

Increasing Business Agility Through Digital Transformation

VMware IT Performance Annual Report 2019



A stylized, handwritten signature in black ink, appearing to read 'Pat Gelsinger'.

PAT GELSINGER
CHIEF EXECUTIVE OFFICER
VMWARE

“ At VMware, we have a deep and long-standing commitment to helping shape tech as a force for good in the world. That begins with good engineering, and one of the best examples of world-class engineering is our own IT department.

VMware IT puts all VMware products to work within our own operations—testing, scaling and validating for a demanding customer base of VMware engineers and users. VMware IT is then able to actively engage with customers about the reality of operations in a complex, large-scale, enterprise environment, while ensuring that everything also meets productivity, agility, security and resiliency requirements. I couldn't be prouder of these efforts and VMware IT. ”



Table of Contents

Welcome from the CIO	2
Embracing New Ways of Operating	5
Creating an Agile Enterprise Through App Modernization	19
Building on an Infrastructure Primed for Transformation	24
Transforming Business Through IT Innovation	29
Contact Us	30



“I am incredibly proud of our team at VMware. We operate as one global team, providing our colleagues with the platforms they need to innovate, using our products and services before our customers do, driving innovation to meet customers’ needs, and ensuring we secure our data and assets. The team is leading the way as we grow VMware toward a SaaS model across our portfolio.”

BASK IYER
CHIEF INFORMATION OFFICER
AND CHIEF DIGITAL
TRANSFORMATION OFFICER
VMWARE

Welcome from the CIO

I write this annual letter with a sense of pride about our company and our thousands of employees in the IT organization around the world driving our transformation.

At VMware, our core philosophy is around people and process first, followed by technology. We’re creating a workplace of the future that makes it easier for colleagues to access the tools they need to be productive. We’re employing new technologies and launching innovative initiatives designed to enhance efficiency, boost productivity, improve engagement with business partners and customers, and increase business agility. We’re adopting advanced solutions that anticipate technical issues and accelerate problem resolution.

We’re also optimizing sales and marketing efforts with technologies that help streamline processes, spark new opportunities and generate new customer insights. This new way of working has improved the quality of collaboration across the company.

And we are seeing deep, aligned integrations across teams, improving the way we work, how we align with our business partners and, most importantly, how we improve colleague and customer experiences.

Additionally, we contribute directly to product development and see most of our innovations incorporated into VMware products. For instance, people search, electronic approvals, room locators and other capabilities were all ideated and implemented by IT. These and other features are now part of VMware Workspace ONE® or on the product development roadmap for future releases. We pioneer new use cases for emerging tech, such as the Internet of Things (IoT). And HID Global announced our partnership at VMworld® 2019 Europe in Barcelona to open office building doors with mobile phones enabled with Workspace ONE. Our teams created this capability, and it’s now on the path for revenue generation.

VMware IT continues to introduce new infrastructure programs and initiatives that work alongside app modernization efforts to provide a launchpad for business transformation. Our infrastructure teams manage and leverage private and public clouds, and deploy new technologies to control spending, bolster security and improve resiliency. We’re bringing together developers and IT operations with an agile mindset to deliver the apps our colleagues need to be productive and successful. At the same time, we’re enhancing security efforts to safeguard data even as we deploy new cloud services and acquire new companies. We’re improving enterprise resiliency to help ensure that colleagues and business partners stay productive.

In 2019, we added to our charter accountability for company-wide operations, systems and tools, driving collaboration to accelerate our software-as-a-service (SaaS) transformation and mergers and acquisitions (M&A) integration. This enabled us to refine some of our key priorities, notably cultivating happy customers while doubling down on our dedication to making it easier for everyone at VMware to do their very best work. This means listening intently and continuing to innovate our systems, tools and processes. Critically, we have focused our efforts on building scale, accelerating our SaaS transformation and M&A integration while gaining efficiencies in our systems integration processes.

Knowing the road we've traveled, I've never been more optimistic about our future. 2019 was a wildly transformative year for VMware, our customers and our partners. We have made progress and continue to accelerate the pace.

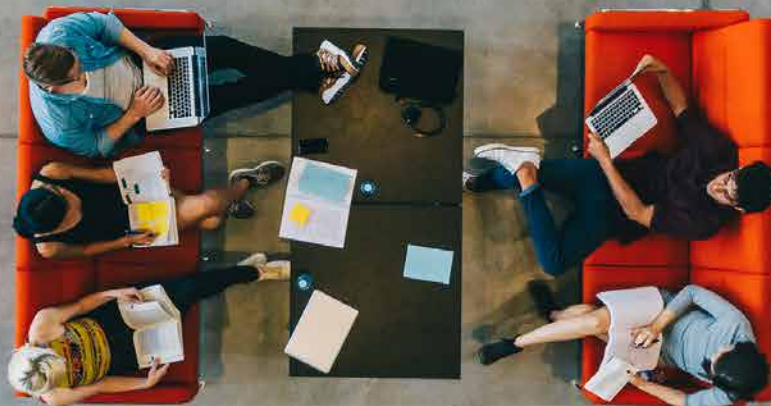
I invite you to keep reading to learn more about our journey, what we've learned along the way and where we're headed. I would like to express my deep gratitude and appreciation for the employees of VMware IT. From this report, I hope all readers gain an appreciation for the tremendous character and capabilities of this team. I am incredibly proud of who we are and what we have accomplished.



Bask Iyer

“ VMware is on the same digital transformation journey as many of our customers, and our IT department is the foundation for our success. VMware IT is accelerating and enabling our own internal SaaS transformation and also helping R&D deliver continuous innovation—so our customers can build, run, manage, connect and protect their own transformational applications.”

RAGHU RAGHURAM
CHIEF OPERATING OFFICER, PRODUCTS AND CLOUD SERVICES
VMWARE





Embracing New Ways of Operating

At VMware, we're undergoing a digital transformation. This means embracing new ways of operating, such as modernizing our apps to create a more agile enterprise. It also means we're building an infrastructure that can take advantage of our evolution and transform our business through IT innovation.

Enhancing the colleague experience

Attracting and retaining top talent are vital for any enterprise. We're improving our recruiting and retention efforts by focusing on the colleague experience—how people interact with VMware processes, tools and services in the areas of technology, their physical environment and culture. Within IT, the Colleague Experience and Technology (CET) team develops and promotes this shared vision by providing an immersive experience and enabling continuous learning for our colleagues.

The CET investment pays off in many different ways. For example, it helps us meet people's expectations for their work environment. And importantly, it helps us foster the type of creative mindset that provides a crucial competitive edge in the global marketplace.

Shaping the workplace of the future

Millennial workers will soon represent the majority of workers globally—and they love technology. So we launched Workplace X, our workspace of the future initiative, to address the technology expectations of all our colleagues, from early-career employees to industry veterans.

The program has defined several areas of focus. We will achieve our goals by capitalizing on a range of new technologies—including artificial intelligence (AI), machine learning (ML), virtual reality (VR) and IoT—and by offering new services, such as remote support for laptop issues.

Humanizing productivity apps with a Genie

Providing the right kind of colleague experience is critical for improving technology adoption across an enterprise. Our colleagues today expect a consumer experience with every tool they use. To meet that expectation, VMware IT developed VMware Genie technology, designed to augment human abilities through AI. Genie turns any device—such as a smartwatch, digital assistant, smartphone, laptop or traditional office phone—into a comprehensive, omnipresent portal that provides secure access to the VMware ecosystem and associated apps. Colleagues can use Genie to find out what's cooking at the company café, book a conference room and more—all through simple voice and text commands.

VMware IT has a short-term goal of reducing reactive human support work by 40 percent by eliminating problems at the root.

Genie also offers remarkably personalized experiences. It learns each person's likes, dislikes and ways of working, just as a human assistant would. But unlike a consumer digital assistant, Genie is restricted to working within the VMware ecosystem, which maintains security and privacy regardless of the person's location or device. Genie automates the mundane and makes even the smallest tasks effortless—all while safeguarding data. Colleagues gain control over their personal data when using personal devices or other resources, such as HR systems, that consume that data.

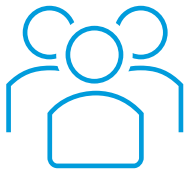
Providing proactive support and meeting colleagues where they are

Taking a reactive approach immensely drains all company resources. VMware IT has a short-term goal of reducing reactive human support work by 40 percent by eliminating problems at the root.

Our service desk and walk-up tech bars are called Oasis. We recently introduced Virtual Oasis to enable our remote and mobile colleagues to get help. Now, colleagues can access immediate tech support in the ways they prefer, such as through an internal home page or other collaboration tools like chat and text messaging.

If colleagues want a more immersive support experience, they can use Oasis kiosks. Rolled out in 25 locations to date, the kiosks allow real-time video conferencing with support team members and—like Virtual Oasis—significantly accelerate the entire support process.





ONBOARDING NEW
COLLEAGUES FASTER WITH
WORKSPACE ONE

25 minutes

average time from receiving laptop
to being up and running

Delivering immediate access to loaner laptops

It's an all-too-common scenario: A defective system or a lost piece of luggage leaves a colleague or visitor in desperate and immediate need for a laptop. But obtaining a laptop on short notice is no easy matter. The request must engage an already-busy IT team, which might not have anything suitable in the inventory. If a system happens to be available, IT will have to address security issues before handing it over. Meanwhile, time is of the essence. If a visitor needs a laptop immediately for a one-hour meeting before catching a plane, IT might not be able to respond fast enough.

This familiar problem prompted VMware IT to develop a laptop vending machine (LVM). Mimicking the look and size of candy and soda dispensers, the LVM enables colleagues with Active Directory credentials to immediately obtain a Mac or Windows laptop without involving a person. Each laptop is fully integrated with Workspace ONE, so colleagues can be up and running right away. Systems can be provisioned and deprovisioned on the fly, enabling instant reuse. The LVM also eliminates a significant—and common—burden for IT. While still in the experimental stages, LVM prototypes have been popular in pilot programs.

Accelerating laptop provisioning

Imaging Mac and Windows laptops has traditionally been a long, drawn-out process for both IT and the colleagues requesting machines. That's all changed at VMware by switching from an imaging approach to one that employs provisioning. This new approach eliminates much of the unnecessary IT effort involved with imaging. Our IT teams can also automatically push the latest applications to colleagues on demand.

Colleagues receive their laptops faster, and they realize a seamless “open and enjoy” experience. In fact, it takes just 25 minutes on average from the time colleagues receive a system to the time they're up and running with an internet connection. In the past, colleagues had to wait hours or days, and many had to visit the corporate office. The new tools also provide a zero-touch solution for laptop provisioning that offers unprecedented IT control combined with state-of-the-art security.

Making Day 1 productive with VMware Horizon View and Workspace ONE Boxer

Ensuring new colleagues are immediately productive can be a challenge, especially for those who join VMware through a merger or acquisition. The VMware Horizon® View™ virtual desktop infrastructure (VDI) enables IT teams to provide hundreds of colleagues with secure access to VMware resources in a very short period of time—a tremendous (and necessary) advantage in the age of the agile enterprise.

Now, new colleagues can be productive from Day 1 as they gain immediate access to a VDI Windows 10 or Mac desktop with all required tools and software pre-installed. Other non-standard features or apps can be easily accessed through the platform or a secure URL. After new colleagues settle in, they can stay with the VDI desktop or receive a corporate laptop, depending on their preference.

VDI desktops take pressure off deployment teams. Traditionally, laptops and other devices had to be imaged, configured and delivered to a new colleague before any access was granted. Now, deployment teams can offer new colleagues immediate access to resources and then customize hardware to meet specific requirements as needed.

To migrate existing email and individual settings for new colleagues, we rely on VMware Workspace ONE Boxer—a fast, smart email, calendar and contacts app that offers standalone app management without requiring any device management. Installation and management are seamlessly accomplished with VMware corporate email access. Managing incoming colleague email, calendars and contacts with a single app makes onboarding effortless and hassle-free, allowing the IT team to focus on more mission-critical tasks. Once the merging of email and other accounts is complete, colleagues can drop the old accounts and continue with the VMware account only.

The app helps streamline IT management while giving new colleagues a positive experience from Day 1. Case in point: We used Workspace ONE Boxer and VDI to facilitate a seamless transition during our recent Carbon Black acquisition. New colleagues were up and running almost immediately.

Reimagining access governance

As a global enterprise with multinational offices, VMware must maintain close governance over employee access to reduce security risks and comply with local, regional and country regulations. To address these governance requirements, we introduced a platform for full-employee-access lifecycle management—from birthright through access removal—that enables risk-driven access management, rights and entitlements. The platform includes capabilities for requesting access, provisioning and deprovisioning access, and transferring and accessing re-certification for all colleagues.

The new access management platform delivers several key benefits. For example, it enhanced the colleague experience by accelerating new-hire access, and increased efficiency by enabling automated provisioning and deprovisioning based on the



SAVING TIME WITH AI- AND ML-BASED INCIDENT MANAGEMENT

400 hours
of effort saved per quarter through
auto-assignment of incidents

240 hours
saved per quarter through auto-
resolution of incidents

person's lifecycle events. In addition, the platform helped tighten security by removing closed accounts in a timely manner and automatically detecting anomalies in usage patterns. All thanks to simplified auditing and reporting plus advanced identity and access management (IAM) functions.

Redefining incident management with AI and ML

Our IT teams faced several limitations with existing VMware incident management systems. The solution was to implement a suite of AI and ML programs based on deep learning and natural language processing frameworks through VMware vRealize® Orchestrator™. These programs automate a wide range of tasks, including assigning incidents to the proper teams and sub-teams, auto-resolving incidents by executing incident resolution workflows built on vRealize Orchestrator, and generating audit reports to track model efficiency. The programs seamlessly integrate with other conventional incident management systems in the VMware ecosystem.

The AI and ML programs have delivered impressive, quantifiable results. For auto-assignments, we saved 400 hours of effort per quarter, with an efficiency of more than 92 percent. Those savings help significantly improve IT efficiency for teams that average 6,000 cases per quarter and have five minutes to manually analyze and assign each case. For auto-resolution, the programs help resolve 120 incidents per quarter, with combined savings of 240 hours.

Resolving problems before they even occur

While AI and ML programs help streamline incident management, we simultaneously address potential technology issues before they become full-fledged incidents in our environments. VMware Global Services developed a SaaS solution called VMware Skyline™, which IT built to automatically and securely collect, aggregate and analyze product usage data. Skyline helps VMware customers proactively address potential problems by generating reports for VMware vSphere®, VMware NSX® Data Center for vSphere, VMware vSAN™, VMware vRealize Operations™ and VMware Horizon environments. VMware Skyline Log Assist™ simplifies the log upload process while enabling VMware technical support engineers to improve time to resolution and provide a better support experience. There are currently more than 5,400 Skyline customers.

Positioning VMware to be a leader in a multi-cloud world

As organizations increasingly spread workloads among multiple clouds and opt for SaaS or subscription models for their cloud solutions, VMware has a long-term goal of becoming the control plane for enterprise IT. This requires VMware to transform into a SaaS company.

The transformation will extend to several aspects of our business. For example, we will need to implement continuous, automated, touchless nurturing for marketing while delivering lifetime value (not just total contract value) for sales. We will also need to enable customer usage management at scale. And we will need to introduce hybrid purchasing models combined with trial-driven and usage-driven purchasing for the back office and IT. In addition, we will need to conduct real-time continuous data measurement for all lifecycle stages.

“Our IT team has been a great partner for driving operations transformation, bringing vision to reality. The self-service experience for our global distributors has reduced turnaround time by more than 50 percent. Full visibility into our pipeline and orders has resulted in a smoother QE experience.”

NAYEEM AHMED KHATEEB
DIRECTOR, GLOBAL ORDER
MANAGEMENT
VMWARE

Transforming the sales process

Our goal is to deliver best-in-class experiences by incorporating SaaS, cloud subscriptions and other business models. These efforts enable us to streamline essential sales tasks for sales teams, customers and partners. Our new Configure Price Quote (CPQ) process maximizes operational efficiencies. It facilitates a SaaS approach by providing hybrid offerings. The new CPQ process also presents a flexible, scalable platform.

Improving visibility into customer adoption with a single source of truth

VMware IT is obsessed with helping VMware customers accelerate their time to value and achieve measurable results. The adoption of a single source of truth (SSOT) program automates reporting, which reduced work for colleagues and customers. These and other capabilities ultimately translate into greatly improved customer value.

Re-envisioning partnerships for the cloud era with Partner Connect

VMware Partner Connect simplifies the partner experience and empowers partners through a single program framework that encompasses VMware's on-premises, hybrid and cloud-based solutions and business models. This drives consistency, predictability and value, and also helps consolidate route-to-market (RTM) program elements to create efficiencies while driving partner engagement across the full customer lifecycle.

Generating new insights through digital marketing transformation

We are driving a digital marketing transformation that encompasses marketing automation as well as data and analytics capabilities. Through this multiphase project, we aim to deliver a best-in-class digital experience. The project has helped provide a new, more immersive platform.

Refreshing the customer experience with the My VMware portal

Over the past year, our teams modernized *My VMware®*, a customer portal accessed by millions every month—and did so with no major disruptions. These efforts included:

- Updating the user interface to deliver a cohesive and simplified customer experience
- Moving to a cloud native architecture (lightweight microservices) for superior performance and availability
- Enhancing security via multifactor authentication



“ To help keep our sales force productive on the go, VMware IT delivered mobile applications. They also provided our systems engineering team with the ability to connect technical sellers with each other and needed resources. With a strong partnership and a shared vision, Sales and IT continue to strive for digital transformation, such as reworking our Configure Price Quote tool to provide a more streamlined experience for customers, partners and sales. These efforts allow Sales to better meet customer expectations and demonstrate how VMware’s multi-cloud strategy works at scale. ”

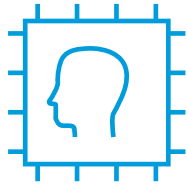
JIM DELIA
SENIOR VICE PRESIDENT, WORLDWIDE CUSTOMER OPERATIONS
VMWARE



JEN FELCH
PRESIDENT,
CHIEF DIGITAL OFFICER
AND CIO
DELL

“ Dell Digital and VMware have a long history of working together and innovating for the benefit of Dell and its customers. Because most organizations are in our same situation in terms of modernizing legacy systems and digitally transforming, Dell team members use the same products as our customers to improve our experiences and reduce operating costs.

We are all on a mission to provide a great employee experience, and to operate a modern and secure infrastructure with cloud-ready applications. VMware Workspace ONE lets us work anywhere on any device. We are also modernizing our network and data center with VMware SD-WAN™ by VeloCloud® and cloud management automation with VMware vSAN. With these and many other digital projects in the works, I expect our close working relationship with the VMware IT team will continue for many years to come. I am proud of our work together and really appreciate the partnership on so many fronts. ”



600K+ VMs

managed by the VMware Learning Platform per month

Delivering knowledge to everyone, everywhere through the VMware Learning Platform

VMware Learning Platform™, the technology that powers our popular Hands-on Labs, was released as a cloud service offering on cloud.vmware.com. With the ability to scale on demand, it delivers a hands-on enablement experience that empowers customers to train their employees with their own use cases.

The platform was created as an internal incubator project to address the growing need for delivering training and demos of software-based solutions to colleagues at scale. Today, it is used extensively for on-demand learning, instructor-led training, large hosted events such as VMworld, and product demonstrations, along with malware and SecOps cyber training. The platform currently manages more than 600,000 virtual machines (VMs) per month. Positive feedback and growing interest in the platform among customers encouraged us to make the service available commercially.

Understanding infrastructure to discover the truth

VMware IT wanted greater visibility and an SSOT for software deployed in hybrid clouds, edge devices and related topologies. We needed a single pane of glass with a 360-degree view of application mappings and interdependencies. The solution was a SaaS configuration management database (CMDB) for hybrid cloud, which enables app and infrastructure owners to understand technology dependencies and identify the people dependent on the associated IP addresses (a major security concern).

The CMDB offers comprehensive management, including the ability to successfully manage change, impact, incident and application portfolios. In addition, it provides seamless access to a policy-based infrastructure engine and enables role-based access control (RBAC) for infrastructure, applications, and security and resiliency.



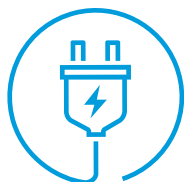
Pre-emptively addressing risks with agile teams

Today's business environments require a company's IT, security and resiliency, and compliance teams to be agile. Those teams must be focused on real-time risk management and also support initiatives that equally prioritize prevention and response mechanisms.

At VMware, agile teams focus on providing early feedback on emerging risk areas and in-flight initiatives for real-time consideration and action. By engaging early in the process, these teams can influence prioritization and management of IT risks. Real-time critiques have a more meaningful impact than post-mortem reviews, which are often too little and too late.

Agile teams have also become an integral part of the IT process, serving as trusted advisors rather than being perceived as a necessary evil. These teams help enhance enterprise resiliency and improve responses to IT issues through active blind-spot corrections. They identify emerging risks, helping ensure VMware delivers robust and quality products the first time out.

Having buy-in from all relevant IT stakeholders, including C-level executives, is key to the success of agile teams. That buy-in enables the team to have a greater impact, ultimately helping to produce a more cost-efficient and flexible enterprise that can successfully compete in any business climate.



ACHIEVED OUR CARBON
NEUTRALITY GOAL AND

100 percent

renewable energy for our global
operations one year ahead of target

Improving sustainability at VMware

In 2018, VMware IT conducted a server technology refresh for its largest data center, significantly enhancing data center efficiency. We moved from 900 servers, 147 racks and 4,200 VMs to just 660 servers, 45 racks and 2,560 VMs. The new data center saves 1.7 million kilowatt hours and 410 metric tons of carbon emissions per year. We completed the migration in one year—with only four hours of downtime.

As a result of lessons learned from the migration, we are now looking at ways to help customers more easily identify idle VMs and hardware to save money and conserve energy, which lowers emissions. Data center migrations are complex, but the team's use of several VMware products—including vRealize Log Insight™, VMware vSphere vMotion® and VMware Site Recovery Manager™/VMware vSphere Replication™—greatly facilitated the process.

Led by the Office of the CTO and supported by Corporate IT, VMware kicked off a sustainability innovation project with the City of Palo Alto to build a proof-of-concept (PoC) renewable energy-powered community microgrid at our headquarters. Microgrids—consisting of a localized power source, battery storage and a management system—are an element of the emerging smart grid.

The smart grid is revolutionizing energy distribution and enabling communities to move away from a centralized distribution model toward independent, energy-resilient, clean-powered local systems. We will leverage this PoC as a testbed to explore how our edge software-defined data center (SDDC), IoT and blockchain technologies can play a role in the emerging smart grid to help decarbonize our electricity supply. Our long-term goal is to expand this PoC into a campus-wide community microgrid that can operate cooperatively with the city utility's infrastructure and become a showcase for others.

Doing good through the IT for Good Giving Network

Nonprofits typically have less than half the IT budget of government or educational organizations. To help level the playing field, VMware established the IT for Good Giving Network as part of the VMware Foundation Service Learning program. This initiative encourages VMware colleagues to donate time and intellectual talent to nonprofit organizations to shrink the technology divide and enable those nonprofits to stay focused on capacity building.

One example of these efforts is VMinclusion Taara, a program aimed at upskilling women who want to rebuild their careers and return to the technology industry after a career break. To date, the program has helped more than 15,000 women in India.

Another example is the Good Gigs Discover and Design projects for Child Advocates of Silicon Valley (CASV). Over the past year, VMware IT teams worked with CASV to modernize the day-to-day management of their Court Appointed Special Advocate (CASA) and Guardian Ad Litem (GAL) agencies system that includes intake and caseload tracking of volunteers. This work is part of a phased, structured Good Gigs process, with the goal of taking a customer-centric approach aimed at developing sustainable solutions that meet nonprofits' needs. CASV's goal is to streamline work processes to make them as efficient as possible. That efficiency, in turn, can help maximize every dollar donated to the organization, ensuring a gratifying return on investment for all.

In Computerworld's "The 100 Best Places to Work in IT 2019" survey, VMware ranked 4th in the benefits category and 12th in the large organization category.¹

Focusing on our talent

VMware's success would not be possible without a focus on our employees, from entry-level roles on up. We offer competitive benefits, a generous time-off policy and a beautiful campus work environment. We also encourage colleagues to participate in community service activities of their choosing, and we provide 40 paid hours for volunteer work. In Computerworld's "The 100 Best Places to Work in IT 2019" survey, we ranked 4th in the benefits category and 12th in the large organization category.¹

VMware was also recognized for diversity and inclusion, being named on the Forbes "Best Employers for Diversity 2019" list.²

To build our team, VMware IT undertakes robust intern and new college graduate recruiting efforts in key sites, including Palo Alto, Denver, Austin and Atlanta in the U.S.; Bangalore and Chennai in India; Sofia in Bulgaria; and Heredia in Costa Rica. We also have a culture of reverse mentoring, where the more tenured IT staff take the time to hear and learn from early-career colleagues.

Unlike many other IT organizations, we do not depend heavily on outsourcing to third parties. Instead, we've found success when our teams control the work output. The outcome? Happy employees that deliver quality work.

Our workforce attrition rates are below company and industry benchmarks. Why? We enable our staff to undertake cutting-edge projects, and we empower them to do great things. We give them access to VMware products as well as a variety of other industry-leading technologies. We don't believe in the concept of bimodal IT, where some teams develop new projects while others continue with old, routine work. Instead, everyone can focus on building a modern IT environment. We have an unwavering focus on innovation with a collaborative mindset and passionate people.

1. Computerworld. "Best Places to Work in IT 2019." Julia King, Computerworld staff and contributors. June 17, 2019. <https://www.computerworld.com/article/3400380/best-places-to-work-in-it-2019.html?page=2>

2. Forbes. "The Best Employers For Diversity 2019." Vicky Valet. January 15, 2019. <https://www.forbes.com/lists/best-employers-diversity/#833609064686>

ACCOLADES



#3 Best Place to
Work in India
Indeed, 2019



#10 The Just 100
Forbes/Just Capital, 2020

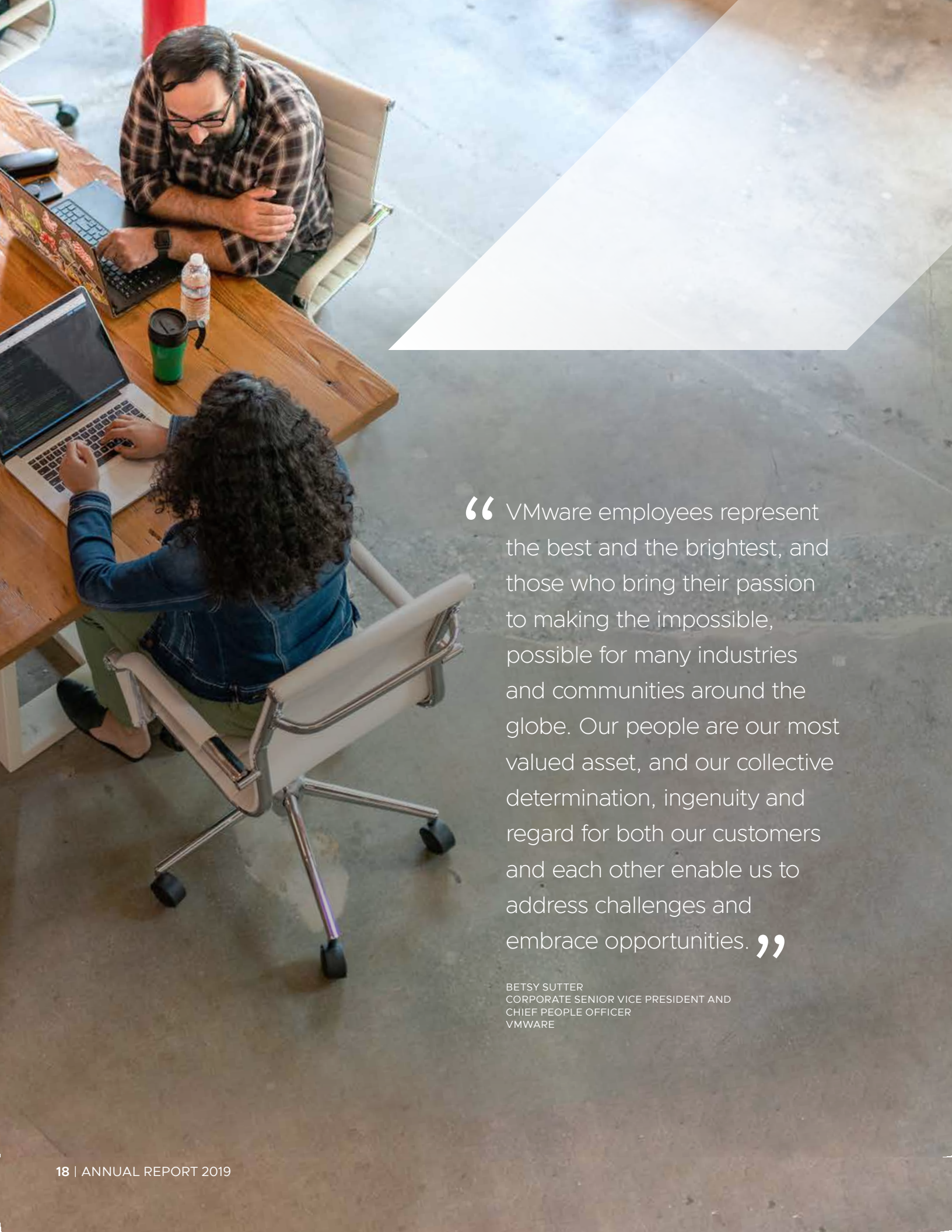


Named as a
Best Place to Work
Glassdoor, 2020



Named as a Best
Employer for Diversity
Forbes, 2019





“ VMware employees represent the best and the brightest, and those who bring their passion to making the impossible, possible for many industries and communities around the globe. Our people are our most valued asset, and our collective determination, ingenuity and regard for both our customers and each other enable us to address challenges and embrace opportunities. ”

BETSY SUTTER
CORPORATE SENIOR VICE PRESIDENT AND
CHIEF PEOPLE OFFICER
VMWARE



CAPITALIZING ON A
DEVOPS APPROACH

300 percent
increase in code check-in

Creating an Agile Enterprise Through App Modernization

How are we transforming our business at VMware? App modernization plays a central role in enabling us to become a more agile enterprise—one ready to accommodate marketplace changes and shifting demands from customers, partners and colleagues.

At VMware, we bring together developers and IT operations, adopting a DevOps approach along with agile development to accelerate app modernization and deliver the apps our colleagues need to be productive and successful. We're also employing new technologies to speed our journey to cloud native applications and ecosystems. At the same time, we're enhancing security efforts to safeguard data even as we deploy new cloud services and acquire new companies. And we're improving enterprise resiliency to help ensure colleagues and partners can stay productive under all circumstances.

As part of VMware's SaaS transformation, VMware IT has been making changes to improve our service availability, delivery agility and cost model. We recently merged part of our quality engineering team and our support team (L2) with our technical development team. This ensures our IT delivery teams have end-to-end accountability for what is delivered to our stakeholders.

Transforming how VMware works with a DevOps approach

Across the IT industry, many enterprises are integrating individually siloed development and operations teams into a single, cohesive organization that embraces the DevOps culture. But this type of dramatic change is challenging. To successfully create a DevOps culture, organizations must change their tooling and processes as well as their colleague mindsets. The right leadership and culture are vital to achieving these changes.

At VMware, our shift to a DevOps approach involved feature-based delivery, deploy-when-ready and production-ready-code-anytime initiatives. Combined with an agile development methodology, the DevOps approach enabled our teams to reimagine what's possible in a cloud-based enterprise.

Today, we have greater focus on resolving incidents with code. We have heavily automated Day 0 and Day 2 activities, and we increased code check-in by 300 percent. Most importantly, our culture is changing. The DevOps approach empowers our teams to face the trends and challenges of tomorrow in a more dynamic and responsive way.

Accelerating the journey to cloud native ecosystems with containers and Pivotal

To meet the increasing demands of our global business, VMware is on an aggressive journey to optimize our cloud native deployments, such as Kubernetes and container microservices. Cloud native storage (CNS) running on VMware vSAN is a key aspect of the integration because it accelerates the adoption of cloud native applications. These technologies help VMware deliver new features faster, resulting in an ever-improving experience for VMware customers.

VMware IT leverages the VMware Passport app for seamless physical authentication and door unlock.

VMware vSphere CNS on vSAN offers a host of benefits. For example, it provides application containers with on-demand persistent volumes that increase productivity, thanks to dynamic volume provisioning for the continuous integration/continuous delivery (CI/CD) pipeline. It also significantly reduces latency due to the hyperconverged infrastructure (HCI). CNS on vSAN also offers seamless integration with native monitoring and alert systems, such as Wavefront® by VMware, VMware vRealize Operations Manager™ and vRealize Log Insight. Overall, running CNS on vSAN has made our ongoing journey to cloud native ecosystems faster and more efficient.

We are also in the process of moving various applications to the Kubernetes platform. Part of this migration includes refactoring applications to be cloud native and upgrading them to run on an updated tech stack for improved stability and performance. Kubernetes helps us make our applications highly available and scalable across multiple data centers.

Pivotal Software, acquired by VMware in 2019, is integral to these operations. We use GemFire, Pivotal's de facto caching product, for the My VMware portal and other applications to enable high-speed data caching and deliver near-zero wait times for VMware customers using the My VMware portal. VMware IT uses a message broker for all our critical applications, as well as those from third-party cloud service providers. Its simple and reliable architecture helps us achieve the desired application goals with ease.

Pivotal Cloud Foundry (PCF) has become the platform of choice for the stateless applications we deploy. It lets us quickly create databases and application instances that can be used by those stateless applications. This platform, managed by PCF BOSH, offers high stability and availability. There are dedicated PCF instances located in two geo-dispersed data centers. Those instances provide IT teams with the flexibility to conduct thorough platform maintenance without affecting the service availability or the experience for VMware customers using the My VMware portal.

PCF underlies numerous mission-critical components of our IT ecosystem. The SaaS billing platform, deployed on PCF, helped us modernize the app stack with microservices. Teams were able to seamlessly migrate the My VMware portal to a cloud native state, as well as provide a platform for Skyline. Additionally, our content delivery is tied to Pivotal Container Service (PKS), we leverage VMware NSX Advanced Load Balancer™ and we employ Bitnami containers to secure pre-build images—a crucial aspect of container infrastructure.

Increasing operational efficiency with smart OT and IoT solutions

As our digital transformation progresses at VMware, operational technology (OT) and IoT technologies are taking more prominent roles. We envision several key use cases for OT/IoT. For example, we deployed the internally developed VMware Passport™ app through Workspace ONE to improve the colleague experience with seamless physical authentication and door unlock. We're also enhancing building efficiency and improving space utilization (including conference rooms and offices) by using occupancy sensors and advanced analytics. And we're capitalizing on an intelligent facilities surveillance solution to improve security, cost efficiency and scalability.



VMware IT
approaches security
from a holistic,
360-degree
point of view.

To help bring these use cases to life, we established an enterprise OT/IoT forum to eliminate silos and drive better alignment across key OT groups, such as Real Estate and Workplace (REW), Physical Security and Sustainability. We're also integrating OT and IT by enabling OT teams to leverage existing IT processes for enterprise architecture, privacy, security and vendor management, so teams can execute faster while reducing business risk. Finally, we're kicking off an enterprise implementation of VMware Pulse™ IoT Center™—a secure, enterprise-grade edge infrastructure and IoT device management solution that will enable lifecycle management of all IoT devices across the company.

Keeping everything safe everywhere—with cloud and SaaS security

As we continue to implement more cloud resources and SaaS applications, security has become more of a mission-critical issue than ever before. That's why VMware IT approaches security from a holistic, 360-degree point of view. Our security initiatives touch on code, IT services (such as laptop and device delivery), infrastructure operations and our externally facing services. We also focus efforts on security attestations that help ensure third-party solutions are always compliant with applicable security rules and regulations.

Our security work grows in step with the company's consumption of cloud resources. In the past year, our security efforts expanded 50 percent to address the 50 cloud services and 33 live cloud services we deployed or will deploy soon. These security efforts cover a wide range of VMware business initiatives, including CloudOps, DevOps, edge and telco, end-user computing (EUC), hybrid cloud, support and other functions. And they create a solid and secure foundation that will enable future products and services to become part of the VMware ecosystem seamlessly while effectively managing risk.

Pushing physical security into a new era

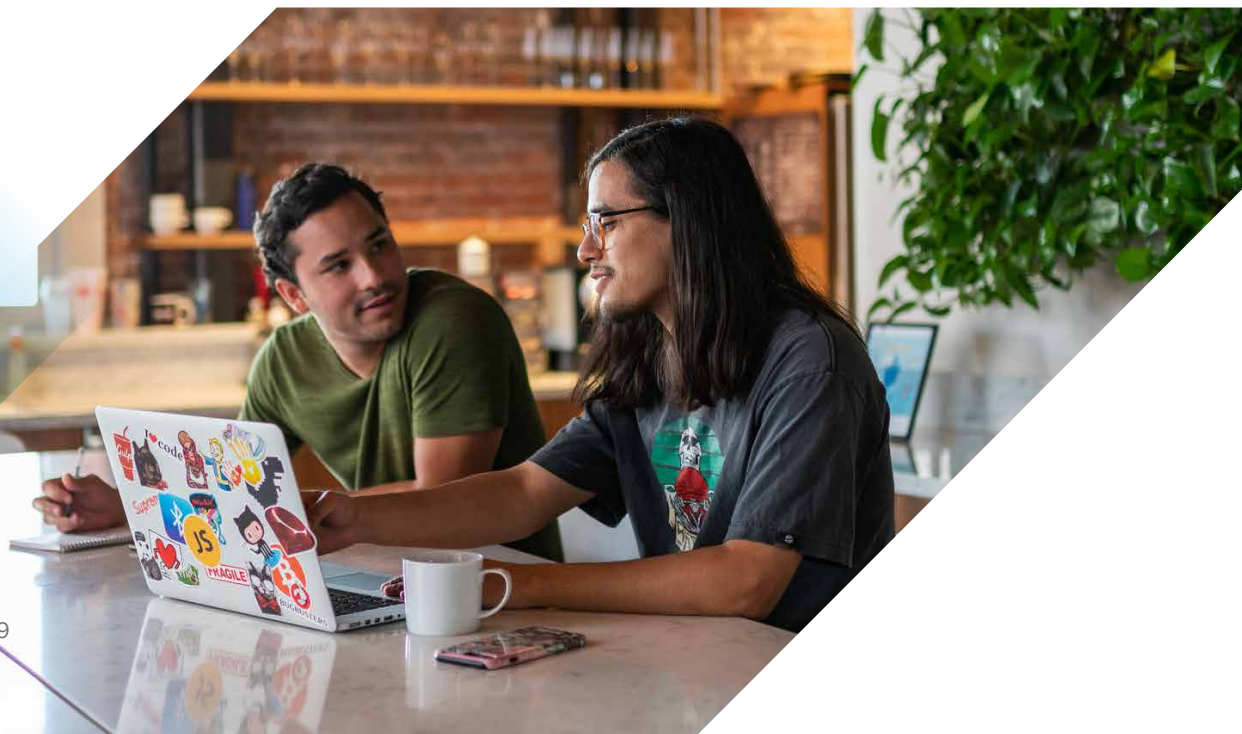
The VMware Physical Security team is going digital. The video surveillance industry has resisted moving to a serial digital interface model because of two primary challenges: camera-to-server bandwidth consumption and the high cost of storage requirements. Our implementation of *Project Dimension* will address those challenges.

The key is our Dell EMC and VMware partnership. Through this partnership, we're able to keep bandwidth local and store data on a Tier 2 cloud solution, all while deploying computing and other resources at the edge. As a result, we can bring the benefits of a serial digital interface to the video surveillance world without bandwidth issues and high storage costs. Serial digital interface benefits include centralized management, virtual hardware scalability, load balancing, auto scaling, virtual graphics processing units (vGPUs), virtual segmentation and change management agility. Combined with an on-premises local hardware deployment, VMware serial digital interface solutions are ushering in a new era of security and flexibility. Test deployments of drones and robots (to enhance security of our campuses and events) are also in the works.

Staying productive under any condition with the Enterprise Resiliency program

In an increasingly complex and interconnected world, being resilient is paramount. Our Enterprise Resiliency (ER) program—which incorporates people, processes and technologies—has two interrelated goals: Ensuring VMware is prepared to cope with major operational disruptions, and integrating that resilience into our DNA to sustain resiliency going forward. By employing systematic processes that support continuous improvement, the ER program brings together the company's business continuity (BC), disaster recovery (DR), physical emergency response and enterprise crisis management programs under a common governance framework.

We established several initiatives as part of the ER program, and we're equipping colleagues, leaders and managers with tools and resources such as mobile-friendly resiliency action plans to support their teams during disruptive events and emergencies. We also conduct periodic exercises and drills with various groups, including our executive staff, to review their plans and preparedness. Finally, we partner with site leaders around the globe and special event teams to integrate resiliency into their site operations and major events.





“VMware IT has been key to our transformation in container-based app development, the hybrid and multi-cloud journey, digital workspace for employees and our transformation as a security provider. When customers ask me for a role model for digital transformation, I am proud to point them to VMware IT.”

SANJAY POONEN
CHIEF OPERATING OFFICER, CUSTOMER OPERATIONS
VMWARE



Building on an Infrastructure Primed for Transformation

Digital transformation requires a strong—but flexible—infrastructure. The infrastructure must be stable and reliable enough to deliver mission-critical services without fail. At the same time, it must accommodate shifting expectations from colleagues and evolving requirements from business groups.

Realizing the multi-benefits of a multi-cloud strategy

Like many organizations, VMware today operates in a multi-cloud world. Employing a multi-cloud strategy ideally positions VMware to support growth and capitalize on future opportunities by maximizing the benefits of both private and public clouds. Private clouds provide highly reliable, low-cost, secure environments for the majority of the company's workloads. Meanwhile, public clouds—including Amazon Web Services (AWS), Microsoft Azure and Google Cloud Platform—enable us to instantly burst to meet huge spikes and seasonal demands, such as with an acquisition or a major event like VMworld.

The multi-cloud strategy directly benefits colleagues and contractors. We can deliver a consistent user experience regardless of device, app or work location. The multi-cloud strategy also enables IT to perform upgrades, patches and other maintenance behind the scenes without requiring users to restart their devices or wait until fixes are deployed. DR processes are similarly seamless for users: Even under the worst-case scenario, colleagues enjoy an uninterrupted experience as workloads smoothly transfer from one cloud to another in the background.

Bringing branch offices into the cloud era with SD-WAN

VMware colleagues across the globe increasingly depend on the multiple clouds we use for an array of cloud-based voice and data services. But connecting global offices is no easy task. VMware IT found that legacy wide-area network (WAN) architectures could not keep up with the rising traffic load. After evaluating a variety of ways to achieve the required level of connectivity, we homed in on software-defined WAN (SD-WAN)—a technology designed specifically for supporting cloud applications and similar resources.

We rolled out VMware SD-WAN across multiple geo-dispersed sites in North America; South America; Europe/Middle East/Africa (EMEA); and Asia-Pacific (APAC). The solution has improved upload/download speeds, eliminated brownouts, removed multiprotocol label switching (MPLS) single points of failure, significantly reduced OpEx costs and substantially reduced packet loss. VMware SD-WAN helps eliminate the need for CapEx spending and avoid individual site-by-site management. At one site, we were able to decommission expensive MPLS altogether. Today, remote offices are able to take full advantage of everything our public and private clouds offer.



ACHIEVING TANGIBLE RESULTS

30 percent

reduction in IT public cloud compute costs using CloudHealth

3 months
to 2 weeks

acceleration of Horizon deployment using VMware Cloud on AWS—while avoiding CapEx and gaining the ability to reduce OpEx after one year

3x

less expensive to use internet circuits with VMware SD-WAN compared with MPLS circuits, which can be decommissioned

>8 percent

reduction in IT cost per VMware colleague

\$12K

Total IT spend per colleague

Improving enterprise app delivery with the NSX Advanced Load Balancer

As consumption of cloud-based apps rises, VMware IT continuously looks for ways to deliver a consistent, responsive user experience. In 2019, VMware acquired Avi Networks, a company known for software that seamlessly delivers enterprise applications from data centers and clouds. Using NSX Advanced Load Balancer, VMware can offer a full set of networking capabilities through software—spanning data centers, WANs, branches and the edge—while providing common management and intelligence, on premises and in the cloud.

We started our own NSX Advanced Load Balancer global rollout soon after the acquisition. We have replaced our existing legacy load balancers in a private cloud and deployed NSX Advanced Load Balancer in a public cloud (VMware Cloud™ on AWS) to load balance VMware Horizon 7, vmworld.com and the VMware authentication platform. Our team is currently working on deploying the technology for load balancing containers through PKS.

Regaining control and optimizing public cloud spending with CloudHealth

Public cloud services make it very easy to sign up and consume resources—so easy that many people don't think about the potential costs. CloudHealth, acquired by VMware in late 2018, delivers unprecedented control and remarkable insight into cloud spending across AWS, Azure, Google Cloud Platform and other cloud environments. CloudHealth has a proven track record, managing more than USD \$8 billion in total cloud spend across several vendors. When we decided to employ CloudHealth at VMware, we knew its technology leadership made it the ideal cloud management choice for our operations.

After deploying CloudHealth, our team significantly reduced VMware's overall cloud resource waste and optimized spend—all through push-button subscription management. Overall, our CloudHealth effort reduced VMware IT's public cloud compute costs by more than 30 percent. By providing data insights, CloudHealth helped us stabilize our public cloud spend growth and brought new levels of predictability to budgeting.

Getting it right every time with the Production Readiness Program

As VMware continues its journey to becoming a true SaaS company, we constantly develop new services. But we need to meet all requirements for a service before that service sees the light of day. We created the Production Readiness Program (PRP) to address that goal.

The PRP strives for continuous improvement. We aim to improve the service before it goes into production, optimize the service during its lifetime and enhance the service before any major updates. The program focuses on ensuring resiliency, reliability and performance; tightening security; and meeting—or exceeding—service-level agreement/service-level objective (SLA/SLO) targets.

Thanks to the Production Readiness Assessment (PRA) component of PRP, we can generate solid metrics to measure readiness. PRA quantifies improvement by producing a service maturity score, providing a key performance indicator (KPI) rating for the service dashboard, and highlighting three to five areas the service should work to improve next.

The Building and Operating SaaS (BOSS) program—part of PRP—combines curated information about key internal processes (legal, business and so on) with best practices for development areas, such as security, performance, compliance and cost analysis. The goal is to significantly reduce the incidence of post-development and production problems.

Expanding the security footprint with an NSX service-defined firewall

VMware IT was using NSX Data Center for vSphere micro-segmentation capabilities to provide robust security for individual workloads in private clouds. But to enable a zero-trust network for protecting workloads in multi-cloud environments, the VMware IT team decided to migrate to VMware NSX-T™. The NSX-T network solution offers public cloud support, container support, VMware vCenter® independence and other features not available in NSX Data Center for vSphere.

The VMware IT team conducted a PoC for securing workloads running in the VMware Cloud on AWS public cloud. We then used NSX-T to complete micro-segmentation for 12 applications. In the future, we plan to use NSX-T for micro-segmenting all our production apps.

We also used NSX technology to address another challenge. The proliferation of cloud native applications in the enterprise made it difficult to secure virtual workloads deployed on Horizon 7 virtual desktops in public clouds. Realizing the gravity of the situation, we developed the VMware NSX Cloud™ solution—an extension of NSX Data Center technology—to secure Azure workloads. NSX Cloud provides a more robust security posture for cloud-hosted virtual desktop environments in Azure. Meanwhile, we use NSX-T to secure VMware Cloud on AWS.

All these efforts enabled us to expand the overall security footprint of both perimeter and landscape ecosystems. Today, we offer the same strict and enforceable security measures found in highly secure private cloud environments.





At VMworld 2019 US,
more than 14,000
Hands-on Labs were
delivered in five
days—
a 22 percent
increase over 2018.

Strengthening resiliency in hybrid cloud environments with VMware Cloud on AWS

Since its deployment, the public VMware Cloud on AWS solution has become an integral part of our DR strategy. It provides a unified and operationally consistent experience regardless of a workload's location (on premises or in public or private clouds).

With VMware Cloud on AWS, teams can shift from a CapEx spending model to more cost-effective, on-demand OpEx spending. As a result, those teams can instantaneously expand and contract resources as spikes or seasonal workloads dictate—an especially important capability because we often require temporary capacity for on-the-fly acquisitions. With only a one-year OpEx commitment, we can serve desktops without acquiring expensive hardware that would be unnecessary in the long term.

We've applied our DR cloud strategy to vmworld.com as well as to Jira, SAP and Horizon desktops. For protecting Jira—a software development tool used to plan, track and release software—we moved the Jira DR instance from a data center hosting a private cloud to VMware Cloud on AWS. Now if a problem arises, everything Jira in the on-premises private cloud gets replicated in the public cloud.

We also used our DR cloud strategy for the Hybris Billing and Revenue Innovation Management (BRIM) system—a mission-critical system running on SAP HANA that manages subscription (SaaS) orders. We deployed the DR solution with VMware Cloud on AWS in just two weeks and achieved a recovery time objective (RTO) of less than 40 minutes—an important metric in DR.

We employed a similar DR strategy with our Horizon desktops. VMware Cloud on AWS enables our IT teams to deliver desktops to a wide range of colleagues with minimal IT overhead. It also allows our teams to achieve important DR goals, including remarkably quick failovers to unaffected locations. As a result, colleagues have an uninterrupted experience under any and all conditions.

VMware on VMware at VMworld: Sharing our experiences with the world

The VMware on VMware presence at both VMworld US and VMworld Europe proved a resounding success for our IT teams and the customers we met. We shared our experiences using VMware products in our environments, discussed thought-leadership topics and best practices, and heard about customer challenges and successes. The sessions covered some of today's hottest IT issues, including security, automation, the changing role of VDI administrators and Day 2 operations.

VMware Hands-on Labs: The ultimate test-drive

VMware Hands-on Labs enable customers to test-drive full working versions of VMware technologies without having to purchase equipment, software or licenses—just like test-driving a car at the dealership. Not surprisingly, Hands-on Labs are immensely popular. At VMworld 2019 US, more than 14,000 labs were delivered in five days—a 22 percent increase over 2018.

Behind the scenes, the Hands-on Labs required three geo-dispersed private clouds and two public clouds (VMware Cloud on AWS and IBM Cloud) in active/active mode. Using those clouds enabled all labs to be available to all participants at all times—no waiting, ever. The entire endeavor was made possible thanks to the highly scalable hybrid cloud architecture combined with state-of-the-art monitoring tools such as Wavefront, vRealize Operations and vRealize Network Insight™.

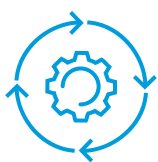


VMware IT looks forward

In FY21, VMware will continue our digital journey toward building a company culture infused with digital DNA—becoming more digital in the right areas to improve our ease of doing business with, and getting things done inside, VMware. To help us organize, operate and behave in ways that support our transformation, we will focus on:



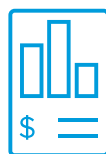
Enhancing our security and resiliency posture to reduce risk and enable growth



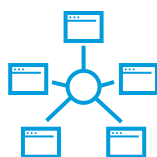
Showcasing how VMware IT uses our own products to accelerate bookings, promote thought leadership, partner with R&D and arm the sales force for success in the field



Integrating acquisitions successfully



Continuing to optimize our VMware IT investments and processes



Leading the transformation to a VMware digital DNA culture that improves our ease of doing business with VMware and ease of getting things done inside VMware



Attracting and retaining the best talent



Increasing colleague productivity, and improving colleague experience and satisfaction

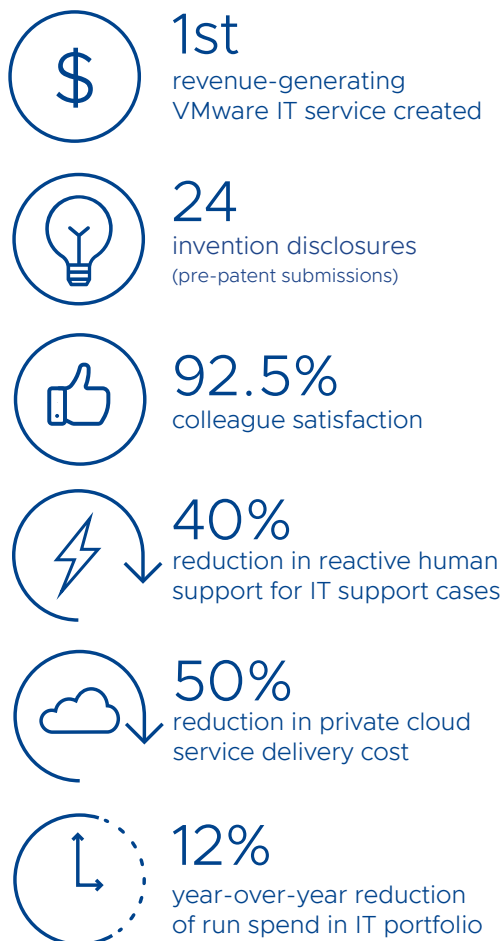


Extending our cloud leadership with improvements in our private cloud and with third-party cloud providers

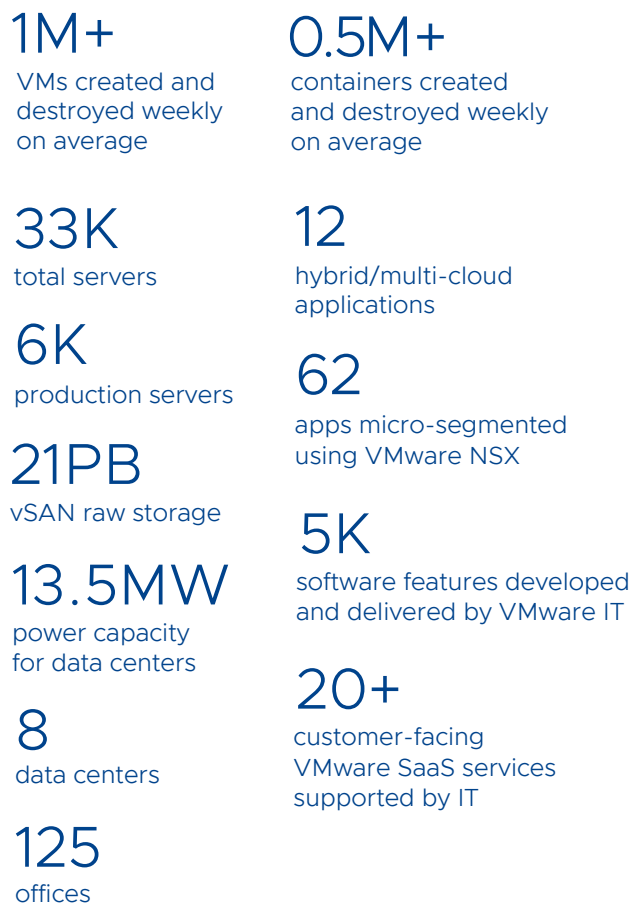
VMware IT

Transforming Business Through IT Innovation

IT ACHIEVEMENTS AT A GLANCE

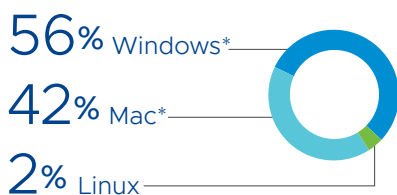


IT-MANAGED ENVIRONMENT

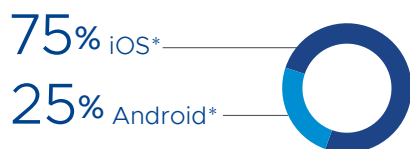


PRIMARY DESKTOP OS DISTRIBUTION

*Managed by VMware Workspace ONE



MOBILE OS DISTRIBUTION



Contact Us

To learn more about the work we're doing in VMware IT, reach out to us at vmwonvmw@vmware.com or through these social media channels:

VMware on VMware [Website](#)

VMware on VMware [Blogs](#)

VMware on VMware [YouTube](#)

VMware on VMware Twitter [@vmwonvmw](#)



VMware, Inc. 3401 Hillview Avenue Palo Alto CA 94304 USA Tel 877-486-9273 Fax 650-427-5001 vmware.com Copyright © 2020 VMware, Inc.
All rights reserved. This product is protected by U.S. and international copyright and intellectual property laws. VMware products are covered by one or more patents listed at vmware.com/go/patents. VMware is a registered trademark or trademark of VMware, Inc. and its subsidiaries in the United States and other jurisdictions. All other marks and names mentioned herein may be trademarks of their respective companies. Item No: 313758aq-bro-cio-annual-report-uslet 1/20