Elevate the Customer Experience and Adapt to Changing Requirements
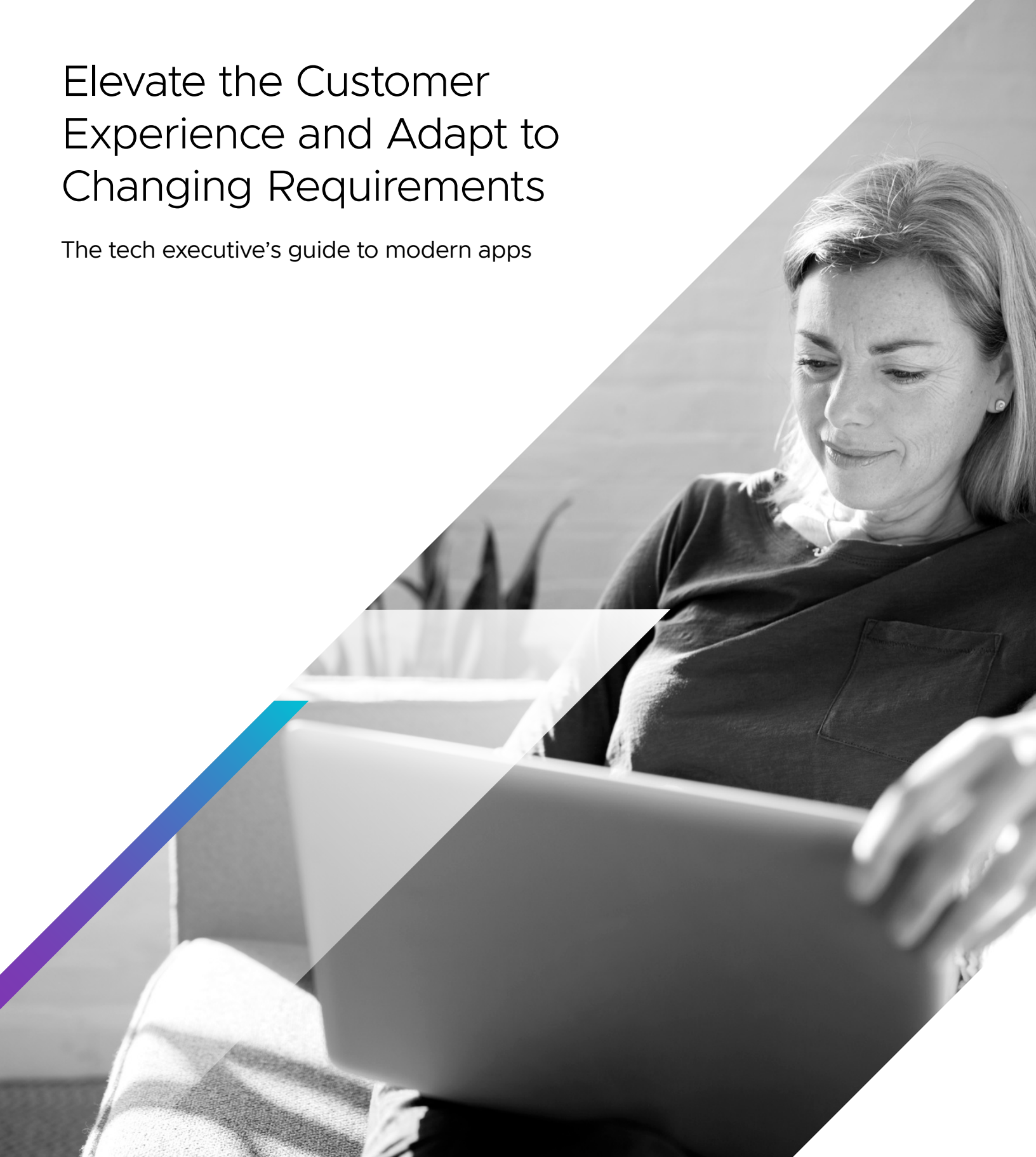
The tech executive's guide to modern apps
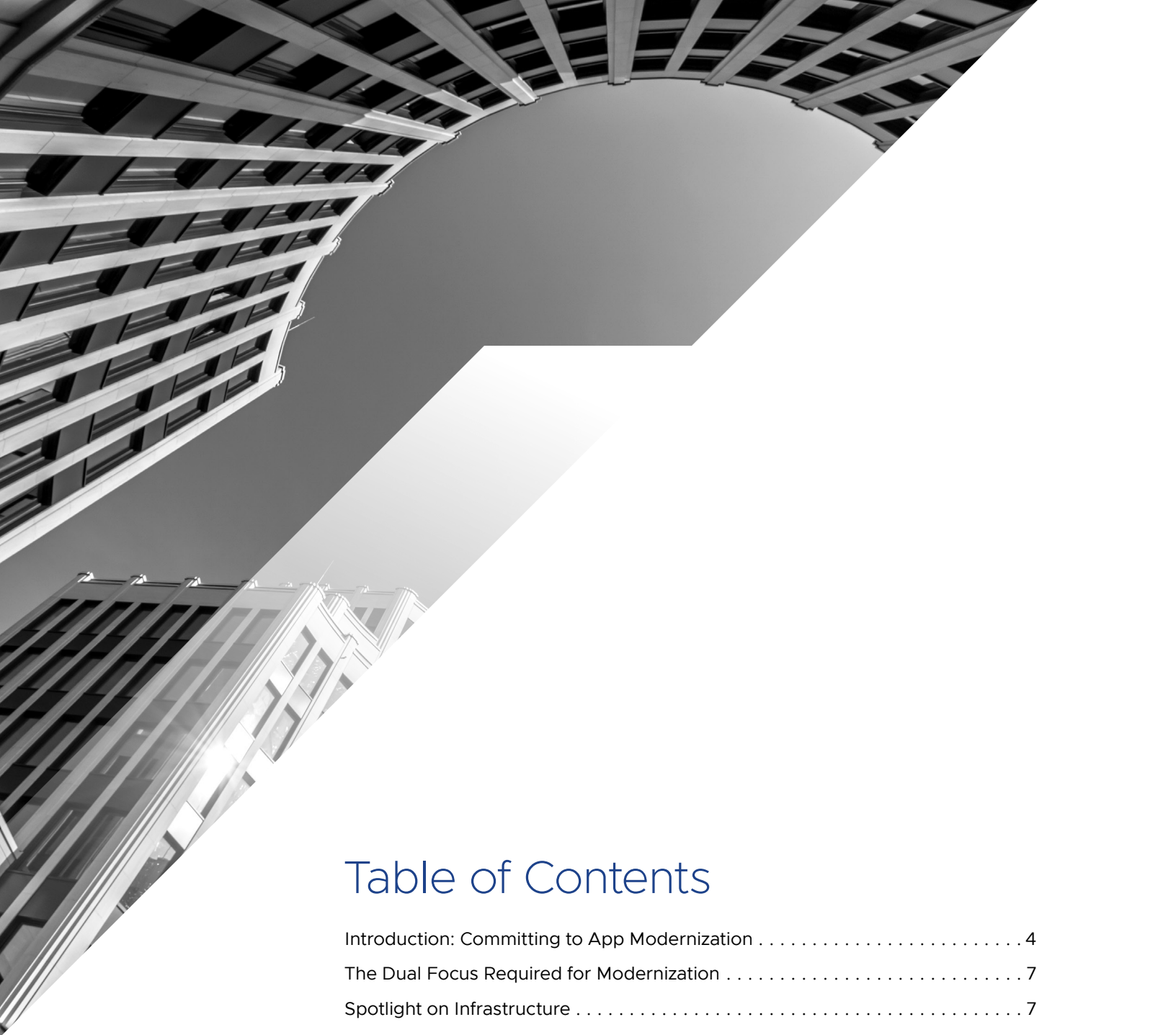
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Executive Summary

Technology leaders are responsible for determining which technologies will deliver the most value for the business—and how to prioritize IT investments when multiple areas need an upgrade or overhaul. In the midst of unprecedented change, the IT foundation powering the enterprise must be flexible, agile, and available—anytime, anywhere and on any device. Delivering upon this ideal means building and managing an IT infrastructure and application portfolio primed for continuous transformation and innovation.

Introduction: Committing to App Modernization

NOTEWORTHY RESEARCH
Now, more than ever, customer experience is everything. Read on for global insights into how 600 IT executives are charting the course for modern, cloud-native apps and services in support of better customer and end-user experiences.

Read the Forrester Consulting report

TERMINOLOGY

App modernization refers to the process of improving an existing piece of software, often (but not always) with goals of running the software in the cloud and leveraging APIs and microservices architecture.

Modern app refers to the improved piece of software, the result of the modernization process, or a newly developed application. The term "modern" implies that the software is cloud-friendly (if not cloud-native).

Great customer experience (CX) is now considered critical currency and, for IT leaders, improving an application that compromises CX is one of the most powerful demonstrations of value they can make to the business. Often, these improvements correlate with today's definition of a modern application; that is, modern software that is compatible across any environment (multi-cloud, hybrid cloud, on-premises, edge), highly scalable, and based on distributed application architecture and modern development, deployment, and management practices.

In November 2019, VMware commissioned Forrester Consulting to survey more than 600 global enterprise CIOs and senior vice presidents (SVP) of IT to find out how enterprises are adopting modern application architecture and technologies to support business objectives. The *study* found that improving their application portfolio is a top priority for more than 75% of the respondents, with nine out of ten agreeing that improving the application portfolio improves customer experience, which they overwhelmingly viewed as directly tied to revenue growth.[1]

There are several reasons enterprises are modernizing their app portfolios. At its core, application modernization minimizes the time it takes to move from idea to production-ready code and alleviates the inefficiencies inherent in managing and maintaining inflexible legacy applications and infrastructure. These outcomes can begin to reduce decades-long technical debt while enabling businesses to build and iterate products and features as the market dictates—resulting in better user experience and new sources of revenue.

The direct connection between the application portfolio and business outcomes will be even more critical in the coming months and quarters as enterprise IT budgets are reduced and technology investments are aimed at reducing inefficiencies and cost.

Cloud-native principles, containers, Kubernetes, and microservices are opening new opportunities, but also creating gaps between where enterprises are today and where they want to be. Closing this gap is critical, yet it will take work, including new technologies, skill sets, operating models, and organizational structures. To begin, senior tech leaders must reduce organizational dependence on complex, brittle, and inflexible app environments by prioritizing infrastructure consolidation, standardization, and automation with an aggressive cloud migration strategy.

A 2020 Management Insight Technologies survey on the state of applications and hybrid cloud computing commissioned by VMware found that:

76%
of CIOs are committed to hybrid cloud as a long-term strategy.[2]

72%
of businesses are focused on building a path forward for their existing applications—including modernizing and refactoring for cloud-native architecture and leveraging cloud services to develop hybrid applications.[2]

73%
of businesses plan to containerize existing applications, and 41 percent plan to build most or all new apps as containerized apps.[2]

CIOs are advancing the foundational work (i.e., updating on-premises infrastructure to support hybrid and multi-cloud operations) required to modernize their existing application portfolios and pave way for new opportunities.

While the majority of enterprises are setting their digital foundations up to support modern ways of building, running, and managing applications, the reality is that 48% of executives haven't updated their application portfolios in a year or more.[1] The reasons for this aren't unique: IT organizations are saddled by technical debt and their environments are too rigid and complex to support rapid iteration. For many, the risk to the business combined with the cost to modernize mission-critical legacy systems is too high. As a result, more than half of enterprises are not innovating at the speed demanded by their markets.[1]

Top 3 Priorities for Application Portfolios[2]

72%	44%	42%
Application transformation	Cloud migration	Cloud app development
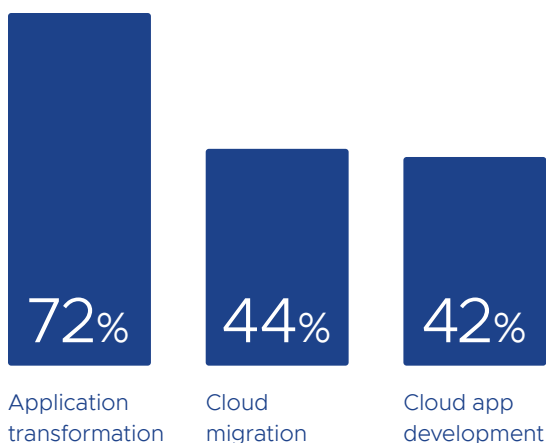
"It's not surprising that CIO tenures are short—averaging 4.3 years—because too much human capital is still being spent maintaining existing systems," says Ian Andrews, vice president of marketing for VMware Tanzu, a family of products and services for building, running, and managing modern apps on any cloud. "An impactful goal for today's CIOs is to focus on reducing spend on their current estates and making innovation cost less. That's where app modernization comes in. Modernization drives down the cost of all projects."

" All corporate strategies these days have technology as a core factor. Technology is no longer considered a cost center. It is considered a revenue center, so technology leaders are now at the epicenter and the core of corporate strategy. "

VEENA DANDAPANI
GLOBAL HEAD OF TECHNOLOGY TRANSFORMATION, WESTERN UNION

The Dual Focus Required for Modernization

To be fair, few CIOs today have the infrastructure and tooling to develop and deliver modern applications. Many set up their infrastructures for software development before cloud and continuous integration/continuous delivery (CI/CD) platforms existed. And organizational structures are still largely siloed, with application developers and infrastructure operators on complementary, yet seemingly divergent paths.

Regardless, "seeking to show greater return on the application development budget they've been entrusted to manage has to be a higher CIO priority or lines of business will increasingly encroach on that ownership," explains Andrews. "IT leaders should not be afraid to make their technology teams more relevant and key to the success of the business."

For CIOs wrestling with how to catch up to the new normal of high-velocity enterprise application development and delivery, there are two equally important decisions to make:

1. How to transform IT infrastructure to be modern—yet reliable and scalable— to meet a growing portfolio of new and existing applications
2. How to best support developers—with a focus on user experience and productivity—to accelerate creation of next-generation applications

Consider the journey to application modernization to be twofold—each equally critical and intertwined. To achieve business objectives, CIOs must support the needs of developers creating the next generation of cloud-native applications as much as they enhance the on-premises and hybrid cloud infrastructure on which the applications and workloads are run and managed.

Spotlight on Infrastructure

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 requirements as the business dictates. Modern on-premises infrastructure supports modern, cloud-native applications and modern hybrid and multi-cloud operations simultaneously, enabling organizations to capitalize on future opportunities by maximizing the benefits of both private and public clouds. As IT leaders plan to host more than half (52 percent) of their applications in the data center,[2] they are prioritizing virtualization beyond compute, automating more core processes, and adding cloud-like capabilities to their on-premises environments. The symbiotic relationship between on-premises infrastructure and modern application architecture cannot be overlooked.

Focusing on Developer Needs and Organizational Processes

At the same time, IT leaders have to make cultural change—people, process, and teams—part of the greater modern apps conversation. Modernizing, optimizing, innovating, and simplifying the app portfolio requires focus and dedication. Otherwise, cultural and organizational barriers can stymie or even stop digital transformation efforts.

Kit Colbert, vice president and chief technology officer (CTO) of the cloud platform business unit at VMware, stresses the importance of a comprehensive initiative. "Yes, the technical foundation—the application infrastructure—must evolve to support modern apps. But more importantly, people and process have to evolve and change."

CIOs should focus on creating a modern "software supply chain" that includes off-the-shelf components for developers, such as databases, messaging software, and security capabilities. Strive to automate all manual activities, enabling visibility across the whole stack, and use analytics to make data-driven decisions. In this way, IT leaders can shorten the path to product.

Top Three Barriers to App Innovation[1]

| Lack of skills with modern development platforms | Securing funding | High technical debt |

Most important, senior tech executives should look at ways to reorganize their development and operations teams. A popular way to evolve is by adopting the Agile software development methodology, centered around the concept of iterative development where requirements and solutions change through collaboration between self-organizing, cross-functional teams and the users they serve. Agile helps teams develop apps faster, meet users' needs more precisely, and experience fewer errors. A full 82 percent of CIOs recently surveyed ranked implementing an Agile software development methodology "very" or "extremely" important to their companies.[1]

Across industries, enterprises are also integrating individually siloed development and operations teams into a single, cohesive organization that embraces DevOps culture. This type of dramatic change is challenging, as organizations must change their tooling and processes as well as their colleague mindsets. The DevOps approach, however, empowers teams to adapt to new opportunities and challenges in a more dynamic and responsive way. Three-fourths of CIOs say that putting DevOps in place is "very" or "extremely" important to them.[1]
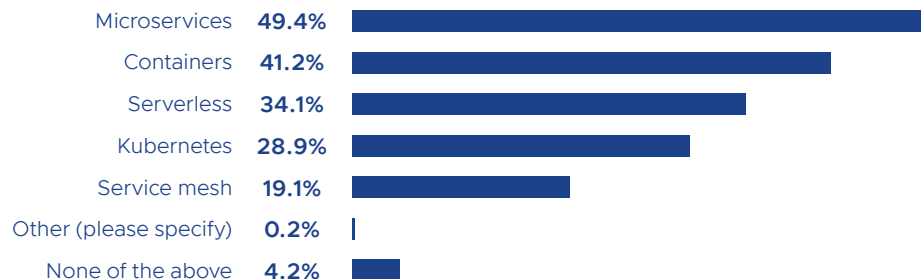
Technology: Microservices, Containers, and the Kubernetes Ecosystem

While the real goal of app modernization is (and should be) the ability to quickly change code for business opportunities and security purposes, modernization often manifests as going from monoliths to microservices. Why are microservices useful for app modernization? Microservices, or any way of decoupling code, allows code to change—and fail—with less impact to the rest of the code base. According to 451 Research, microservices are the most critical cloud-native technology or methodology to DevOps implementations.[3]

The heart of the modern application movement is cloud-native, microservices architecture wherein an application is composed of smaller, more agile and deployable components, stacks, or services. Microservices aren't a technology— they're an architectural pattern—but they do favor certain technologies such as API management and containers, which are lightweight, startup quickly, and allow for consistent runtime across infrastructure. Given the complexity that microservices architecture introduces, automation of container orchestration is very useful.

Microservices aligns to DevOps and Agile development and operating models, and investing in microservices architecture will deliver more value to your modernization efforts as you're able to take advantage of containers and Kubernetes for a variety of applications.

Which cloud-native technologies and methodologies are most critical to your organization's DevOps implementation[3]

Technology	Percentage
Microservices	49.4%
Containers	41.2%
Serverless	34.1%
Kubernetes	28.9%
Service mesh	19.1%
Other (please specify)	0.2%
None of the above	4.2%

Developers identify Kubernetes as the third "most loved" platform, after Linux and Docker. Now considered a key component of modern application architecture and operations, Kubernetes should be on every CIO's to-do and to-mature list.

Learn why

While acknowledging that "lift and shift" does not yield the improvements and cost savings desired, containerizing apps can yield some quick wins. Containerizing software begins to bring many modernization advantages, such as the ability to move a workload between infrastructure and have it run in a consistent fashion. Containers improve IT and developer efficiency, and speed development and deployment to meet business needs. Nearly three out five CIOs feel an urgent need to adopt containers to improve their app portfolios.[2] By leveraging technologies like containers, executives can more rapidly deploy, patch, and scale their applications. Containerizing applications before moving them to a new platform enables operational efficiency gains without rewriting a line of code.

By a large margin, Kubernetes is the most preferred open-source container orchestration platform. Kubernetes takes a declarative approach to infrastructure, allowing a user to declare the state of container environment desired and will continuously reconcile to that desired state. As part of this approach, Kubernetes offers a consistent taxonomy for configuration and a useful degree of automation of applications and microservices.

MODERNIZING YOUR APPLICATIONS NOW

How can technology leaders quickly evolve application portfolios now to create more valuable customer and employee experiences that resonate in the future? VMware APJ CTO, Bruce Davie, discusses the complexities of modernizing apps at scale, from how to communicate business value and attract developer talent to choosing open source software and setting metrics.

Listen to podcast

Best Practices and Advice for Modernizing Your App Portfolio

To date, modernization of application portfolios has tended to prioritize the oldest or easiest platforms rather than the most valuable business capabilities. It's imperative for IT leaders to evaluate, communicate, and prioritize modernizing the apps that provide the most value to the business.

"It's important to establish why your business should modernize its app portfolio," advises Colbert. "What's the driving business need? What's the business rationale? A lot of times customers dive head-first into moving to cloud, modernizing their app portfolios, and developing cloud-native apps which can cause unnecessary complexity, churn, and cycles—without delivering much more value."

On the other end of the spectrum, "Executives must channel their vision by challenging design decisions made ten years ago. They must face the pushback that will come from all sides—from infrastructure, operations, app development, and lines of business alike."

To start transforming, executives should identify the most valuable applications to modernize and engage security and compliance stakeholders early on to address requirements and plan secure and compliant automation. It's also prudent to anticipate a steady increase in the number of different public clouds, private clouds/data centers, and edge environments in which teams build, manage, or run applications. Recent projections expect enterprise cloud environments to increase by 55 percent in the next 3 years.[1]

Starting or Scaling Enterprise Application Modernization Efforts

The beauty of modern apps is their inherent flexibility, which allows IT leaders, operators, developers, and application owners to achieve modernization strategies from several angles. The following initiatives highlight some of the various ways in which enterprises are modernizing application architecture to accelerate their app modernization efforts.

Modernize the Data Center

Removing roadblocks to modern development practices and delivery models means eliminating proprietary architectures, hardware-centric solutions, and manual operational tasks. Hyperconverged infrastructure (HCI) alleviates the burden of previously isolated infrastructure silos by bringing together virtualized compute, storage, and networking into a standardized, software-defined operating model. Why adopt hyper-converged infrastructure as part of your app modernization strategy? "Because it's not realistic to rearchitect all apps to be cloud-native," says Colbert. "When execs want to do this, they're chasing a vision instead of being more practical. Not all apps need to be in the cloud. Some may need cloud-like capabilities, which can be achieved on-premises."

While organizations expect to continue to run applications in global data centers, they're also well aware of public cloud's infinite scale, resiliency, and possibilities for innovative, on-demand developer services. To best handle modern applications and hybrid operations now and into the future, IT teams should add cloud-like capabilities to their on-premises environments that support both existing and modern workloads, including containers and Kubernetes.

Evolve Existing Applications

Growth in public cloud adoption continues, and cloud preference will continue to be hybrid for most organizations, refusing an either-or choice. A cloud market study by Management Insight Technologies, commissioned by VMware in February 2020, found that organizations prefer to modernize existing applications by integrating with public cloud services (30%).[2] This may include adding APIs so existing applications can interact with cloud-native applications, or updating a component—such as shifting a database to a cloud version (e.g., Amazon RDS) without changing the application architecture. Almost a quarter of applications (23%) will remain unchanged and in data centers, with plans for these data centers to gain new, cloud-like capabilities through modernization.[2] Only one in ten (12%) existing applications are expected to be rewritten for a cloud-native architecture.[2]

Develop New, Cloud-Native Apps

When faced with developing a net new application, the concept of a cloud-native app is designed from the very beginning to take advantage of the unique cloud services and commodity infrastructure available in a pay-per-use environment. Increasingly, those building cloud-native applications use microservices architectures, and utilize Kubernetes for container orchestration to enable scale and availability of those microservices. You should take this path for all new app development—whether deployed on-premises, in the cloud, or in a hybrid environment.

Choose a SaaS App

SaaS applications are very viable options to replace non-strategic "commodity code" and commercial off-the-shelf applications that businesses have historically purchased and hosted internally on-premises. The SaaS model reduces the burden of installing and maintaining infrastructure, middleware, and the app itself. Based on your business' core differentiator(s), your IT teams can go all-in on building those from a software perspective and consume everything else you need from elsewhere. One of the limitations of choosing this approach for productivity or other apps is if you are required by regulation or security concerns to control where data is stored. Choose SaaS apps when you don't need the app to differentiate your organization in any way from competitors, and you don't require a high degree of app customization.

Key Considerations and Next Steps

The rate of change in enterprise applications is fast. Organizations have hundreds of applications in production at any one time and many more in development pipelines. The open source community continues to churn out attractive innovations. New everything-as-a-service (XaaS) applications and services appear daily. CIOs now have an immense variety of choices for where and how to run their applications.

A pragmatic approach to modernization is essential for success. Such an approach factors in the lessons learned across people, process, and technology changes from successful modernization efforts. Avoid focusing modernization efforts on a single application, platform, or technology, and remember that code isn't the only thing that requires updates in an app modernization effort. Embrace the mindset shift to go fast to stay stable. Despite all the layers of process to avoid risk in software delivery, outages, failures, and breaches continue to occur. The assumption that checks and controls prevent outages, failures, and breaches is false as those events are inevitable. Instead, architect and operate with the assumption that failure will occur, and optimize for speed of change to make it easier to recover when it does happen.

VMware and other experts in the space also recommend that CIOs strive to reduce complexity in any of their modernization efforts, keeping these three points in mind:

1. **Focus on modernizing business capabilities versus a single application, platform or technology.**

   Modernizing business capabilities means assessing the capability end-to-end, and its life cycle and dependencies across all the applications, platforms, components, services, APIs, and data assets used to deliver the capability. Be sure to factor in the target-state technologies and teams that will be required to run this capability, process, or workload today and tomorrow. Advancing cultural change is key to accelerating business agility.

   "One of the key things for doing this right is to really rethink your entire approach to how you're solving technical problems," says Chris Wolf, vice president, Office of the CTO at VMware. "For example, looking at problems in isolation is not the right approach, because by the time you get to the solution, the requirements have already changed because the world is moving too quickly."

   "We encourage customers to think about flexibility as a design principle," explains Wolf. "That means that when designing a solution, you should be baking the expectation of change into the design itself. This principle allows you to deal with changing technologies, regulatory constraints, and infrastructure requirements."

2. **Prioritize applications that are limiting customer experience.**

   Modernizing an app that is compromising customer experience is the most powerful demonstration of value that CIOs and other tech leaders can make. You will have success funding these types of improvements, as they deliver benefits that senior business executives appreciate.

3. **Seek out skilled partners to assist with portfolio analysis and modernization strategy.**

   Leading CIOs are aggressively seeking trusted and proven consulting and professional services partners to take stock of what they have and help them rationalize and simplify their portfolios—and chart a course for the future. Look for industry partners that can help with discovery services and advise you on how to quickly start improving the right applications. Ensure partners can assess your organization's maturity and measure their progress by whether their strategy has a direct impact on customer experience.

In Summary

Boards of directors and executive leadership teams remain committed to funding digital transformation efforts, especially when those efforts contribute directly to customer experience and revenue growth. CIOs should take advantage of the opportunity to automate and shift efficiency models to further fund innovation and modernization efforts. Remain a partner to the business by providing flexible platforms and ways of working without sacrificing security, stability, and risk. Above all, now is the time to lean on industry partners and experts to help rationalize and plan for the future of your app portfolio.

1 Forrester Consulting, study commissioned by VMware. "Improving Customer Experience and Revenue Starts With the App Portfolio," March 2020.

2 Management Insight Technologies, survey commissioned by VMware. "App Modernization in a Multi-Cloud World," March 2020.

3 451 Research Voice of the Enterprise: DevOps H2 2019; Sample size - 425.

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