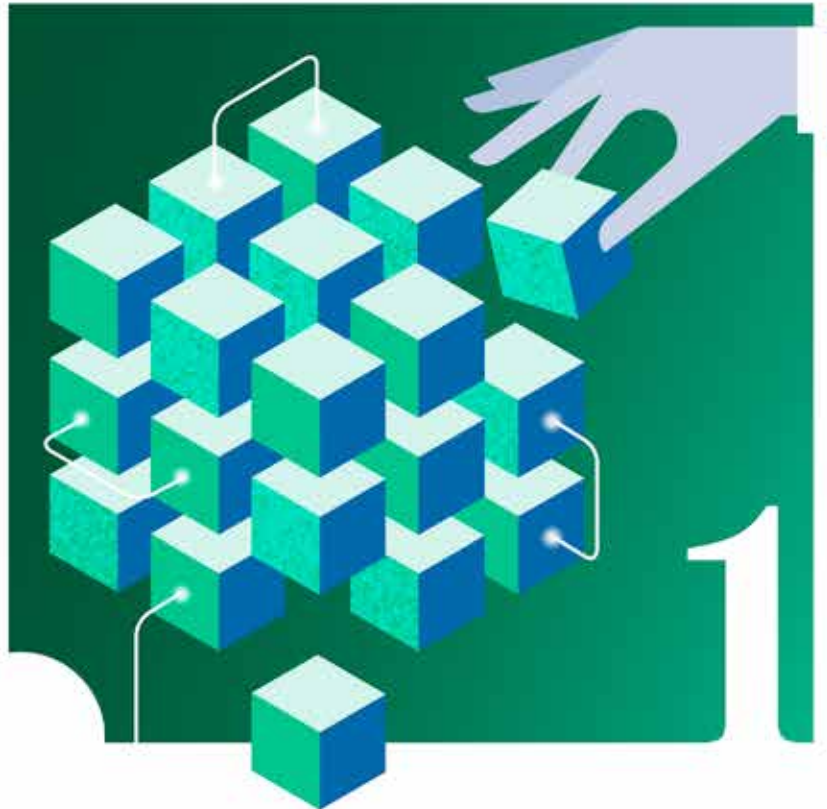
Five technologies disrupting enterprise IT

Ben Rossi

Infrastructure as code

Creating full-stack environments that are identical, repeatable and entirely from code is enhancing the software delivery life cycle for companies working on continuous integration and delivery. Utilising DevOps methods, infrastructure as code (IaC) enables firms to scale on demand and rapidly move ideas from initial concept to live service.

UK challenger bank Tandem has adopted IaC to end infrastructure bottlenecks and create an environment of consistent building. “Software updates can be in the hands of customers at a much more efficient rate,” says head of IT, Difa Niculescu. “When used in public cloud environments, the ability to almost infinitely scale adds enormous value.”



Serverless delivery

Servers may have long been a staple of the datacentre, but new systems and solutions built in the cloud are now being designed to run without them. The major cloud providers all offer serverless runtimes, and the ability to connect software-as-a-service products with platform-as-a-service solutions, without having to provision physical or virtual servers, is liberating the idea among enterprises.

“The advantages are so great that it is becoming the de facto infrastructure pattern,” says Stephen Long, managing director at KCOM. “These design patterns are becoming the go-to architecture for new systems due to their value, speed and flexibility. There’s approximately a 200 per cent increase in use of this technology per quarter in the last year.”

SD-WAN

By allowing companies to automate complex processes and configure their network traffic and performance options centrally, software-defined wide area network (SD-WAN) software technologies are boosting service deliveries. In the race for digital transformation, SD-WAN technologies give enterprises a more reliable and available network.

Following remarkable growth over the last few years, IDC forecasts this market will reach \$8 billion by 2021. Leveraging companies' existing network investments and cloud applications, SD-WAN products enable multiple environments to be managed in a standardised way. "IT teams can put a control layer over these different physical networks and components," says Marc Sollars, chief technology officer at Teneo. "They can gain a better overview while intelligently routing different kinds of traffic across their networks."



Multicloud

Having moved beyond their early deployments of cloud computing, chief information officers are honing their understanding of what they can do in a public cloud for optimum scalability and cost efficiency, and what they prefer to sit in a more controlled private cloud. This is creating multicloud environments that require management and orchestration.

"Enterprises need diverse infrastructure without piling on unnecessary operational burdens," says Bikash Koley, chief technology officer at Juniper Networks. "The era of multicloud will be defined by a huge transformation in enterprise operations. Multicloud orchestration, automated workflows and machine-learning will all feed progress here. We have to bring cloud-like operations to enterprises that don't operate at Google scale."

Artificial intelligence

As enterprise IT continues to expand exponentially both in terms of volume and complexity, the massive amount of data it is creating in the process is making it an ideal target for effective use of artificial intelligence (AI). There are numerous areas where AI is disrupting IT, perhaps none more crucial than in threat protection.

IT security has previously had to respond to cyberthreats in a reactive way, analysing based on configured rules. With AI, however, security products can learn new threats and respond proactively. The technology will also disrupt the way enterprises use the cloud. "There is always a latency when cloud environments scale in line with actual demand," says Jon Wrennall, chief technology officer at Advanced. "AI can solve that by scaling slightly ahead of peak demand having learnt human behaviour based on historic demand." ●



COMPETITION

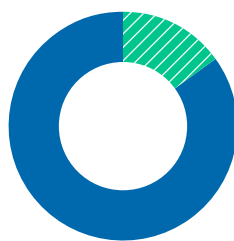
Disruptors place digital at their core but culture comes first

Fintech startups are leading the way in demonstrating how digital innovation can successfully transform businesses and industries, enabled by cloud and microservice-based architectures, but those who overlook the importance of culture are setting themselves up for failure

Ben Rossi

Companies that embed digital innovation at the very core of their business and products are rewarded with an ability to innovate at an unprecedented rate. The power this gives them is evident in the disruption that has taken place across sectors, causing companies that have reigned as market leaders for decades, to be surpassed by agile startups.

Digital-led transformation as a concept has evolved rapidly within the enterprise in recent years. Beyond a project championed by IT, it is now about changing monolithic,



15%

of new current accounts are opened with Monzo digital-only bank

Monzo, 2018



In contrast to the slow-changing ways of the banking behemoths, fintech firms move at pace

silo-based systems into ones that are interdependent and intercommunicating. Businesses that transform successfully understand the importance of embedding the objectives across the whole organisation, beginning with buy-in from the very top.

Desired outcomes must be defined and communicated clearly from the outset, focusing on company-wide goals and the bigger picture of growth and modernisation rather than just solving isolated issues. Building a company culture that accommodates this is crucial, which means employees must believe in the necessity for such change.

“This requires their involvement,” says Joanne Taylor, director of digital strategy at Software AG. “Getting employees on board with the outcomes of digitisation projects, promoting partnerships and setting out measurable goals throughout the process all contribute to the mantra of ‘buying in’, and are vital for achieving success.”

Truly digital organisations are built on a modernised core surrounded by optimised business processes with data and automation at the heart. Recent research by Infosys categorised global firms into three clusters representing their digitisation progress. The first group, the “watchers”, predominantly see it as a way of driving efficiencies. Automation removes waste and the need to carry out simple tasks over and over again.

That is certainly valuable, but the other two clusters have moved beyond an early-adoption phase and are working on embracing digital as part of their identity. The “explorers” are actively committed to enhancing the customer experience and meeting client demands, while the “visionaries” understand its full potential and are shifting their business models to seize future opportunities.

While most of the larger incumbents in the financial services sector have been slow to

digitise and are still stuck in the first group, challenger banks are among the most successful of the visionaries. In contrast to the slow-changing ways of the banking behemoths, fintech firms move at pace. They position digital at the centre of their organisational structure and observe digital disruption with the greatest clarity.

The results are clear. Last March, just a few months after launching its current accounts, digital-only bank Monzo revealed that more than 500,000 people had opened one. That grew to one million by September, and Monzo now claims to represent 15 per cent of new current accounts opened in the UK. Fellow UK fintech innovators Revolut and Tandem, meanwhile, recently reached three million and 500,000 customers respectively.

“It’s not hard to see why customers are increasingly migrating to digital-only challengers,” says Mohit Joshi, president of Infosys. “Atom Bank allows customers to take out a mortgage using a mobile app and Starling Bank even became the first UK bank to launch its own APIs [application programming interfaces], allowing developers to create Starling-compatible apps and offer value-add services to its customers.”

Mojo Mortgages is another UK player that has set its sights on transforming a traditional financial service ripe for digital disruption. The online mortgage broker offers free advice and a mortgage in principle in under 15 minutes. When an estimated 40 per cent of mortgage brokers in the UK don’t even have a website, this is an attractive proposition for digitally savvy homebuyers and remortgagers, particularly millennials.

For Richard Hayes, the company’s co-founder and chief executive, the need to keep well away from the monolithic systems that prevent digitisation, let alone the launch of a digital-only service, has meant not building proprietary products that require vast maintenance and continued development. Instead, Mojo Mortgages has engaged willingly with third-party providers, allowing it to focus on building specialised elements of its products.

A cloud and microservice-based architecture is at the heart of modern, innovative businesses, and has been a key enabler of the digital disruption seen in the financial services sector and beyond. Companies such as Monzo, Starling and Mojo Mortgages have



40%

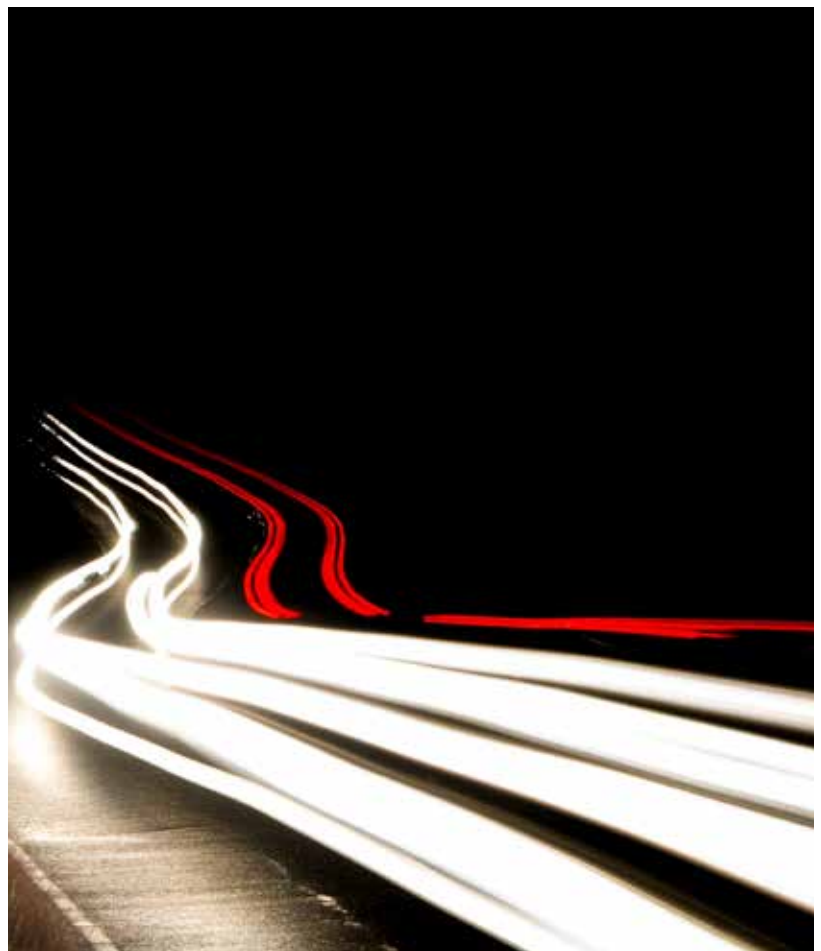
of UK mortgage brokers don't have a website

Mortgage Solutions, 2017

been able to focus on providing greater levels of service and customer experience because they don’t have to worry about existing infrastructure and systems.

“These types of uncoupled infrastructures allow for scale at extreme pace and drive higher user engagement,” says Mr Hayes. “They enable businesses to cope with huge influxes of traffic, while developing and deploying new features much quicker. The advancements and adoption of APIs across multiple sectors have also been key to digital projects, allowing organisations to integrate a multitude of new technologies quickly and efficiently, while also allowing other businesses to integrate with them.”

These technologies are providing the foundation for companies to embrace digital innovation, disrupt industries and transform business models, but organisations must always address culture first. If a digital-first mentality is not already prevalent in a business before embarking on such a project, adoption and output will no doubt diminish over time, and create a divide between the products and operations. ●



TRANSFORMATION

DevOps fever spreads throughout the enterprise

DevOps has become an invaluable methodology for organisations in the digital economy and its momentum shows no signs of slowing as other parts of the business, from marketing to sales and beyond, begin to embrace its principles and practices

Ben Rossi

P rinciples of DevOps, combining software development with IT operations practices to drive closer alignment with business goals, have become central to transformation projects as organisations seek to evolve in the digital economy. Software success is increasingly indistinguishable from business success in this new competitive climate.

With companies under growing pressure to innovate, traditional IT teams have realised their existing approach to delivering software does not enable them to respond quickly enough to meet business requirements. This has given rise to the DevOps movement, which involves adopting cultural and technical practices that accelerate innovation.

The past few years, in particular, have seen a large upswing in popularity for the methodology as the cloud has enabled unlimited flexible resources and companies have increasingly consumed IT on individual, service-based architectures while enjoying shorter development cycles.

The pace of software delivery has accelerated at an unprecedented level. Automation



of testing and deployment, along with code reuse, has helped companies reduce product release cycles for large-feature delivery from more than six months to two weeks or less.

“In a recent project, we moved the code-test cycle from three months to two hours,” says Jon Hammant, head of DevOps at Accenture UK and Ireland. “The frequency of release is also massively increasing. Amazon.com releases live code, on average, every 0.3 seconds.”

DevOps enables hypotheses-driven development and makes it much easier to create,

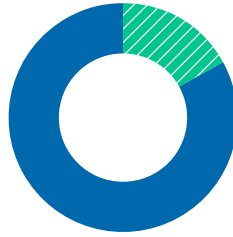
roll out and test extra functions with real customers. As a result, many businesses are seeing a definite link between their IT capability and top-line revenue for the first time.

It is now beginning to spread to other departments touched by software development. Ultimately, DevOps is about solving business problems and optimising the whole rather than individual silos. Bottlenecks and constraints can exist anywhere, not just between development and operations, and embracing the DevOps principles of culture, automation, measurement and sharing can be valuable for any part of a business.

The Y Combinator seed accelerator programme has helped produce a number of successful startups that adopt DevOps thinking throughout their organisation, testing constantly and failing fast to drive innovation, while fintech firms have also embraced the methodology to accelerate their growth. Such high-performance companies prioritise increasing collaboration, flow and feedback, as well as removing silos.

Spreading the influence of the DevOps mindset across more established organisations, however, will mean tackling the more time-consuming and expensive aspects of test runs. More automation, simulation and consumption of software-as-a-service (SaaS) solutions will increase the ability of entire companies to make this move.

“The major challenge for the ongoing shift into a DevOps-everywhere style will be the skill and availability of staff who are able to constantly adapt to disruptive changes in technology,” says Mr Hammant. “However, aspects of the software development life cycle will increasingly be performed in conjunction with artificial intelligence actors to build efficiency and make up



17%

of organisations had fully embraced DevOps in 2018, up from 10% in 2017

Sauce Labs, 2018

for skill shortages. We’ll also see the death of infrastructure-as-a-service and rapid transformation into serverless and SaaS-provided components.”

While they may not call it DevOps, other parts of the business are already adopting agile practices, which lend much of their traits to DevOps methodology, particularly in the marketing function. Any team, group or organisation that is seen to be in any way restrictive to delivering value to the customer is ripe for DevOps-driven optimisation.

Businesses that embrace DevOps more widely will be able to innovate faster and better respond to market conditions and new kinds of disruption. However, every transformational journey will include peaks and troughs, as well as a need to drive culture change, so organisations must be prepared to manage these challenges.

“Acknowledging that a change curve exists is extremely important,” says Mark Levy, director of strategy at Micro Focus. “When you are in the honeymoon period at the top, make the absolute most of it. Seize the moment because you will inevitably hit the trough of disillusionment and it will require proper commitment, patience and determination.”

The rise of microservices-based architectures and automated cloud deployments is enabling new technologies and practices that allow DevOps teams to move even faster. Microservices reduce external dependencies through encapsulation and enable products teams to accelerate their ability to drive change while managing the overall impact.

Although DevOps is still a work in progress, its principles and practices will soon start spreading to other organisations in the value chain, such as sales and support, and practices including continuous delivery will migrate to new and different platforms. “We will see more companies standardising on DevOps practices,” says Mr Levy.

With its ability to innovate faster with less risk, DevOps will increasingly be seen as a logical first step to transformation in the digital age. Implementing its principles will not only positively impact top and bottom lines in new ways, but will also enable businesses to do more with less, freeing up people across the company to drive value. ●



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