VMware Special Edition

Cloud Operating Model

for dummies®

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Unify your app and cloud strategies

Accelerate your organization's digital transformation

Gain competitive advantage and delight customers

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About VMware

VMware software powers the world's complex digital infrastructure. The company's cloud, app modernization, networking, security, and digital workspace offerings help customers deliver any application on any cloud across any device. Headquartered in Palo Alto, California, VMware is committed to being a force for good, from its breakthrough technology innovations to its global impact. For more information, please visit www.vmware.com/company.html.

Cloud Operating Model

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Publisher's Acknowledgments

Introduction

Today, people everywhere depend on digital. They rely on applications to shop and bank, to stay connected and productive at school and work, to schedule appointments and monitor health, and even to track lost pets.

Although so many applications have made our personal lives simpler, they've also complicated IT environments and operations.

Arguably, the biggest change is the acceleration of cloud computing. Cloud is often hailed as the solution to every technology woe. How many times have you heard a well-meaning adviser say, "Just put it in the cloud!" And you think, "If only it were that easy."

About This Book

Whether you're just starting out on your cloud journey or well on your way, there's considerable value in ensuring you have a cloud operating model to take you forward. This book can be your guide. It's loaded with information that will bring you up to speed on the whats, hows, and whys of cloud operations and management. Armed with that knowledge, you can maximize your existing and future cloud investments — whether they're private, public, hybrid, edge, or multi-cloud.

Foolish Assumptions

Are you interested in finding out how IT can help your business capitalize on innovation across clouds? Support agility without giving up control? Guard against cyberattacks? Do more with flat or declining budgets? Then this book is for you!

To make sure we cover everything you need to know — and skip the things you don't — we've made some assumptions about you:

>> You're a business or IT leader in an enterprise environment.
>> You want to use IT to empower your business.

>> You believe cloud can help your organization achieve business goals.

>> You expect to be managing multi-cloud services, sometimes in conjunction with traditional IT infrastructure.

Icons Used in This Book

We've included some handy icons in the margins to make reading easier, so take note of these as you're following along.

The Remember icon points out key definitions and points.

REMEMBER

The Technical Stuff icon flags technical details that you can safely skip without missing the main point of the subject at hand.

TECHNICAL STUFF

Anything marked with the Tip icon can save you time.

TIP

On your cloud journey, watch out for pitfalls marked with the Warning icon.

WARNING

Where to Go from Here

This book is written as a reference guide, so you can read it cover to cover or jump straight to the topics that most interest you. You can't go wrong with either choice. Both give you a better understanding of how the cloud operating model and cloud management capabilities drive innovation in business.

For even more information on the cloud operating model and VMware Cloud Management, head to `www.vmware.com/cloud-solutions/multi-cloud-ops.html`.

Chapter **1**

Introducing Cloud-Driven Transformation

When *MIT Technology Review Insights* surveyed chief information officers (CIOs) and senior executives with technology decision-making responsibilities about digital attitudes and actions midway through 2020, the results were striking:

» Seventy-five percent of respondents believed their digital transformation efforts were accelerated by the pandemic.

» Thirty-three percent of respondents anticipated budget increases due to the pandemic.

» Thirty-eight percent of respondents accelerated adoption of a cloud-based platform supporting modern app development.

Digitally transforming organizations are moving en masse to cloud. According to a recent IDC report, 97 percent of enterprises worldwide already use some combination of on-premises private clouds and one or more public cloud services.

Yet multi-cloud adoption is often tactical — with IT choosing a cloud for a specific capability, a business unit going around IT for

resources, or a merger or acquisition of a company with an existing cloud footprint. The result: the accumulation of a complex, disjointed, and often very expensive environment.

But let's back up a second, because the cloud conversation shouldn't really start with cloud computing and its various deployment models. Conversations should start at the business level. What are the organization's business goals and how does the organization use, process, secure, and access apps and data to support those goals? How does it do these things today, and how does it plan to do them a year, two years, and five years from now? Ideally, business strategies drive app and data strategies, with app and data strategies providing inputs into the cloud strategy — all coming together on a daily operational basis through a cloud operating model, as shown in Figure 1-1.
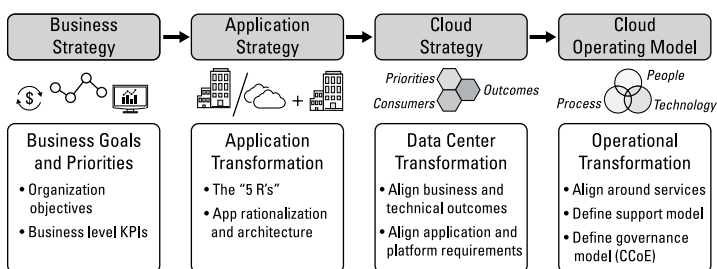
FIGURE 1-1: Your business strategy drives your cloud operating model.

As executives discuss ways to meet digital-first needs and delight customers and employees with new digital experiences, the need arises to purposefully create or update an organization's cloud strategy to avoid certain pitfalls and drive the most strategic use of cloud services.

What then do business, application, and cloud strategies have to do with a cloud operating model and cloud management solution? The following sections get into it.

Becoming a Future-Ready Organization

A future-ready IT organization has clear objectives — with well-thought-out strategies to support its objectives. Its app, data, and cloud strategies align with higher-level business strategies, initiatives, and outcomes.

For example, a healthcare provider wanting to transition make-shift virtual encounters to a robust telemedicine practice will gain executive support, establish business key performance indicators (KPIs), and set app, data, and cloud strategies. It will also hire appropriate medical staff, optimize physical and patient processes, and architect a digital platform with services extending into the cloud with the necessary reliability, performance, and security to meet patient demand and compliance requirements.

The kind of digital transformation that future-proofs an organization ultimately involves significant strategy discussion and reimagining people, processes, and technologies. Change can begin anywhere. And importantly, it can (and often probably should) be technology led. Technology can be employed to help decision-makers understand where cloud spend is going to inform business strategy. Leading with technology rather than people or process consulting helps inform your strategies and cloud operating model by giving you quick returns — and wins — so you can show value fast. And that's what stakeholders want!

Siloed business and IT strategies don't successfully achieve outcomes. Aligned business and IT strategies drive cloud-driven transformation. And technology-led change can accelerate the journey.

REMEMBER

Understanding How App Needs Are Driving Cloud Adoption

The one big reason that everyone cares about cloud now is apps. Apps are the *why,* and cloud is the *how.*

IT organizations are often responsible for supporting hundreds or even thousands of apps for their lines of business. With the continual addition of new apps, the demands for functional upgrades to existing ones, and the importance of critical apps being always available and protected from disaster, enterprises have to make difficult decisions about how to prioritize resources across the app portfolio. This is where cloud can really help.

Cloud enables organizations to deliver on-demand, elastic, software-defined services with flexible consumption and payment options. Depending on an app's requirements, cloud can

simultaneously help organizations respond more quickly to requests for IT services, reduce operational burdens on existing IT staff, and expand with greater ease to additional geographical locations.

Public cloud providers have economies of scale and deliver agility that most IT organizations will struggle to achieve alone. Used wisely — and strategically — public cloud services can be an attractive addition to support business strategy.

Strategizing how to modernize, update, or retire apps

TECHNICAL STUFF

As cloud services have evolved, so, too, have app architectures. *Cloud native* is a term used to describe app architectures designed to take advantage of the benefits delivered by cloud environments. Often, this means the use of *microservices* — the decoupling of an app's functionality into smaller, interconnected services. These new app architectures are dependent on capabilities such as containers, open application programming interfaces (APIs), and dynamic infrastructure environments — capabilities that are at the core of most cloud services.

According to the *FY22 Q1 VMware Executive Pulse,* organizations recently surveyed report that 90 percent of their app initiatives focus on modernization. So, how do you best modernize your existing apps, as well as plan for optimal business outcomes in the future? One helpful tool is the five rationalization areas, or the five Rs for short.

You must decide how each app should be handled as you move your organization's IT to cloud operations.

» **Retain:** Optimizing existing apps and services as they are

» **Rehost:** Migrating an app to the cloud as is

» **Replatform:** Migrating from virtual machines (VMs) to containers or being modified to run on public cloud infrastructure

» **Refactor:** Rewriting or writing the app, typically in a microservices architecture

» **Retire:** Replacing an app with software as a service (SaaS) or decommissioning the application

For now, suffice it to say that a business or app strategy outlines what software and data the company needs — and when — to support customer, employee, and partner needs.

WARNING

Keep in mind that you may need a different app strategy for apps built in-house by development teams versus those outsourced to be built or apps consumed as a service. Because there are different infrastructure requirements for different app architectures, app strategies will inform cloud strategies.

Managing an ever-increasing amount of data

Ever-increasing numbers of apps have led to an explosion in data, making the scalability and relatively low cost of cloud capacity attractive to store and manage data. Modern businesses gain competitive edge from data, setting up the need to collect information from Internet of Things (IoT) sensors and endpoints, SaaS apps, new systems of engagement, and more.

It's a perpetual cycle. Because new apps are generating data, organizations are creating new apps and using new analytics tools to analyze that data, which requires adding automation in the form of machine learning (ML) and artificial intelligence (AI) to process data for new insights. Time and time again, data is fueling the need for more data and more apps.

Building data centers and procuring, installing, and administering infrastructure are both time intensive and resource intensive. The only way to keep up is public cloud.

Modernizing infrastructure

If your business is interested in managing multi-cloud services in conjunction with an existing IT infrastructure, you need a digital foundation that supports both. You need a cloud infrastructure that not only works onsite but can be seamlessly extended to take advantage of the massive scale and agility of public clouds, too. Hybrid cloud (see "Hybrid cloud," later in this chapter) with consistent infrastructure makes managing environments simpler because IT pros use familiar tools and skills and can take advantage of the benefits of public cloud infrastructure without having to reconfigure workloads.

Defining Your Cloud Strategy

Gartner's IT glossary defines a cloud strategy as:

> a concise point of view on the role of cloud within the organization. It's a living document, designed to bridge between a high-level corporate strategy and a cloud implementation/adoption/migration plan.

Here are some examples of cloud strategies:

» **Cloud first:** The insistence that any new workload or app should be served by cloud infrastructure

» **Cloud smart:** A U.S. federal government cloud strategy encouraging agencies to adopt cloud services

» **Multi-cloud:** An approach to reduce dependency on one cloud vendor

» **Cloud everywhere:** Okay, maybe not, but you get the idea

A cloud strategy that comes from leadership should clearly identify priorities and expected outcomes. In reality though, most strategies aren't clearly documented — or widely shared. So, although a business or cloud strategy may get everyone in the same boat, it's not a given that everyone is rowing in the same direction. That's why organizations need a cloud operating model.

Although cloud can drive innovation and solve business problems, it can also add management overhead and complexity to already overburdened IT organizations without delivering clear benefits. Understanding the organizational goals and objectives for using cloud services is paramount.

Defining Some Key Terms

Before we go any further, let's review some terms to be sure we're on the same page when it comes to how we talk about cloud.

Public cloud

Public cloud is an IT model where a third-party provider manages on-demand computing services and an infrastructure that multiple organizations share using the public Internet.

Steadily growing for a decade or more, public cloud providers (the largest of which are known as *hyperscalers*) include Amazon Web Services (AWS), Google Cloud Platform (GCP), and Microsoft Azure. They offer enterprises an entirely new way to acquire IT infrastructure: on demand, self-service, and with a low-barrier to entry. It's a model that has proven widely popular with consumers — namely, lines of business and developers frustrated by slow internal infrastructure delivery cycles.

Because lines of business are getting more budget allocated directly from finance, and public clouds and their services are easy to acquire, teams don't always involve IT in the acquisition process. As a result, internal IT organizations may be managing infrastructure and operations they have no knowledge about or visibility into. This may no longer be called *shadow IT,* but the hurdles may remain because IT is ultimately responsible for the entire organization's data security and compliance.

Private cloud

Private cloud is an on-demand cloud deployment model where cloud services and infrastructure are hosted, managed, and maintained privately. Companies often host private clouds within their own intranet or data center using proprietary resources that they don't share with other organizations.

To compete with public cloud providers, some IT teams create private clouds in the hopes of saving money and speeding service delivery. Early cloud management solutions focused on providing the capabilities that IT teams needed to deliver infrastructure as a service (IaaS) within the relative safety of private data centers.

Edge cloud

Most private and public clouds live in data centers where powerful processing is typically centralized, but an *edge cloud* takes processing power to devices and sensors at the very ends of the network. Many connected clients can take on smaller processing tasks for low-latency services. Implementing edge computing can result in improved response times with less complexity and cost.

Emerging 5G mobile edge computing use cases include smart retail, smart factories and industrial manufacturing, smart glasses, gaming, and better security.

Multi-cloud

Multi-cloud refers to using a combination of clouds, which can be two or more public clouds, two or more private clouds, or a combination of both public and private clouds.

Today, most organizations have a mix of private and public clouds in their environments (IDC says it's 93 percent). Internally, organizations may be on version two or three of a private cloud. And many are using services across multiple cloud providers, such as AWS, GCP, and Microsoft Azure — due to tactical necessity, by inheriting platforms, or through strategic use of public cloud services. And it's probably a good bet that enterprises that aren't already multi-cloud will be soon.

Hybrid cloud

Hybrid cloud describes environments that span both private cloud and public cloud platforms to provide a flexible mix of cloud computing services. Although many tech companies use the terms *hybrid* and *multi-cloud* interchangeably to describe a mix of resources across heterogeneous clouds, VMware uses a tighter, more prescriptive definition of *hybrid cloud:* a consistent VMware software-defined data center (SDDC) across multiple cloud providers.

LET'S TALK SaaS

As a service (aaS) is a catchall phrase for digital capabilities that used to be a purchased combination of hardware and software, or software only, and are now available as hosted or managed services to people and organizations over the Internet via subscription.

Enterprises that rely on a host of different SaaS apps may or may not be truly multi-cloud. Services such as Dropbox, Salesforce, Workday, and Zoom operate differently depending on the provider(s) responsible for the overall management and maintenance of aaS and its underlying infrastructure. Internal operations teams can integrate aaS with existing onsite operations, but many operate independently.

This more prescriptive hybrid cloud definition is an important differentiation because, by using a consistent software-defined infrastructure stack, IT professionals can manage these environments using familiar tools and utilizing existing skill sets, with workload portability across environments. Eighty-seven percent of all enterprises surveyed will have a cloud strategy that results in a hybrid cloud scenario, according to the *VMware Multi-Cloud Architecture: Enabling Choice and Flexibility* report.

TIP

Cloud can mean different things to different people, so make sure you align definitions early on when discussing cloud and cloud services. It will save a lot of confusion down the road.

Understanding the Cloud Operating Model

REMEMBER

It's important to remember that *cloud is not a destination.* Cloud is a journey to better serve the business through technology. Successful cloud strategies support business and app strategies, and they're operationalized by a cloud operating model that's powered by a cloud management solution with capabilities for maximizing the return on all clouds the business uses. Your cloud operating model will bridge and bind your app and cloud strategy decisions, accelerating your digital transformation.

An effective cloud operating model implements the cloud strategy and will evolve to meet the needs of the business. It's flexible enough to deliver cloud services that are built, run, managed, and deployed by internal teams, as well as cloud services provided by hyperscalers or specialty and regional cloud providers. And it works across multi-cloud and hybrid cloud environments, provided they're powered by modern digital infrastructure.

The cloud operating model involves restructuring the way teams operate. It creates consistency across disparate environments to help businesses create a digital advantage by adopting cloud best practices and managing cloud technologies. A cloud management solution delivers the technical capabilities that map to the cloud operating model (see Chapter 5).

Some people may think that a cloud operating model works differently depending on the scope. For example, they may picture one way for managing internal cloud services, another way for managing public clouds as part of a multi-cloud strategy, and yet another way for a hybrid approach.

However, a well-structured cloud operating model rolled out in conjunction with a comprehensive cloud management solution will be effective for all types of clouds you plan to use to achieve your business goals.

The most effective digital transformation journeys have business objectives, app, data, and cloud strategies, plus, a cloud operating model supported by a cloud management solution. No matter where your organization is on your cloud journey — just starting out or well underway — there's considerable value in adopting a cloud operating model now that can take you into the future. Keep reading to find out what else you need to know about the cloud operating model.

Chapter **2**

Discovering the Value of a Cloud Operating Model

There's no denying we live in the cloud era. Organizations now deliver cloud services to help people do everything from banking online to building scrapbooks to buying a car. Speed and security in getting apps and services to market fastest matter.

REMEMBER

The value of a cloud operating model is in helping your business create digital advantage by adopting cloud best practices and cloud management technologies, all so you can support your business with the agility it needs.

You probably wouldn't be reading this if you didn't think more cloud services were in your future, so first we cover the pitfalls a cloud operating model helps you avoid. We follow that with all the goodness that comes from having a cloud operating model.

Understanding Why Silos Are a Problem

Remember the arcade game whack-a-mole? Every time you got that pesky gopher back into its hole, another one popped up somewhere else. That's what many operations teams are experiencing the further they progress on their cloud journeys. Lacking a formal operations plan, most enterprise IT environments have become too complex. As shown in Figure 2-1, they're littered with new technology silos that form around cloud providers just as compute, storage, and networking silos popped up in the past.

Different Teams | Different Expertise | Different Environments | Different Tools
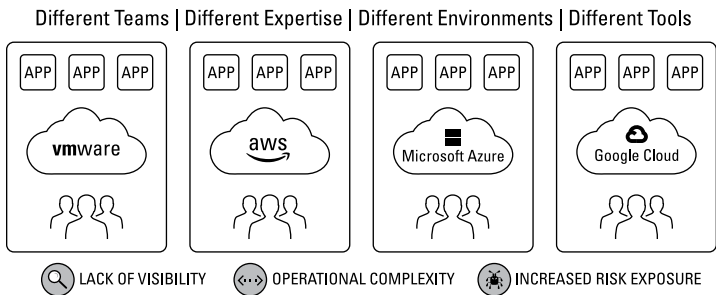
FIGURE 2-1: Cloud silos keep data and apps separated.

Silos are because from user entitlements to application programming interface (API) structure to billing, every cloud provider takes a different approach to managing services and resources. The result is increased management overhead to support cloud environments.

Part of the increased complexity is due to data gravity. Data typically lives where business apps live. For example, sensitive business data such as personally identifiable information (PII) is often housed in on-site data centers, drawing workloads that process this data into the data center. This *data gravity phenomenon* is a common reason IT teams choose a hybrid cloud strategy.

The splintering of operational priorities for cloud services across disjointed teams makes it difficult to get a holistic view into an organization's use of cloud services, to share best practices, and ensure sufficient governance. Consequently, the most pressing concerns for those navigating multiple cloud environments are lack of visibility and increased risk exposure.

As Figure 2-2 illustrates, complexity leads to:

» **Decreased agility:** It can take 7.4 years to refactor and migrate 100 apps to the cloud, according to ESG Research's *Hybrid Cloud Trends — Strategies for Optimizing and Managing On-premises and Public Cloud Infrastructure* report.

» **Increased risk:** Ninety percent of surveyed organizations have skills shortages in cloud-related disciplines, according to 451 Research's *Trends in Cloud Transformation* report.

» **High costs:** Investment can be $1 million to move 1,000 workloads from one cloud to another, according to VMware's "Six Ways Application Requirements Drive Your Infrastructure Decisions" paper.

Increased complexity slows you down
and adds risk, and ultimately cost…
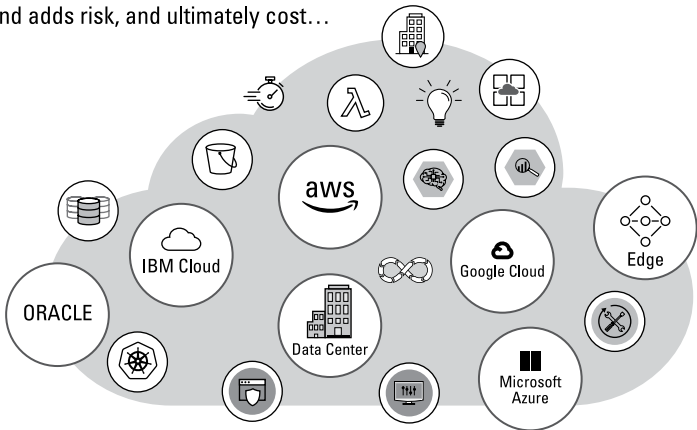
…the things you hoped to eliminate by
using cloud in the first place!

FIGURE 2-2: Multi-cloud complexity is increasing.

Cost and risk obstacles can prevent cloud adoption plans from getting any traction and progressing quickly enough to gain the expected benefits. And it's a shame because companies can overcome all these obstacles with a unified cloud strategy, effective cloud operating model, and a robust multi-cloud management solution.

Defining the Cloud Operating Model

The *cloud operating model* is an evolving set of operating principles. The details vary among organizations, but in general, a cloud operating model turns infrastructure and operations (I&O) teams into service providers and brokers of cloud services — from private, public, multi-, hybrid, and edge clouds — over time. For that to happen, the cloud operating model must be adaptable to accommodate changes in clouds, services, and architectures.

TECHNICAL STUFF

You may hear others refer to the cloud operating model as a *cloud adoption framework, cloud operating architecture,* or *service-oriented model.*

To fully understand the cloud operating model, keep in mind that application and cloud strategies are, in reality, bounded by your financial strategy — for example, IT budgets for app development and cloud consumption. Application strategies define the *what* and *why* of cloud service adoption. The cloud operating model, in turn, defines the *how* and *who* for the ongoing governance, management, and operationalization of those cloud services. That's true whether your organization is building new cloud services, managing existing cloud services, or both.

REMEMBER

This is really important, so it bears repeating. As Figure 2-3 illustrates, you use the same cloud operating model to build new clouds as you use to manage existing clouds.

Build New Clouds
- ⊘ Transform ITOps
- ⊘ The best solution for VMware clouds

Embrace Existing Clouds
- ⊘ Align CloudOps
- ⊘ Extensive capabilities for public clouds
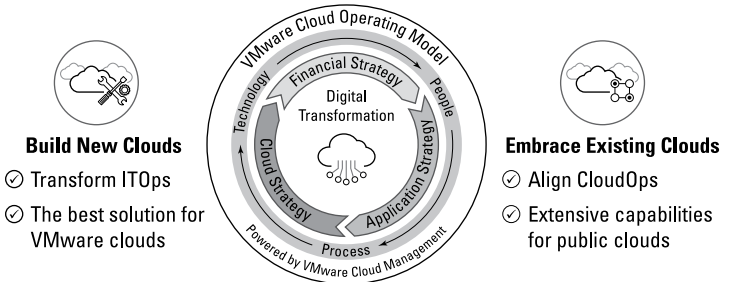
FIGURE 2-3: A cloud operating model is a consistent way of managing all clouds.

Organizations evaluate cloud investments based on the value an app delivers and the value the company gains by deploying that app to the cloud. With so many apps in use, nearly every business is on a multi-cloud journey.

REMEMBER

To deliver cloud agility without increased complexity and risk, businesses need a consistent operational model across multiple clouds to ensure visibility, optimization, and governance wherever workloads reside. The cloud operating model enables organizations to gain the greatest advantage from their cloud strategies by simplifying the adoption, management, security, and control of cloud technologies.

The cloud operating model positions the IT organization to continuously improve by adopting cloud best practices and implementing cloud technologies. It considers the following three key areas for transformational change:

» **People:** There's a reason the management book, *Who Moved My Cheese?* remains a timeless business classic. People react to change differently, and it can be a real challenge to get some IT teams — leaders, developers, managers, operations staff, and individual contributors alike — adapting to the speed of cloud-centric IT. The cloud operating model requires organizations to take a hard look at what changes they need to make to the organizational structure to enable and accelerate transformation and maintain continuous improvement.

» **Process:** IT organizations undertaking the new working methods that cloud demands must also rethink decision making and change management practices in general. The first step is ensuring that IT, the major stakeholders, and the affected lines of business are communicating with one another, early and often. If they're not, the likelihood of IT meeting the business's needs drop dramatically.

The second step is for IT to leave manual, ad hoc tasks and fragmented approaches behind, moving to automation and self-service for delivery — anytime and anywhere that resources are needed. The cloud operating model is a forcing function for teams to consider what operating processes need to be updated for revolutionary change.

» **Technology:** Many organizations believe technology will be the hardest part of moving to a cloud operating model. This assumption is almost always wrong. People and process change cause the most headaches. Technology-led change can actually jumpstart your cloud operating model framework.

That said, all change takes time, and organizations will have to accommodate both cloud-native services and existing services and infrastructure for some time, even as they accelerate cloud adoption. The cloud operating model pressures organizations to figure out what technology capabilities are critical to supporting the model.

REMEMBER

As noted earlier, cloud is not a destination — it's a journey. The purpose of any cloud journey is to better serve the business through IT. Your evolving cloud operating model is complementary, bringing people, process, and technology together around the cloud strategy with the goal of moving to frictionless, on-demand, self-service operations.

Understanding the Benefits of a Cloud Operating Model

A typical enterprise organization will have distinct teams — mostly disconnected and siloed — that individually take care of infrastructure (including networking, storage, and middleware), app development, operations, security, and compliance. This arrangement not only introduces errors, but also adds time and complexity to digital business.

In contrast, the cloud operating model breaks barriers by automating operations for the benefit of the business without requiring IT to give up control over cost, security, and resource management. Some of the advantages of a cloud operating model include the following:

>> Responding faster to the business's needs

>> Delivering business value and high-quality service

>> Reducing the risks and complexity associated with multi-cloud adoption

>> Strengthening collaboration between IT and the business

>> Driving innovation and new technology implementation

>> Providing an overall, consistent layer of control and governance across all clouds — guardrails, if you will — that doesn't stifle developer creativity

>> Optimizing costs across multiple clouds

A cloud management solution is critical to delivering the technical capabilities required to support your cloud operating model and help achieve the advantages mentioned. A recent international survey published in *VMware Application Modernization in a MultiCloud World* asked IT leaders about the capabilities they would find most helpful to operationalizing their hybrid clouds and easing everyday operations. Respondents overwhelmingly favored a consistent management plane across all their infrastructure silos. They stated that effective cloud management breaks down silos and enables effective integration between on-premises and cloud environments.

That insight points to the role of cloud management — specifically a single management model as the best way for organizations to achieve a variety of cloud transformation goals. Those same surveyed IT leaders reported the following primary benefits of consistency across multi-cloud environments:

>> Forty-nine percent said they experienced improved responsiveness to customers and lines of business.

>> Thirty-eight percent said they experienced reduced IT operating costs.

>> Twenty-eight percent said they experienced faster delivery of app features and releases.

Considering the Competencies Impacted

Don't be surprised to find that a move to cloud impacts key competencies in your organization. How do you start protecting your organization from the risks of complex multi-cloud environments, while making consumption easier for your users? The answer is to create an effective cloud operating model powered by a robust cloud management solution.

The cloud operating model categorizes desired outcomes into three broad competency areas, summarized in Figure 2-4:

» **Service delivery:** Delivery automation. The ability to deliver a cloud-like consumer experience — on-demand, self-service, via catalog or API — to all services requires a cloud operating model bolstered by a cloud management solution. With the right cloud operating model, your organization will deliver services faster, unlock app innovation, and support DevOps principles.

» **Operations:** Performance optimization. Adopting cloud best practices and technologies across clouds — also known as *intelligent operations* — comes from the cloud operating model and cloud management solution. An effective cloud operating model will unify your operations, accelerate modernization, and streamline migrations.

» **Governance:** Cost and security optimization. All organizations need visibility into policy and guardrail governance. An organization must apply enough governance to be confident it's maintaining compliance and control, but without being too heavy handed and getting in the way of developers and speed. The right cloud operating model and cloud management solution will ensure you optimize cloud costs, lower your risk exposure, and ensure compliance.

Service Delivery	Operations	Governance
Unlock app innovation	Maximize efficiency	Manage risk
Optimize speed and agility	Optimize performance and cost	Optimize investment
Deliver a modern developer platform	Deliver end-to-end intelligent operations	Deliver a framework for accountability and clarity
Accelerate	Optimize	Control
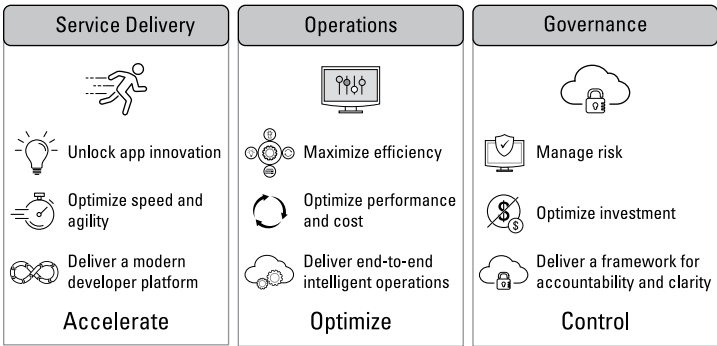
FIGURE 2-4: Key competencies impacted by cloud.

Your organization may initially prioritize one competency over another or try to mature in all three areas in parallel.

TIP

Because the only constant — other than death and taxes — is change, you need a flexible cloud management solution powering your cloud operating model. The cloud management solution you choose should support building one cloud and extending your evolving operating model across multiple clouds to benefit from the best of both worlds. It should be able to operationalize not only management in general but orchestration, costs, and security.

Chapter **3**

Moving to a Cloud Operating Model

A cloud operating model can help an organization by:

» Bringing visibility, operational consistency, and governance to disparate cloud environments

» Giving your internal IT customers an agile, modern user experience

» Partnering on innovation by offering IT services that support real business value

That's all great stuff, right? But be prepared: Implementing a cloud operating model will require huge changes to the way your company operates — including ways you may not anticipate at the beginning of the transformation process.

Building an operating model for cloud requires evolutionary change in the way people, processes, and technologies at the heart of IT work. These changes may seem like a revolution because the cloud operating model doesn't just address technology. It also affects what people do, the processes the organization has

in place, and the technical capabilities used to effectively build or run new and existing apps and services. This chapter looks at some of those changes to help you understand what to expect.

Experiencing the Aha Moment

There's typically an *aha* moment when organizations are ramping up cloud use. It happens when leaders realize existing infrastructure and operations (I&O) approaches for managing resources aren't going to work for cloud services.

As Figure 3-1 summarizes, the reasons are threefold:

» **Disconnected people:** Teams are siloed, but delivering IT services requires at least cross-functional collaboration, if not complete reorganization.

» **Inefficient processes:** Organizational processes are built around limiting the amount of change (and, therefore, risk) to environments, instead of providing guardrails that foster productivity and innovation.

» **Complex technology:** Rigid technologies are in place to create, deliver, manage, and maintain environments. Cloud-driven transformation takes flexibility.

Continuous Improvement
An evolutionary or revolutionary approach to transformation?

People
What changes are needed to the organizational structure?

Process
What operating processes need to be updated?

Technology
Which capabilities are critical to support the model?
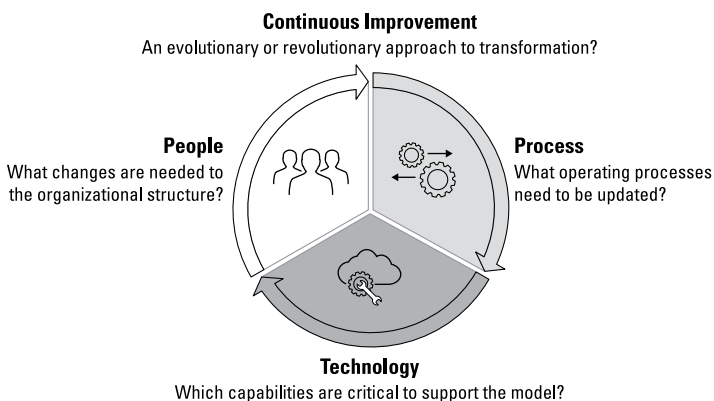
FIGURE 3-1: Key aspects of cloud-driven transformation.

After that aha moment, I&O leaders must put their heads together to start answering some of the big questions:

» What changes are needed to the organizational structure to operate effectively?

» How will we organize to prioritize communication and collaboration?

» Are there new roles to be defined?

» Do we need to recruit people with new skill sets, or can we train existing resources?

» How do we ensure there are clear lines of accountability and responsibility?

» Who are our consumers and stakeholders?

Transformational change takes coordinated effort across people, processes, and technology. The following sections get into how you start to make all that change possible.

Involving the Right People

IT practitioners may want to move to a new way of creating or delivering services via the cloud, but that doesn't mean everyone else understands the benefit or sees the need to change. That's why before you can reimagine IT roles — deciding who is doing what work, across which organizations — you need to get top leadership support. Because let's face it, without C-suite, SVP-level, or VP-level support, enterprise-wide change initiatives don't get much traction.

Key stakeholders

Stakeholders can be your cloud strategy's biggest champions or its greatest detractors. Ideally, you identify your key stakeholders and their requirements — from the consumers of your services to those controlling the purse strings — as part of your cloud strategy. Then you build a feedback loop into your cloud operating model to keep stakeholders in the know. This will ensure that the success (or failure) of the initiative is communicated to all the right people.

TIP

Historically, IT teams have been targeted as the expensive, slow, inflexible gatekeepers of resources, and pretty awful at self-promotion when things go well. This changes when IT teams set key performance indicators (KPIs) for each service and regularly share progress with stakeholders — via automated reports or dashboards. Shared success helps stakeholders prioritize and fund future investment, so it's well worth the time to keep leadership informed. After all, they have skin in the game, too.

KPIs will differ between different stakeholders for the same service. For example, a KPI for the chief information security officer (CISO) may be that critical patches are applied within *x* days, whereas for a vice president of IT, a KPI may be a certain percentage of server builds using infrastructure as a service (IaaS), which will save a certain number of person hours.

Team evolutions

Teams with the best players in the right positions win. With stakeholder approval to move ahead, IT leaders can begin to reimagine their organizations, moving from the typically disconnected groups of development and IT operations to a more cohesive DevOps approach to app and infrastructure management (see "DevOps," later in this chapter).

There's momentum around ITOps, too. IT administrators typically used to be responsible for one or two things — setting up infrastructure, and compute and storage — but some are evolving to add new skills around delivering services and automation. And this is going to include cloud integration — it's just a matter of time. ITOps facilitates more collaboration with product managers from the business, developers, and others.

If you've also been hearing more about site reliability engineering (SRE) teams, you can thank digital transformation. Where before, most platform decisions were made by the IT staff with little development team input and app teams just used the platform(s) defined by IT, that's all changed. With its enablement of simple, self-service access to a host of new capabilities, cloud has empowered developers to use what they want, when they want it. Guess what's happening now? Tremendous growth and IT complexity. And accountability? That sort of went out the window until the introduction of SRE teams. They're responsible for ensuring

platform reliability and availability typically through service-level agreements (SLAs) or service-level objectives (SLOs).

TIP

Some organizations also set up a Cloud Center of Excellence (CCoE) to document standards and policies for cloud operations across the business — not as a bottleneck, but as a creator and facilitator of the rules of engagement without going out of bounds. This can be essential when organizations have embraced public clouds from many providers to meet different business needs. Without this type of oversight and organization, it can be kind of the Wild West in terms of standardization. You can find more about CCoE in Chapter 4.

Team evolutions — together with the emergence of greater definition around providers and consumers (see Chapter 4) — are all good examples of people-related changes helping to accelerate cloud transformation.

Evolving the Right Processes

Process evolution is another big piece of the transformation puzzle your organization must put together to achieve business and cloud goals. What's tricky about evolving processes is balancing wholesale change with the fine-tuning organizations can undertake to accelerate cloud while reducing risk. Here are the key IT process changes driving cloud-based transformation.

DevOps

App development and operations teams have come together as *DevOps* over the last decade in a grassroots, cultural-shift kind of way to support the creation of better software, faster. DevOps practices for speeding software change rates have catalyzed the demand for cloud services. That's because configuring hardware traditionally hamstrung development productivity. DevOps cares about the agility, programmability, and automation that cloud services and infrastructure offer.

Because DevOps' central reason for being is to speed managed change by reducing friction and handoffs, it drives innovations that have become central to the cloud operating model. That's because when resources are defined in code — a result of moving

to a software-defined data center (SDDC) model — DevOps collaborations jumpstart software best practices adoption across infrastructure components.

The SDDC brought flexibility and programmability to the management of infrastructure resources. As you define your cloud operating model, these and other DevOps best practices will surface:

» **Infrastructure as code (IaC):** This is functionality that enables you to define an infrastructure resource or set of resources in a (subjectively) human-readable text file. The deployment system interprets the text file to create the automated steps needed to provision and maintain the resources. You can make changes to the environment by updating the text-based definition file. The primary benefit: an always-current environment with everyone on the same page.

» **Configuration management (CM):** This concept has been reimagined to enable you to define the desired state in code, with the implementation engine doing the heavy lifting of implementing and maintaining that state. CM generally manages operating system and app configuration, whereas IaC typically manages virtual infrastructure.

» **Delivery pipelines:** This is the continuous integration/continuous delivery (CI/CD) that enables you to automate and orchestrate a series of related tasks, including change testing and gating. What's new here is that IT professionals are now using delivery pipelines for testing operational changes.

» **GitOps:** This is the connection of IaC (using Git version control as the operational source of truth) with delivery pipelines for a more robust, streamlined operational process for infrastructure operational management.

You'll need to decide whether your organization is not at all in, willing to try, or all in on these processes. Covering each could be a book of its own, and we only have so many pages, so we'll keep going.

SecOps and DevSecOps

Because security must be at the heart of all digital business, enterprises are driving increased collaboration between security

and ITOps — *SecOps* — to integrate processes and keep data safe. SecOps professionals help avoid risk as the organization speeds innovation.

The most sophisticated organizations have gone one step further, automating security and operations processes and integrating those into the development life cycle itself. That's *DevSecOps.* These experts look for ways to embed security controls throughout the entire software development life cycle — not simply as a finishing touch before the app goes live.

Key process considerations here are the provisioning of hardened infrastructure components, app security controls, and app data backup. And most recently, all of it is shifting left.

Shift-left

Commonly associated with automated app testing for earlier issue identification, the term *shift-left* has lately been used to describe any management or operational processes moving earlier in the app life cycle and, therefore, closer to the developer or end user. The benefit: Potential issues can be identified and remediated sooner.

From a cloud management perspective, shift-left gives curated access to key operational capabilities (such as vulnerability scanning or resource provisioning) for developers to embed where needed throughout the app life cycle. This way, operations and security become a key part of the app life cycle, and not an afterthought. And that's a big time saver for things like compliance, which ends up getting baked into an app early by the developer, instead of bolted on later by another team.

Multiply that across dev and platform teams — for things like resource management, operational control and visibility, and security — and the business enjoys:

» Faster resource provisioning and deployment pipelines

» Improved security and compliance

» Proactive, agile operations with faster remediation

» Better cost optimization

WHAT'S IN A NAME?

Cloud strategies are evolving quickly. So, too, are the ways organizations describe concepts, teams, and shifts as they discover what works best for them. In addition to DevOps, SecOps, DevSecOps, ITOps, and SRE teams, some others are emerging (which may or may not be obsolete by the time you read this — that's how fast cloud is moving):

- **CloudOps:** This cross-functional team or group of teams is responsible for delivering and managing cloud services.

- **PlatformOps:** Because platforms play a critical role in modernization (providing speed, consistency, and even auditable security and compliance), this group takes on responsibilities that include standardization, consolidation, and automation to meet business improvement and time-to-market goals.

- **AIOps:** Next-generation operations include analytics. AIOps uses artificial intelligence (AI) to make ITOps management easier, especially in complex, modern IT environments, to accelerate and automate issue resolution.

Using Transformational Technology to Drive Change

Transforming ITOps can start with your executives freeing up your most valuable and constrained resources: your people. After all, IT organizations have been expected to do more with less for generations, and many are still spending too much time fighting fires, reacting to issues, or doing random busywork tasks that could and should be automated.

To efficiently support the explosion of apps and software, operations teams must be able to hand off all the traditional operational tasks to an intelligent IT platform — otherwise known as a *cloud management platform.* Automation is key across all aspects of operations, and the platform must be able to make intelligent decisions around workload placement or issue remediation that once required a human. Only then will your organization be able to commit the right people, time, and resources to your digital transformation journey.

Not all solutions are equal

We've already established the need for a cloud management solution, so how do you pick the right one?

A best-practice start is to evaluate each solution against the three key competencies driving the cloud operating model — service delivery, operations, and governance. As shown in Figure 3-2, that means the cloud management solution will need attributes that enable all your teams to run, build, manage, connect, and protect a multi-cloud environment — no matter what onsite and off-site technologies they're using.
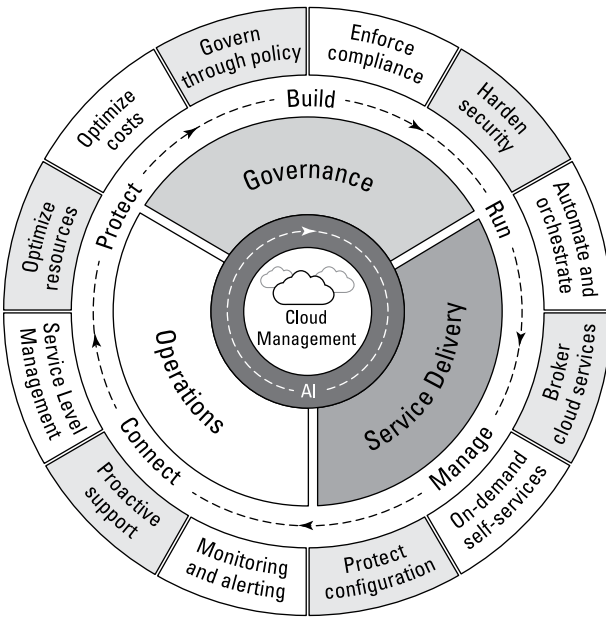
FIGURE 3-2: Essential cloud management capabilities.

TIP Even if your organization is planning to prioritize operations over service delivery for the foreseeable future, you need to ensure that the cloud management solution you choose will support your organization as it matures into those other areas in the future.

Enterprises choosing a self-driving cloud management solution will find that it evolves with business needs. It's intelligent and automated, so people can focus on what's really important to

the business and let the rest just run. Because innovation is constantly driving cloud management technologies, these are some of the emerging tech capabilities that are particularly important to watch.

Artificial intelligence

Today's state-of-the-art IT is in decision support. Providing new information and insights to humans to interpret and make better, quicker decisions is done with AI. As processing power has increased exponentially, so has the availability of cloud-based software solutions that use complex algorithms to replicate the logic required to operate an enterprise IT environment.

Machine learning

A subset of AI, machine learning (ML) not only mimics human intelligence in software, but also evolves and grows it through the application of algorithms and measuring the resulting outcomes. For example, ML in IT operations makes complex operational decisions based on data, while also applying environmental changes based on that information, learning the effect of those changes, and swapping the logic accordingly. That creates self-optimizing, self-tuning, always-learning environments that can support operations at scale.

Chapter **4**

Defining IT Services

Want the best outcome from your cloud operating model? Stay laser focused on the delivery of IT services — both those your team builds internally in your hybrid cloud and those your team brokers from one or more external cloud providers.

Knowing which people require which services, how, when, and where best to deliver and manage them, and whether you should build or broker each service (whew!) is the whole ballgame. It seems like a lot, but don't panic. This chapter is full of advice, like a coach, preparing your team to win.

Moving to a Service-Based Model

IT services, like any other services, have consumers and providers. In other words, there are those who take and those who give. For example, a developer as a consumer may need a cloud sandbox to write and test new code. The IT department as a service provider delivers the sandbox infrastructure to make it possible.

Anything delivered as a service (aaS) can be built and managed internally or brokered from an external provider to deliver infrastructure as a service (IaaS), platform as a service (PaaS), or any

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number of other options where the balance of responsibility shifts somewhere between internal IT and the cloud provider.

The tricky part is that there isn't always a clear line of delineation between consumers and providers. Even when there is, the two parties' priorities can be quite different. Their goals aren't always aligned, and their roles may shift back and forth. To use another sports analogy, consumers and producers are more akin to wrestlers on a mat than squads on a football field. The same people pivot to work offensively and defensively, or in this case as consumers or service providers, depending on what's needed at the moment.

Across the wide range of available cloud infrastructure services (from internal teams and external providers), the level of responsibility varies greatly between a service provider and a technology consumer. In some cases, such as with private or hybrid cloud IaaS, internal IT teams manage the app and the infrastructure services required to deliver the capabilities. The internal IT team is responsible for the installation and maintenance of the entire stack. In contrast, with an external provider, such as a public cloud software as a service (SaaS) provider, the external provider is responsible for the entire app and underlying components that an internal team simply pays for and consumes the capabilities needed.

In other cases, someone from IT services is put in charge of infrastructure maintenance and app delivery for technology consumers. Those consumers may include developers and lines of business. And in still different cases, a cloud service provider such as Amazon Web Services (AWS), Google Cloud Platform (GCP), or Microsoft Azure will be responsible for the complete management and maintenance of the delivered app and all the underlying infrastructure.

Because many organizations still often choose to keep their most sensitive information onsite (see Chapter 2) while adopting public cloud services for a hybrid cloud model, they'll create a cloud operating model that supports their strategy. How they get the combinations right is through *persona mapping,* a method of understanding the customer's needs and wants, which we explain later in the chapter.

Understanding Provider and Consumer Priorities and Needs

In the recent past, app teams (either developers or business units buying packaged software) connected with IT through a project manager and/or ticketing system to get a resource. If the request came in for a standard package, for example, IT was typically responsible for the hardware, operating system (OS), and requested software package. For custom apps, IT was responsible for the hardware and OS, but the app or line-of-business group owned the installation and maintenance of the app software.

And in every case, when IT didn't know what apps or data was already on a system, staff defaulted to a position of architecting every environment with the highest levels of data protection, resiliency, and security. Now that's an expensive, inflexible, and difficult-to-scale approach!

All this illustrates these points: Providers and consumers have different wants and needs. And there are a lot of use cases, and your cloud operating model has to address all of them.

Consumers focused on creating business value at velocity have always prioritized the following:

» Choice

» Speed

» Flexibility

» Ease of use

Providers of the past were almost always considered cost centers.

In contrast, today's providers are innovation partners. The cloud operating model brings providers out of the shadows by exposing IT services directly to consumers. Now providers are able to deliver:

» Visibility

» Reliability

» Guardrails for security and compliance

An effective cloud management solution powering the cloud operating model serves all needs (see Figure 4-1), unifying multi-cloud management for the delivery and management of IT services across private, hybrid, multi-cloud, and native public clouds.
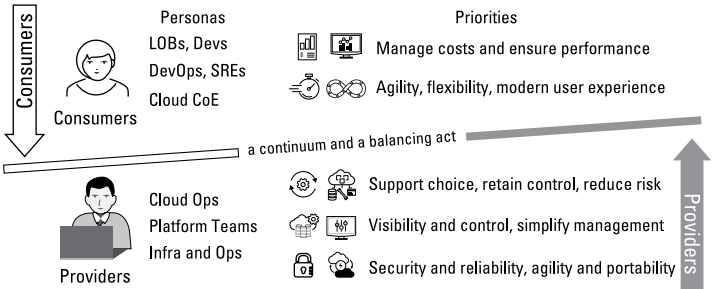
FIGURE 4-1: Aligning consumers' and providers' differing priorities.

Being a Service Provider

In Chapter 3, we highlight some changes organizations need to make to their workforce organization to adopt a cloud operating model. The newly established groups — whether service teams, platform teams, cloud architecture teams, or even Cloud Centers of Excellence (CCoEs) — need to be more aligned than ever to the needs of their consumers. No longer can IT have a one-size-fits-all mindset or approach. There are simply too many alternatives available for today's consumers. This is a new way of working.

REMEMBER

The priorities of service providers and consumers aren't always aligned. Devs want to code as fast as possible, never mind security or cost. IT service providers often prioritize security and reliability within budget, with speed as a bonus.

TECHNICAL STUFF

When you do persona mapping to understand the apps running in the environment and the data classification in place, you can set up your cloud operating model to automate requests and appropriately place resources to meet needs. For example, you can deploy a temporary development machine more quickly by enabling a developer to choose it from a self-service catalog

instead of configuring it from scratch. Automated logic will place the system on a cheaper tier of infrastructure with a built-in lease period, and the resource will be decommissioned when it expires.

Developing consumer personas

A *persona* is a fictitious person that represents a typical user in a particular use case. People in many different professions create personas to help them understand their customers better. They're especially helpful when you have several different kinds of customers and each kind has different needs and priorities.

In creating a cloud operating model, you'll want to envision personas for each service to be delivered. You'll need to specify:

>> What service they need and what the service requirements are
>> When they need it
>> Why they need it
>> How long they need it
>> How they want to consume it

WARNING

For years, IT providers have given consumers a menu of platforms and apps to choose from without recognizing that one size does not fit all. That's why it's so important that consumer personas are identified as part of the service design process. Many organizations have missed this critical step, resulting in a "build it and they will come" mentality to cloud — where all too often, unfortunately, they never come. In other words, the consumer persona was never well understood in the first place. The big takeaway: If you don't understand consumer requirements, you won't deliver what people need and can also end up paying for more than you need.

A well-crafted service will include onboarding docs and materials detailing target and future consumers. Table 4-1 is an example.

TABLE 4-1   **Persona Mapping Example**

Consumer Persona	Requirements	Service
Business user	Windows virtual machine (VM)	IaaS
	Self-service portal	
	Integration with back-end systems	
	Reliability and consistency	
App developer	Multiple environments on demand	IaaS plus app
	Full app stack deployment	
	Consumption via application programming interface (API)	
	Provisioning speed and full control	
	Git integration	
Database admin	Linux VMs configured for Oracle	Database as a service
	Oracle app configuration	
	Consumption via ServiceNow	
	Workload placement for licensing	
	Integration with Ansible	
Mobile developer	Multi-cloud provisioning	IaC
	Security built into app definition	
	Consumption via infrastructure as code (IaC)	
	Provisioning and full control	
	Integration with DevOps processes	

Gaining efficient operations

After you've mapped consumer personas and determined the right cloud services provider and delivery model, a cloud manage-ment platform is essential to efficient operations. The most effec-tive multi-cloud management platform will successfully serve the needs of both consumers and providers across private and public cloud environments for built and brokered services.

For example, it should improve organization-wide financial management by helping IT teams understand the cost of a single VM, so they can optimize capacity while maximizing delivery performance. At the same time, it can automate cost management through governance policies, either by simply alerting about or actually prohibiting consumption when line-of-business consumers exceed cloud budgets. Implementing an evolving cloud operating model on an intelligent digital infrastructure foundation saves time, money, and people resources.

Gaining Visibility with a Cloud Center of Excellence

It takes the right people, approach, and automation to have a successfully governed cloud operating model. That's where the CCoE comes in. We briefly mention it in Chapter 3, but it's worth going into more detail because it can make or break the cloud strategy.

The term *Cloud Center of Excellence* is credited to former head of AWS enterprise strategy, Stephen Orban. In 2016, he said, "Any business relying on cloud for anything should have a team responsible for cloud use."

The CCoE is a team of cross-functional architects and engineers guiding an organization through the appropriate use and governance of cloud services. The best CCoEs try not to get in the way of developers and lines of business; their aim is to enable productivity while still protecting the business. The term *guardrails* is a good one when thinking about how your CCoE should work. Drivers plowing through a guardrail can be pretty certain that someone or something is going to get hurt, so most drivers proceed safely within the lanes.

When a CCoE does its job correctly — developing a framework for cloud operations (also known as the cloud operating model), governing IT infrastructure, and ensuring best-practices use of cloud throughout the business — both consumers and service providers benefit. Figure 4-2 outlines some of the key qualities of an effective CCoE.

Common Names:

- Cloud Business Office
- Cloud Capability Center
- Cloud Competency Center
- Cloud Knowledge Center
- Community of Practice

What do they do?

- Executes cloud strategy
- Drives collaboration and best practices with key stakeholders
- Evaluates and uses technology to support business initiatives

Engaged at all levels	Best Practices and Governance	Customer-Service Centric	Cross-functional	Observe, Learn, Teach	Know the Best Tools

FIGURE 4-2: Qualities of an effective CCoE.

These are key CCoE responsibilities:

» Defining (or interpreting) and, where needed, documenting the cloud strategy, as well as translating it into an actionable framework (that is, the cloud operating model)

» Defining and enforcing governance models for cloud service use

» Identifying apps and workloads for migration to cloud — which often involves working with the app team on the Rs decisions (see Chapter 1)

» Managing and optimizing cloud costs

» Streamlining security and compliance

CCoE ins and outs

The ideal starting size of a CCoE is three to five architects from across a variety of these job roles and teams — developers, system and database admins, network engineers, and IT operations. Organizations with lofty business transformation goals should also ask line-of-business allies to join the team. These people can be from finance, procurement, security, business ops, or other departments. No experience is needed. The team also should have executive stakeholder support.

The scope of work for this team will be limited at first, but the team's responsibilities will grow as it successfully executes. The CCoE will work together to set standards, oversee governance, make service addition and subtraction decisions, and more, all with an eye to how they benefit rather than deter consumer and provider productivity. This team will shine by demonstrating progress — through dashboards and other key performance

indicator (KPI) metrics using a cloud management solution — and by calling attention to areas that are struggling through alerting and remediation, using a cloud management solution as needed.

Running at full steam with complete visibility should be this team's goal, and that, in turn, can speed decision-making timeliness and accuracy across the business. For many organizations, a CCoE is a critical part of the cloud operating model and a key stakeholder in evaluating any cloud management solutions.

Maturing capabilities

Operationally, teams may choose to prioritize across areas of excellence that include financial management, operations, security and compliance, and governance with the cloud management solution. These teams often work through the following phases of multi-cloud maturity (but some skip around):

>> **Visibility:** Without visibility across all clouds broken down by business group, companies struggle to predict and forecast cost, identify security vulnerabilities quickly, and maintain consistent infrastructure. Cost is often the first area that an organization will tackle in regards to visibility; however, usage, configuration, performance, and security are all equally important, if not more so.

>> **Optimization:** This is the process of finding opportunities to be more efficient, whether it's in cost savings, time savings due to operational improvements, or tightening security parameters. A common best practice is to document approaches most beneficial for use across teams.

>> **Governance and automation:** Effective governance is not about strict adherence but rather about setting up suggested barriers that, if run through, could cause significant damage to the business. Yet defining the *ideal state* (from a use, cost, and security perspective) is key to discovering drift. After you establish governance policies, you can automate response and remediation of them. This frees up staff time for more critical tasks, which becomes increasingly important as app adoption and use across clouds increases or accelerates.

>> **Business integration:** The CCoE can help all teams understand exactly how cloud strategy drives business transformation and impacts the most pressing corporate goals.

Chapter **5**

Exploring Modern Cloud Management and Its Benefits

B y now, you understand that apps are your organization's oxygen. Without them, it's hard to survive — let alone thrive. You also know that apps drive cloud and IT strategy to serve the needs of the business. That means your organization's cloud infrastructure and services must excel at providing your developers the agility they need while improving operational efficiency and keeping costs in check.

But driving digital transformation by exploiting cloud infrastructure, services, and tooling requires a different business-technology relationship model. It takes powering your evolving cloud operating model with a modern cloud management solution.

The previous chapters focused on people and processes in support of your transition to a cloud operating model. This chapter explores the must-have cloud management solution capabilities you need.

Grasping the Realities of the Cloud World

It's not all that surprising that business and IT leaders aren't on the same page when it comes to cloud-driven transformation.

Lines of business with new technology spend may see cloud adoption and the latest and greatest cloud services as a way to power multi-modal customer experiences and innovative business models. Some may ask their developers to create and deliver new ways of engaging in the digital-first world through cloud-native apps, modern languages, and microservices-based architectures for speed. Others may turn to multiple public cloud providers for advanced processing power or artificial intelligence (AI) or machine learning (ML) so they can run analytics and improve front-office and web-based apps.

At the same time, internal IT teams may see cloud as an ideal path to easily migrate workloads when they're needed for high-traffic-period bursting and disaster recovery or to give teams software as a service (SaaS) productivity apps. Others in IT may see cloud as a risky, free-for-all strategy or even as a threat to their very existence, especially if they spend lots of time supporting legacy infrastructure. The reality is somewhere between mindset extremes.

Reality check

A great majority of organizations are still operating in a mixed-mode IT world. Their environments are becoming increasingly disjointed and siloed with limited visibility. That makes it challenging to optimize IT and cloud finances and easily provide consumers and customers with on-demand services. It's going to be this way for the foreseeable future — at least until business leaders, enterprise IT, and regulators agree on a cloud path forward.

The good news is that there's a solution. From whatever position your team is starting, investing in the right tools and capabilities will help build confidence and move your organization forward to cloud success. Modern cloud management from VMware delivers complete visibility and guardrail governance whether you're:

- » Onboarding new public cloud services
- » Building new private or hybrid cloud services
- » Growing and managing existing cloud services

Different journeys but similar goals

Organizations on different digital transformation journeys can take advantage of the same cloud management solution to achieve these key goals:

- » **Speeding up infrastructure and app delivery:** This is the key to gaining a market advantage.
- » **Assuring performance:** Performance is not only about uptime, but also about creating satisfied and loyal customers.
- » **Optimizing cloud costs:** Reining in your costs and optimizing utilization improves the bottom line.
- » **Reducing risk:** Controlling your multi-cloud environment by simplifying financial management, strengthening security, and automating compliance.

Multi-cloud and hybrid cloud are all about giving organizations flexibility and choice, and VMware Cloud Management is designed to do just that. For example, it works just as well for organizations that started on-premises with a VMware private cloud and are now expanding to hybrid cloud and native public clouds as it does for those born-in-the-cloud companies realizing that some workloads need to be on-premises. No matter where your cloud journey started or will end, VMware Cloud Management supports and accelerates cloud adoption at every step along your cloud journey.

Consistent operations

VMware Cloud Management provides a consistent control plane for the multi-cloud world. Essential operational capabilities delivered by the same management solution provide visibility, remediation, planning, optimization, automation, security, and governance to properly manage and operate systems and apps across multiple cloud environments. With consistent operations, you can rest assured your cloud investments are continuously optimized, effectively governed, and highly secure.

INFRASTRUCTURE CONSISTENCY IS KEY

A hybrid cloud approach, especially for companies with extensive data center investments looking to take advantage of public cloud, is where most VMware customers begin. If that's you, keep reading. If it's not, jump to the "Flexible consumption" section.

Consistent infrastructure — such as VMware Cloud as your digital foundation — gives you access to a much wider ecosystem than you can build yourself. This increases your choices in where and how you build and run your apps and services while taking advantage of the full VMware portfolio to protect, connect, and manage these. With consistent infrastructure, the business can freely adopt the best and most relevant cloud services with the utmost confidence they'll interoperate. And you get the added benefit of not retraining staff, because they're already familiar with VMware infrastructure and management.

Flexible consumption

Flexibility and choice extend to how VMware delivers cloud management, too. VMware Cloud Management capabilities are available on-premises and in a SaaS model, or you can enjoy one universal subscription for on-premises, SaaS, or a combination of both (a hybrid approach) in a single license. This enables you to adopt a cloud-first model at your own pace while protecting your existing investment or flex when you have unexpected spikes.

Seeing Why Cloud Provider Tools May Not Be Your Best Bet

Because many enterprises in traditional industries weren't "born in the cloud," they run a mix of public and local resources consisting of a patchwork set of legacy and modern app architectures. That makes it impossible for the enterprise to use just one set of cloud provider tools to manage hybrid environments.

WARNING Even if hyperscalers say you can optimize your hybrid or multi-cloud with their management tools, beware. Doing so is unlikely to reduce your cloud costs, boost innovation and agility, or protect your business. All too often, teams are caught struggling to broker services among clouds and software-defined data centers (SDDCs) with consistency, control, and visibility. Let's face it: It's not in one cloud provider's interest to let you easily migrate workloads between multiple clouds.

Understanding What VMware Delivers

There is certainly a core set of operations that individual teams can perform for a particular cloud. But to truly implement a multi-cloud operating model, you need consistency, visibility, automation, financial management, operations, governance, and more across the cloud silos you have today. And this is VMware's sweet spot. No matter what cloud you choose, which service development and deployment approach you prefer, or what business objective you're trying to achieve with cloud, VMware Cloud Management has you covered.

Essential capabilities

VMware Cloud Management's features are all complementary in support of your cloud operating model. This offers huge agility and flexibility bonuses for your organization.

The following sections cover some of the specific capabilities of VMware Cloud Management that boost the three competencies we cover in Chapter 3.

Service delivery

If operating like a cloud provider is your priority, VMware Cloud Management can make that happen. It automates provisioning while offering a modern self-service consumption experience to your developers, so you can deliver a rich set of services via easy, self-service access.

From the provider perspective, VMware Cloud automation enables you to create cloud-agnostic service templates and automate provisioning. This helps DevOps for infrastructure because it enables automated, consistent service delivery across virtual machines (VMs), Kubernetes (K8s), and native clouds. Your teams can also apply DevOps best practices to infrastructure management, such as infrastructure as code (IaC) and continuous integration/continuous delivery (CI/CD).

From the consumer perspective, VMware capabilities support developer agility with on-demand access to curated cloud services. They also enable developers to integrate infrastructure components into app pipelines.

Operations

If optimizing performance at minimal cost is your goal, cloud management from VMware boosts operational excellence. Continuous performance optimization assures app performance by giving workloads the resources they need when they need them. Capacity and cost analytics help you plan for the future by providing app discovery and dependencies that enable you to make intelligent decisions about where to deploy new projects, when and what to migrate, and how to correctly migrate. Teams can take advantage of intelligent remediation and the ability to adopt cloud best practices for proactive, self-driving operations. They also gain app-aware visibility across cloud infrastructure and resources.

Governance

If reducing cloud complexity and risk is your priority, cloud management from VMware provides guardrail security, compliance, and fiscal control and governance for a host of consumers and providers, giving them the freedom and flexibility to work as they want. Cost optimization, showback capabilities, and chargeback capabilities help keep costs in line by helping you make more informed app placement and resource utilization decisions across clouds. DevSecOps processes are smoother as teams share the burden and responsibility of managing cloud costs while enforcing security and compliance across cloud workloads. They also protect app workloads from misconfigurations and security vulnerabilities.

No matter which operating competency you choose to focus on first, you'll have all the support for your cloud operating model you need to develop all three.

The VMware difference

Unlike point products and hyperscaler tools that deliver only a piece of required functionality, and unlike large software vendors that offer only one deployment choice, VMware Cloud Management is the only tool you need. It's a customer-trusted, industry-leading cloud management solution, offering the most comprehensive capabilities and unmatched deployment flexibility.

The benefits of supporting your cloud operating model with VMware Cloud Management include

>> A modern, consistent user experience for multiple personas

>> Operational consistency across environments

>> Support for lines of business with agile service offerings

>> The flexibility of cloud without increasing business risk

Identifying the Four Key Benefits of VMware Cloud Management

REMEMBER

Many cloud management tools and platforms promise big returns, but VMware Cloud Management delivers. It gives you an experience that makes cloud complexity invisible so you can focus on transforming your business. You get comprehensive benefits and capabilities — across service delivery, operations, and governance — to power your cloud operating model, so you don't have to sweat the small stuff. Figure 5-1 outlines four key areas that benefit. The following sections look at those areas in more detail.
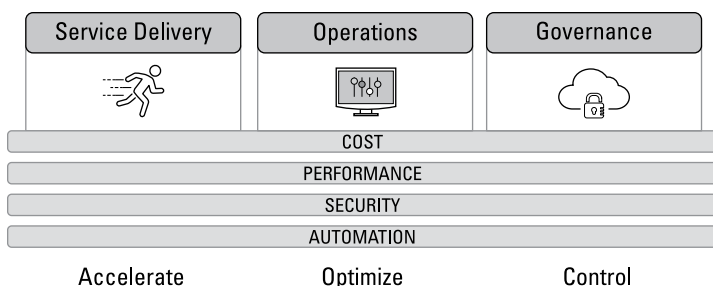
FIGURE 5-1: Key benefits of VMware Cloud Management.

Simplifying financial management

Organizations often start looking at public cloud as a way to lower expenses, but without good discipline, costs can escalate quickly. Executives are often surprised when the invoices turn out to be significantly larger than initial estimates. Leaders ask questions like:

>> How did we spend so much?

>> Who is responsible?

>> Why aren't we more efficient?

Because IT organizations struggle to provide data that accurately reports the cost of similar resources in their own data centers and private clouds, business leaders have no true basis for comparing the cost of in-house services against public cloud consumption. That's when you get finger pointing.

Cloud management from VMware brings total cost of ownership (TCO) visibility for public and private clouds into a single place. You can continuously analyze and report spending by cost center, drive accountability against budgets, and discover opportunities to lower your cloud spend without increasing business risk.

Some of the key financial governance benefits include

>> **Budget management:**
   ● Learn which departments, teams, projects, or apps are accountable for driving cloud cost and usage and hold them accountable with chargeback and showback.

- Track these patterns over time to accurately forecast future budgets and reduce miscalculations.

>> **Custom cost reporting:**

- Correlate datasets for analysis and reporting against your business objectives.

- Easily build reports and dashboards across dimensions to perform granular analysis on cost, usage, and asset data.

>> **Reservation management for public clouds:**

- Take advantage of cloud provider commitment discounts to reduce operational costs.

- Reduce the amount of time spent manually managing reservations and savings plans using modeling, optimization, and amortization capabilities.

- Manage discounts throughout their entire life cycle to maximize savings.

>> **Cost governance:**

- Build policies that monitor your environment for opportunities to reduce wasted spend and optimize costs.

- Proactively alert stakeholders when cost centers are forecasted to exceed predefined budgets or spending anomalies are detected.

- Enable automated actions to execute changes in your environment.

EXPERIAN SCALES AND SAVES

As Experian's cloud environment grew rapidly, the team chose to implement a cloud management solution from VMware that could simplify financial management, achieving:

- $1.7 million in cloud savings and optimization opportunities
- One hundred percent visibility into multi-cloud environment
- Deep cost analysis into cloud spend by region and asset deployment

Unifying operations and ensuring performance

The key to successful multi–cloud adoption is running private clouds at public cloud scale and public clouds with private cloud governance and security — all at maximum utilization while balancing costs and performance. VMware Cloud Management is extensible with many integrations and provides native support across hybrid and public clouds for consistent operations.

The solution's key unification and performance benefits include

» **Performance optimization:**

- Automate workload balancing and placement based on business and operational intent.
- Continuously optimize workloads.
- Schedule and automate rightsizing of workloads and other essential operation actions.

» **Capacity and cost management:**

- Ease Day 2 operations, including, capacity and cost optimization.
- Get proactive alerts if you are running out of capacity with guidance on possible actions.
- Visualize costs, including ROI, TCO, potential cost savings, and more.
- Reclaim wasted resources.
- Conduct bill analysis, cost optimization, and pricing.

» **Capacity and migration planning:**

- Speed up migration plans by assessing inventory and discovering app dependencies with a full view of network requirements and your security posture.
- Leverage "what if" scenarios to model future capacity needs and make decisions about where to deploy new projects, purchase hardware, or migrate to cloud.

» **Intelligent remediation:**

- Monitor and troubleshoot faster with AI for actionable insights.
- Correlate metrics and logs across on-premises and multi-cloud infrastructure and apps.
- Expand how you manage process, services, and applications.

- Unify visibility and monitoring for the entire cloud ecosystem from on-premises hardware to native public cloud services with one platform.

» **Kubernetes operations:**

- Monitor infrastructure supporting both traditional and Kubernetes deployment health.
- Auto-discover Kubernetes clusters, nodes and namespaces, and visualize Kubernetes cluster topologies, including namespaces, replica sets, nodes, pods, and containers.
- Monitor Kubernetes performance, get alerts and report on capacity, configuration and inventory of clusters or pods.

» **Integrated compliance**

- Enforce IT and regulatory standards and automate drift remediation.
- Ensure your environment's adherence to common compliance templates — including those for Payment Card Industry (PCI), Health Insurance Portability Accountability Act (HIPAA), Federal Information Security Management Act (FISMA), Defense Information Systems Agency (DISA), or Sarbanes–Oxley (SOX) Act — or create your own custom templates.

» **Network operations:**

- Securely and confidently manage your network at scale with intelligent app discovery, network optimization, analytics, and troubleshooting with assurance and verification.

PROVIDENT MÉXICO ACCELERATES CLOUD JOURNEY

Provident México adopted cloud to boost business growth, achieving business benefits from VMware Cloud on AWS with VMware Cloud Management.

Thanks to VMware Cloud Management, the company realized these benefits:

- **Two-year migration time savings:** It was able to complete cloud migration in just five and half months due to accuracy of information.

(continued)

- **Less capacity:** It discovered that 30 percent less capacity was needed in the cloud by comparing on-premises consumption to cloud capacity.

- **Improved efficiency:** It simplified IT management, enabling just two staff members to monitor and maintain 300+ servers.

- **Lowered risk:** It reduced their security vulnerability by enabling rapid discovery of app and networking dependencies.

Strengthening security and compliance

With cybercrime on the rise, your organization needs to be extra vigilant about preventing security breaches. At the same time, you need to comply with ever-changing industry and government mandates — without overburdening already-busy staff. VMware Cloud Management helps you better manage security and compliance risk from cloud to Kubernetes.

Some key security and compliance benefits of the solution include

» **Continuous compliance and configuration management:**
  - Define optimized, compliant software states and enforce them across your entire environment — virtual, hybrid, and public cloud — with powerful, intuitive configuration automation.
  - Benchmark and enforce compliance with government and industry standards across your entire environment — virtual, hybrid, and public cloud — with powerful, intuitive configuration automation.
  - Uniquely define company specific regulatory needs with custom compliance frameworks.
  - Report compliance by cloud provider type and individual teams within the company.
  - Facilitate compliance audits with easy access to 13-month data history.

» Multi-cloud search and investigation:

- Quickly search assets and associated relationships with real-time, global search for multiple public cloud providers.

- Discover new vulnerabilities in minutes with a query language that makes it easy to build custom rules.

- In one view, correlate risk due to misconfigurations and threats data from third-party findings.

- Streamline investigations by exporting security findings to other Security Operations Center (SOC) tools.

» Security posture management:

- Prevent unauthorized access to data and cloud accounts with real-time visibility into misconfigurations and threats.

- Prioritize security findings based on intelligent detection and risk scoring.

- Understand security findings with visual context that includes relationships, risk score, metadata, and activity logs.

- Quickly resolve risky findings by alerting service owners, automating remediation, and suppressing false positives.

» DevSecOps

- Shift-left security to proactively detect misconfigurations earlier in the CI/CD pipeline.

- Automatically prevent risky misconfiguration mistakes with security and compliance guardrails.

- Increase collaboration through flexible security interfaces for IT, DevOps, engineering, and security teams.

- Drive business and IT outcomes by building additional integrations with DevOps, IT, and security tools using rich application programming interfaces (APIs).

DISCOVERY HOLDINGS

"CloudHealth Secure State not only identifies any potential issues, but it also ranks them in order of risk. It means we're more effective in focusing our attention on the most critical risks."

—John Marais, Senior Platform Services Manager, Discovery Holdings

Improving cloud automation

Even though cloud is a relatively new model, a big challenge for today's enterprises is how to ensure cloud doesn't become the next great IT silo. In practice, this means preventing the use of fragmented tools, incompatible features, APIs, and automation constructs that inhibit visibility and governance across clouds.

Cloud management from VMware includes automated features to take care of everything from service delivery to self-service consumption interface.

Some key automation benefits of the solution include

>> **Self-service cloud:**
  - Automate provisioning across on-premises and infra-structure as a service (IaaS)–based environments.
  - Give users a unified and consistent self-service catalog with content aggregated from multiple resources, platforms, and native public clouds.
  - Rapidly provision resources via cloud templates, orchestration workflows, infrastructure and app pipelines, and action-based extensibility (ABX) actions.

>> **DevOps for infrastructure**:
  - Support GitOps-based iterative development with enterprise-ready IaC and infrastructure pipelining capabilities.
  - Harden open-source technologies (such as Terraform and Ansible) for enterprise requirements around governance and collaboration.

- Offer a low-code, API-first interface to provide options across teams with different skill sets and development requirements.

» **IT automation:**

- Get event-driven automation to detect and auto-remediate critical issues before they impact the business.
- Manage patches, orchestrate system maintenance, and enable full-scale remote execution to maintain critical business system performance and efficiency.

» **Kubernetes automation:**

- Enable Kubernetes cluster management, self-service, and app deployment in a mixed virtualized and Kubernetes infrastructure with a unified governance and consumption model.
- Provide the ability to manage and govern Kubernetes clusters and namespaces, as well as discover and import clusters.
- Empower developers to request Kubernetes clusters and namespaces via self-service from a catalog.
- Enable Kubernetes app deployment on clusters from pipelines.

» **Network automation:**

- Enable IT and users to easily deploy, configure, and manage production-ready apps with network and security services from a service catalog or programmatically via API.

IHS MARKIT

"With VMware Cloud on AWS and vRealize Automation Cloud, we can provision and manage infrastructure the same way, whether it's on public cloud or private cloud. That's enabling us to fundamentally transform how we run IT."

—*Kory Grinberg, Director of Infrastructure and Automation, IHS Markit*

A cloud operating model powered by a cloud management solution is an imperative, and Forrester, IDC, Gartner, and Omdia consistently recognize VMware Cloud Management as an industry leader. In Forrester Total Economic Impact studies, customers report gaining hours back in productivity, speeding up deployments by a week, and reducing unplanned downtime by 93 percent.

Beginning Your Journey

REMEMBER

Because multi-cloud is the future, a consistent cloud operating model is imperative. By simplifying management and eliminating complexity, your organization can become more efficient. You can achieve greater agility at lower costs as you accelerate your business. Best of all, a consistent cloud operating model redirects IT focus from managing IT to building and delivering services and apps that differentiate your organization and drive competitive advantage.

Chapter **6**
Ten Key Questions (and Answers)

There's really no secret to getting your cloud operating model right. It's a stepped process that starts with business, app, and cloud strategies and succeeds with the right cloud management solution.

From knowing what it is to where you go to take a test drive, this chapter has the answers you need to ten key questions around understanding, creating, and powering your cloud operating model.

Where Should We Start When It Comes to the Cloud Operating Model?

Leaders generally prioritize one of three key cloud operating model competencies to begin: service delivery, operations, or governance. Modern cloud digital infrastructure underpins all of them (see Chapter 3). After you choose your first competency, you can move forward in defining your consumer and provider personas (see Chapter 4).

What Needs to Be in Place Before Defining the Cloud Operating Model?

You should first define your business, app, and cloud strategies. This will help you drive the most strategic use of cloud services and avoid pitfalls. You may also want to define your data strategy, too. With those strategies documented, you can begin to establish your cloud operating model and choose your cloud management solution.

What Should We Expect to Change?

No matter which business, app, and cloud strategies — private, public, hybrid, or multi-cloud — your organization adopts, you should be prepared to reimagine the way your people, processes, and technology work. The cloud operating model will help you gain the greatest advantage from your cloud strategy by simplifying the adoption, management, security, and control of cloud technologies.

Why Do We Need a Cloud Management Solution?

Whether you're just starting your cloud journey or you already have workloads in multiple clouds, bringing consistency to service delivery, operations, and governance enables your organization to be more efficient and better support the needs of the business.

What Benefits Can Our Organization Expect?

A consistent cloud operating model — across private, hybrid, public, multi-, and edge clouds — provides these benefits:

» Optimized financial management across clouds
» Reduced risk through inherent security and compliance

- » Unified operations and visibility for predictable performance and stability
- » Improved cloud automation for greater efficiency
- » Increased developer productivity and agility through automated service delivery

Why Do We Need VMware Cloud Management?

By leveraging VMware Cloud Management, you're empowered to adopt a cloud operating model that:

- » Speeds up the delivery of infrastructure and apps (for competitive edge)
- » Optimizes your cloud costs
- » Reduces your risks

Why Not Use a Native Cloud Management Solution?

Cloud providers with their own tools focus only on their clouds, not on hybrid or multi-clouds. But that's not what businesses want or typically need. VMware Cloud Management delivers a single control plane to help organizations effectively manage their complex multi-cloud environment. When combined with people and process, it's built to fuel the cloud operating model.

Is There a Particular Digital Foundation That Works Best?

Yes, of course, we think so. It's VMware Cloud Foundation. With it, you get consistent infrastructure — compute, storage, networking, management — across on-premises and public cloud environments.

What's the Benefit of Technology-Led Transformation?

Aligned business and IT strategies drive cloud-driven transformation. And technology-led change can accelerate the journey. Leading with technology rather than people or process consulting helps inform your strategies and cloud operating model by giving you quick returns — and wins — so you can show value fast. And that's what stakeholders want!

Where Do I Test-Drive VMware Cloud Management?

Visit the VMware web site at `www.vmware.com/cloud-solutions/multi-cloud-ops.html`.

Make cloud your business!

The speed of your digital transformation journey should match that of your business. A cloud operating model — powered by modern cloud management — can align your business goals with your application, data, and cloud strategies. Whether you're just starting out on your cloud journey or you're well on your way, there's considerable value in ensuring you have the right cloud operating model to take you forward.

Inside…

- Defining the term cloud operating model
- Understanding why you need one
- Aligning your app and cloud strategies
- Integrating people, processes, and technology
- Managing private, hybrid, and public clouds
- Identifying critical cloud management capabilities

vmware®

Mandy Storbakken is a VMware Cloud Technologist, sharing her cloud implementation experiences and guiding customers through the world of DevOps. **Martijn Baecke** is a VMware Cloud Technologist helping customers achieve business value and drive digital transformation with cloud architecture. **Ellie Ruano** is a member of the VMware Cloud Management team and an author on topics about cloud management, SaaS, mobile security, and conferencing.

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