
Hewlett Packard
Enterprise
cloud.nxt
Expert advice to help you get the most out of your cloud transformation.

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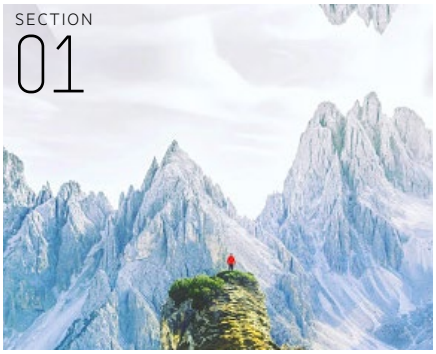


INTRODUCTION

As with any disruptive technology, cloud brings fundamental changes to how enterprises must approach their technology stack, their people and processes, and the economics of their businesses.

This has resulted in nearly every company adopting some form of cloud technology—often in a very ad hoc manner—and many are still struggling to achieve their desired result: improved business speed and agility.

The cloud landscape today is also growing in complexity. Most companies continue to struggle to find the right mix of public, private, and hybrid environments.

Common barriers to cloud that your business may be facing are inability to manage costs, lack of alignment, and skills gaps, among others. ■

FIGURE 1: **BARRIERS TO SPEED IN A CLOUD-ENABLED WORLD**

01

PREPARING FOR YOUR CLOUD TRANSFORMATION

How to do cloud the right way: 7 best practices for success.

SUCCESS FAVORS THE PREPARED

Moving to the cloud is a good thing, but it is critical that an organization proceed with guidelines and best practices in mind, as transforming from on-premises to hybrid cloud-based IT requires more than an understanding of the technology. Here are some helpful hints to get you started on your cloud program journey.

No. 1: Define cloud

First and foremost, what does cloud mean to you and your organization?

Cloud is not a destination but an experience.

This sounds like a simple question, but everyone seems to have a different answer, and making sure you're correctly defining cloud can have far-reaching impacts for your organization. Some say cloud is automated virtualization on premises, because users can request virtual machines quickly, and others say it is software as a service (SaaS) that powers their business. Some might counter that cloud is about using the native capabilities of public cloud providers such as Amazon Web Services (AWS). And then there are others who argue that cloud is not a destination but rather the way IT should operate to deliver value.

Cloud is not a destination but an experience. Cloud is a *different operating model* for IT, where infrastructure becomes code, functions become fully automated, and both infrastructure and application code are launched into live production environments without the constraints of release windows. Cloud is also a world where human error and inefficiencies are virtually eradicated when implemented and configured correctly.

Before you embark on your cloud journey, figure out what cloud means to you and how that definition aligns with your organization's goals.

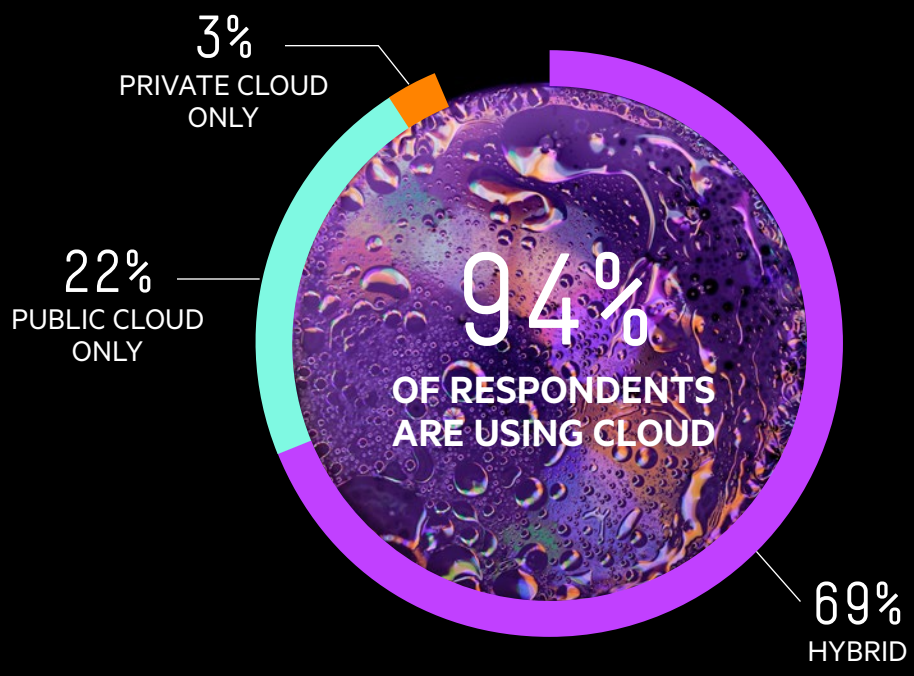
No. 2: Determine whether cloud is right for you

The next question to answer is, "Why cloud?" If you've read Simon Sinek's book *Start with Why*, you might remember the line, "People don't buy what you do; they buy why you do it." The cloud experience significantly changes the way enterprises currently operate their businesses. This change impacts people, process, and technology, and, by far, the people aspect is the most difficult—and the most impactful. If you want your teams to follow you on this journey, they need to buy into *why* you are doing it.

Conducting cloud adoption workshops before starting cloud initiatives enables you to openly discuss the hidden issues, face fears, understand and agree (even in principle) on the desired outcomes, and generally get aligned with the "why." The consensus and shared vision established during these workshops allow the company to more easily overcome the various issues you may encounter along the cloud adoption journey.

For example, a common issue is not getting security and governance groups involved early enough. Teams can get defensive and even adopt a "not our problem—you should have asked earlier" attitude, which of course has a negative impact on progress. This is not because they are not interested in helping, but because they are put on the spot and being told what to do instead of being included as part of the solution from the start. Prevent the finger-pointing by getting consensus early.

FIGURE 2: **RIGHTSCALE'S 2019 STATE OF THE CLOUD REPORT**



Source: RightScale 2019 State of the Cloud Report from Flexera

The key benefit of getting consensus and addressing the question of why is that it makes you think through the problems you are trying to solve. Cloud, as good as it is, might not be the right answer for everything.

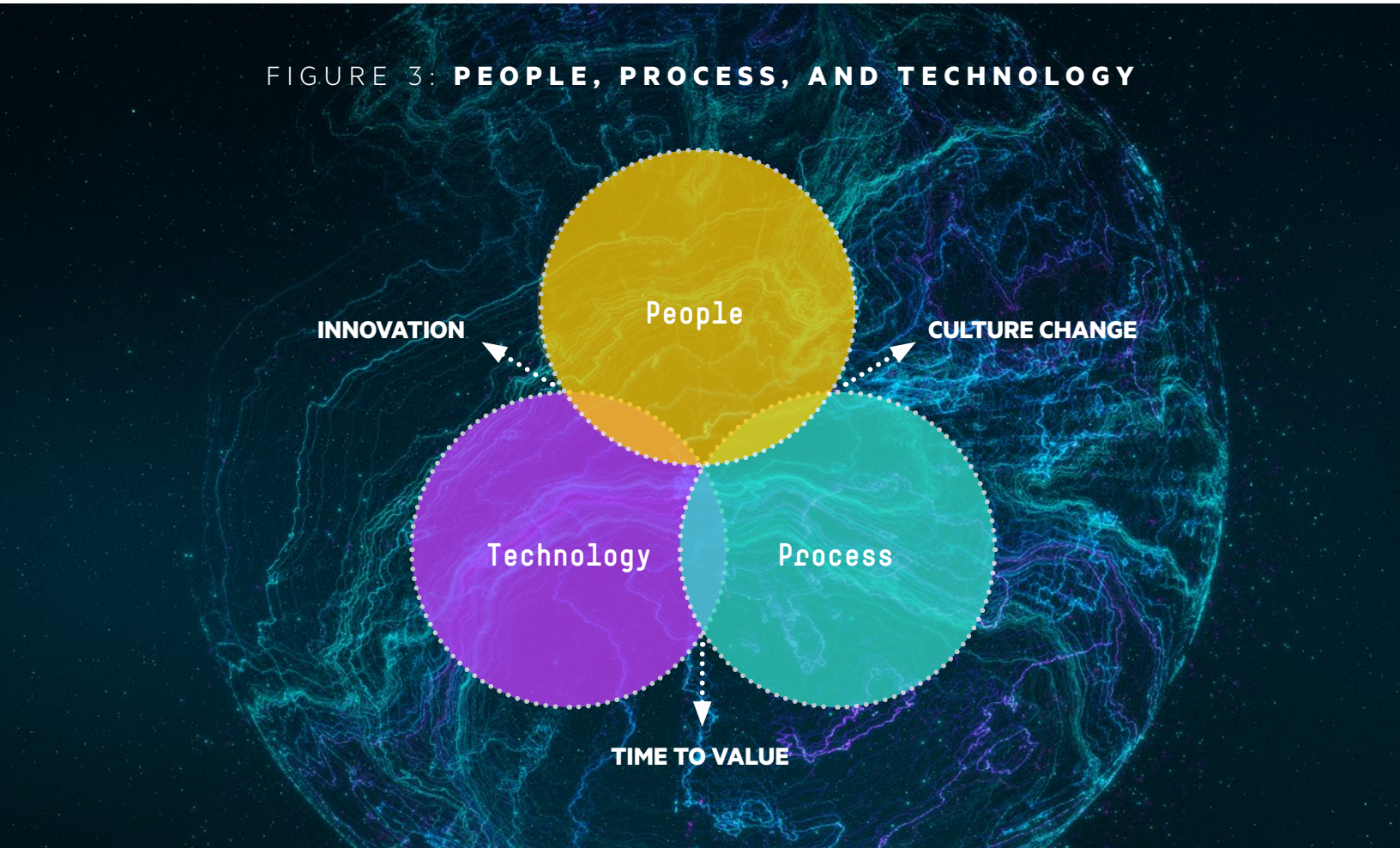
Consider the classic people, process, and technology intersections shown below in Figure 3.

People, process, and technology make up the what of any transformation, including cloud adoption, but they are not the *why*. There are different "whys" you might identify. The three most common drivers for "Why cloud?" are:

1. Culture change is at the intersection of people and process. Companies need to break away from the status quo and the "we have always done things this way" mentality.
2. Time to value is realized by getting the best out of process and technology. It is not just about the automation of software deployments but rather improving the entire value chain.
3. Innovation is driven by people applying technology to come up with new ideas. Cloud certainly allows companies to experiment and innovate much faster than they were able to before.

Make sure you are clear on why you want to go to cloud, before you embark on the journey.

FIGURE 3: **PEOPLE, PROCESS, AND TECHNOLOGY**



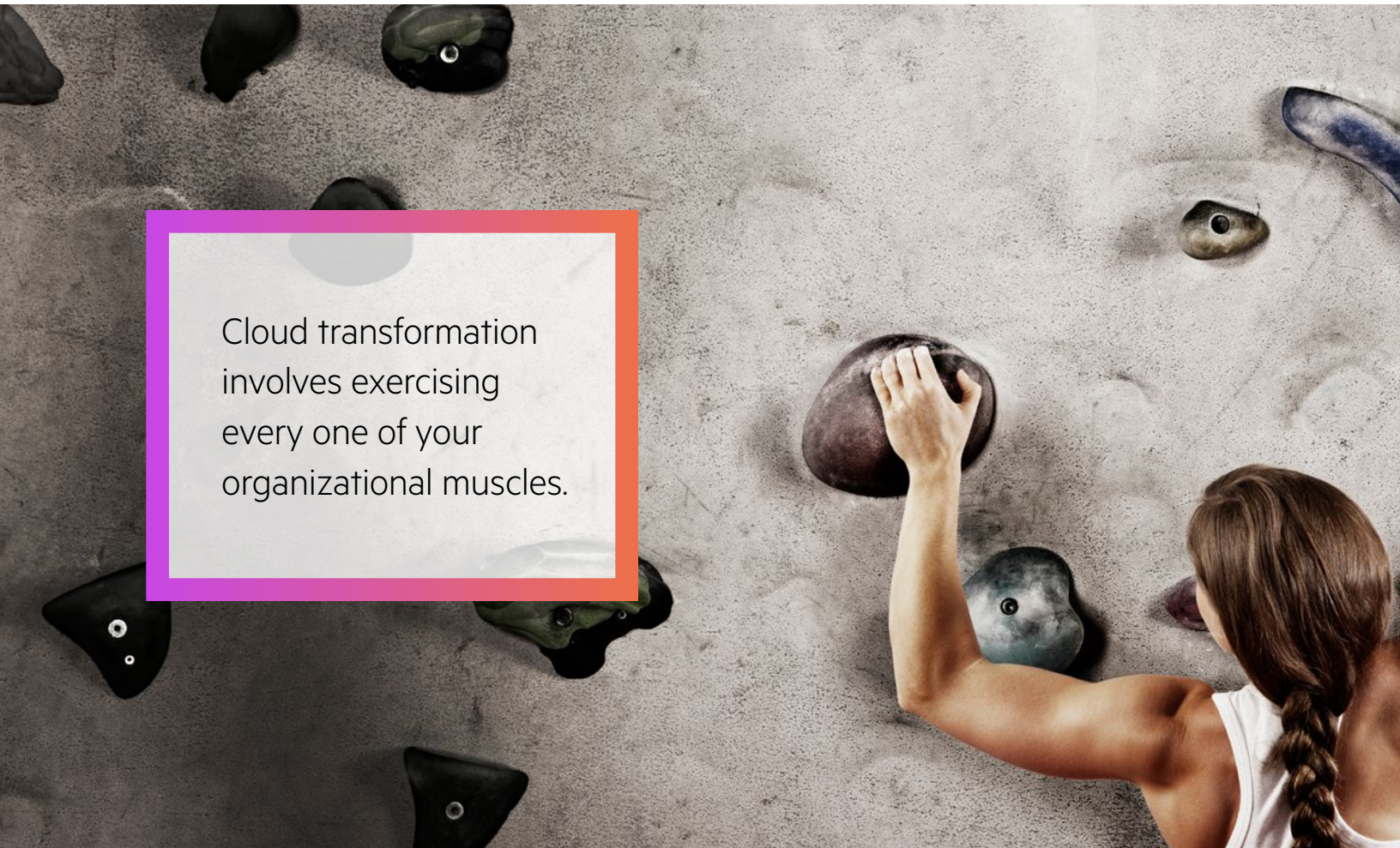
No. 3: Make sure the timing is right

Humans are creatures of habit, and change is hard. For some people, it is never the right time for change, and so-called analysis paralysis is prevalent in a number of organizations. On the other hand, just because cloud might be the right answer for you doesn't mean it is the right answer *right now*.

For example, if you have a long-term contract with your data center provider and still have a few years left, now might not be the right time for cloud. Or, if you just made a significant investment in your on-premises infrastructure, you may have to wait a couple of years before taking on additional financial obligations.

But the biggest reason the time may not be right is that the organization is not ready for the change. For example, you might be going through a number of changes already (an acquisition, a reorg, a new ERP system implementation) and do not have the capacity to absorb more structural changes. Cloud transformation involves exercising every one of your organizational muscles, so you need to be truly ready to do that. The simple "sure, sure, we will just deal with it when it comes" approach is not going to work. You need to be truly prepared to face the challenges ahead.

So, are you ready for change, and is everyone aligned with what that entails?



No. 4: Establish a Cloud Business Office

Cloud adoption will have an enormous impact on your company, evolving processes that have not been seriously touched in decades. For the first time, developers are able to create and modify their infrastructure requirements using software. The implications of such power are both dazzling and frightening.

Software development has lived in a static world of change management, where the critical nature of the business impact has created tight control processes and long approval cycles. Thus, the need for a Cloud Business Office.

The CBO serves as the central point of decision-making and communication for your cloud program, both internally and externally. More than a cloud center of excellence, the CBO is a permanent operational and governing body that directs and guides all aspects of your cloud program, from the first implementation through ongoing operations.

Members of the CBO fall into two categories: full time and part time. Full-time CBO members are leaders who have daily responsibility for the successful adoption, implementation, and management of cloud in your organization. These include:

- Cloud program leadership
- Technical operations leadership
- Chief architect(s)
- Security operations leadership

Part-time CBO members are leaders who have a vested interest in the success of the cloud program and need visibility into the process. These include:

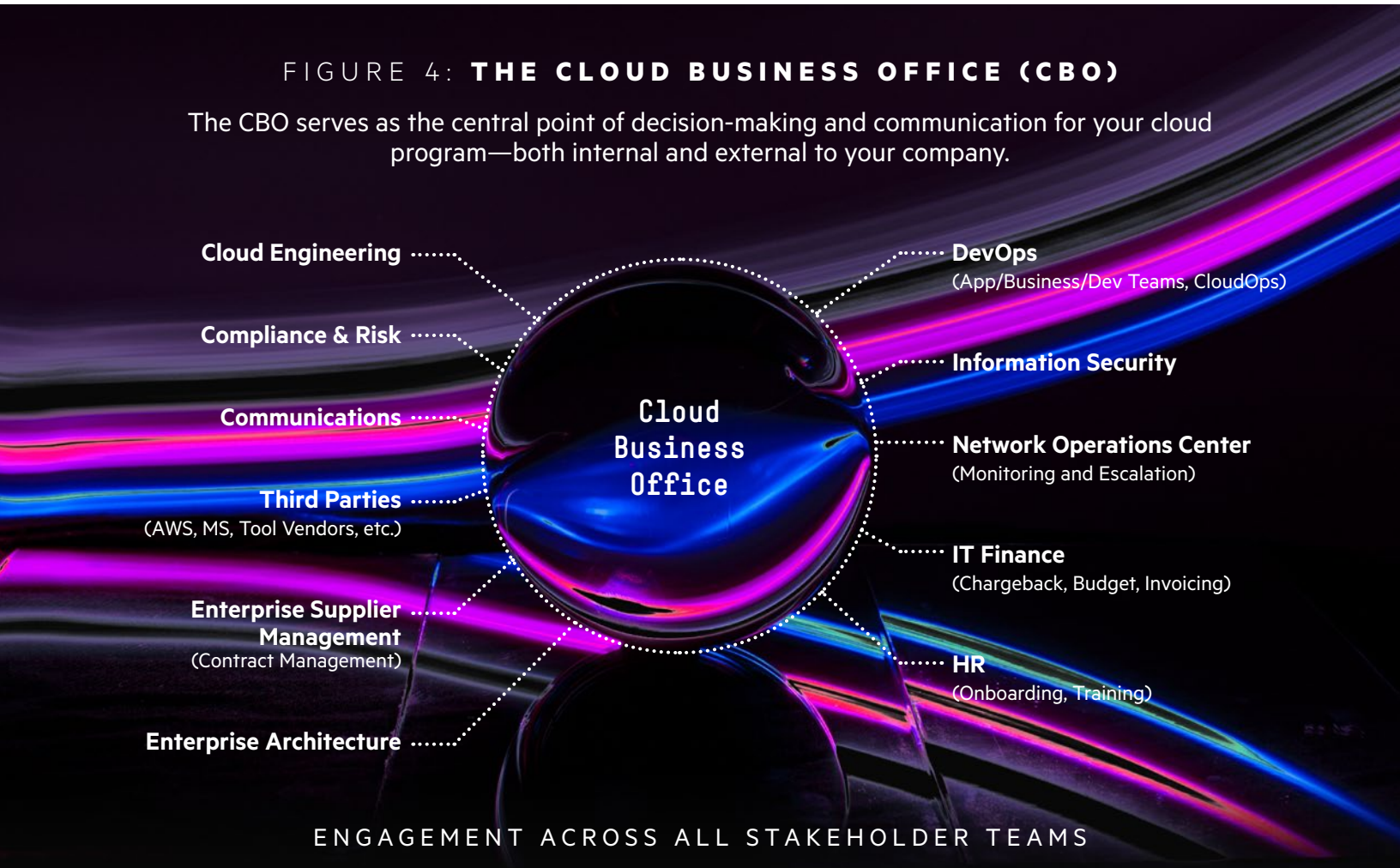
- Legal and risk leaders
- HR leaders
- Procurement
- IT finance
- Application owners and business units (BUs may have a full-time role for a short duration during their onboarding process)

The cloud has completely changed how we consume and operate IT. The agile nature of cloud technology enables dramatic benefits for the enterprise and touches almost every department within an organization. In addition, compared with on-premises environments, the cloud requires far fewer people to manage and operate it, so you need a tighter, more cohesive team to break down silos. Because you are combining operations, development, infrastructure, risk, and finance, you need a central set of processes (see Figure 4 below). These include:

- Project management
- Technical decision-making
- Application owner onboarding
- Technology training
- Risk/security decision-making
- Organizational change management and training
- Financial governance
- Operational services and governance
- Vendor management

FIGURE 4: **THE CLOUD BUSINESS OFFICE (CBO)**

The CBO serves as the central point of decision-making and communication for your cloud program—both internal and external to your company.



No. 5: Know your cloud economics

Understanding the economics of cloud adoption seems like a no-brainer best practice. As commonly seen, more than 50 percent of enterprises do not take the time required to determine the business case for moving to the cloud, probably because they "already know" it is a good thing. Nevertheless, an organization gains many valuable insights by building a business case and improving its understanding of cloud economics.

Cloud economics falls into two separate, and highly valuable, buckets. The first is a straight-line total cost of ownership analysis, along with hard cost savings. TCO compares the like-for-like replacement of on-premises services with cloud services. When determining your current costs, look at the whole package, not just server-for-server comparisons. Areas to consider include:

- Hardware and networking costs
- Downtime costs (planned and unplanned)
- Upgrade costs
- Disaster recovery/business continuity costs
- Service-level agreement penalties
- Deployment costs
- Operational support costs (day-to-day operations)
- Performance costs
- Costs of selecting vendor software
- Requirements analysis costs
- Developer, administration, and end-user training costs
- Cost of integration with other systems
- Quality, user acceptance, and other testing
- Application enhancement and bug-fix costs
- Physical security costs
- Legal, MSA, and contracting costs
- Replacement and takeout costs
- Cost of other risks (including security breaches)

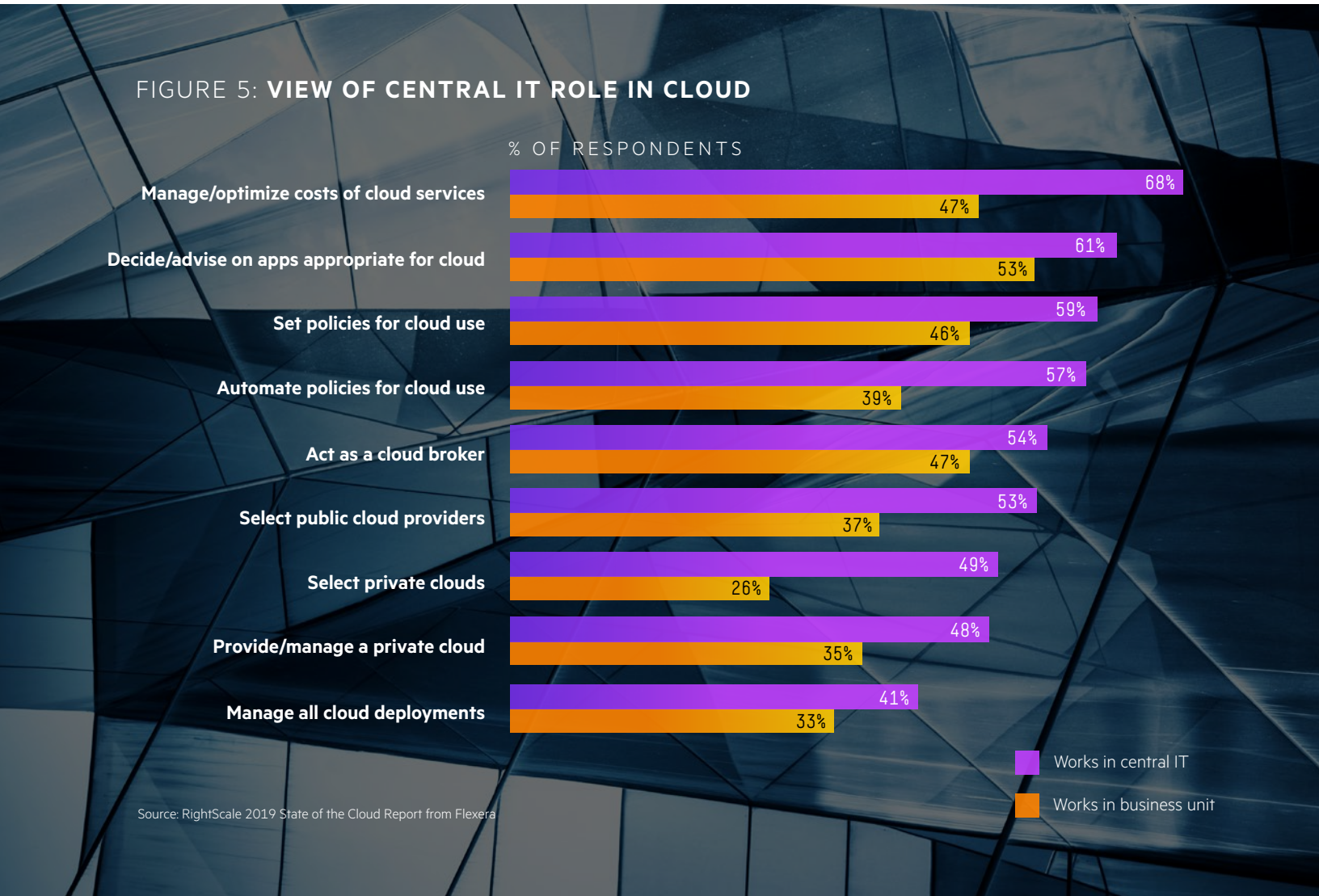
The second bucket of cloud economics includes agility and other soft costs. What is the benefit of having cloud-native, highly flexible, and agile infrastructure? What is the financial impact of decreasing provisioning times from months to hours? Quantifying these intangible cloud benefits for an enterprise can be difficult. Consider these questions:

- How do you measure the impact of productivity (in person-days)?
- What is the total benefit of accelerated application development?
- How do you measure the impact of faster software lifecycles?
- How do you measure a "fail fast" model?
- How much do human error and outages cost your organization?

Getting to solid answers around these topics is challenging; however, many companies have been able to determine tangible benefits. For example, one financial services company saw a 10 percent productivity gain in its software development after moving to AWS. On a $700 million budget, that gain is significant and can help build the business case for a cloud-native commitment.

Finally, it is a best practice to track your financial KPIs as you build your cloud program. Your economic model gets better over time, as you add more and more use cases.

FIGURE 5: **VIEW OF CENTRAL IT ROLE IN CLOUD**



Source: RightScale 2019 State of the Cloud Report from Flexera

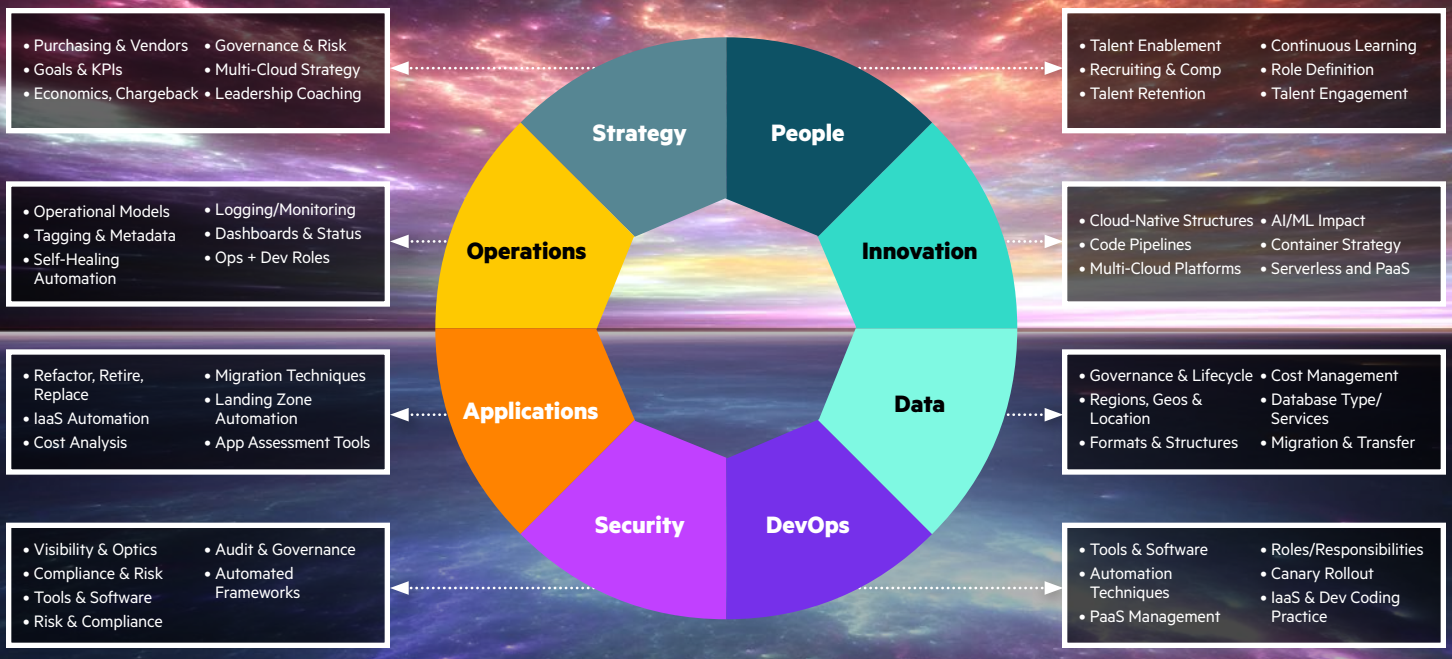
No. 6: Execute well

To do something well, you have to know what you are doing. These are the what and how parts of the why, what, how trifecta. You have defined what cloud means to you and why you want to do it, and you've prepared yourself for the journey. Now, here's a look at what you should focus on and the actual execution.

The what

Companies are adopting the cloud to deliver more value to their end customers. They want to mature their operations so they can stay competitive by delivering value faster and more cost effectively. The right cloud initiative can fundamentally transform how a business operates, but it can be a daunting journey. Following a proven Cloud Transformation Maturity approach can help focus your team's priorities on the core components of a cloud transformation (see Figure 6 below).

FIGURE 6: **KEY CLOUD TRANSFORMATION MATURITY DOMAINS**



These maturity domains are all interconnected, and to be truly successful in the cloud, companies must address all of them. That does not mean you have to focus on every domain right away, nor that you should put the same amount of effort into each one. However, you should absolutely understand your current level of maturity first and identify your desired target end state so you can chart your course accordingly. Transformation takes time, so do not worry about boiling the ocean right away. Pick a couple of areas and begin the journey. Good candidates are typically the strategy and security domains.

The how

The majority of technical personnel at large enterprises adopting cloud either do not have the required skills or, more important, the time needed to focus on the new initiative. Oftentimes, they are busy supporting mission-critical applications every day, which does not give them enough bandwidth to dedicate to other work. Therefore, most enterprises choose a partner to help accelerate the cloud transformation and enable the IT staff to become capable and self-sufficient in the cloud over the long term.

Could an organization's IT staff do everything on its own? Maybe, but certainly not right away and not at the velocity a partner can help establish. Sometimes, there is a bit of healthy tension between the partner and internal IT, but you should resist IT's argument that it can do the same work with the same quality and in the same time frame as the partner. If it could, who would be doing IT's regular work?

The key thing to remember is this: It is not about "us vs. them." There is plenty of work for everyone. In the most successful projects, teams identify all the key stakeholders relevant to the undertaking and get their buy-in and participation out of the gate. The whole point is to accelerate your journey and enable your people, and it is easier to do those things when you have the right partner alongside you, instead of trying to do it alone.

No. 7: Keep learning

As noted, cloud is not a destination but a way of doing business, involving agility, lessons learned, and additional improvements. Whatever applications, operations, or services you end up migrating to the cloud, make sure you foster a culture of continuous improvement in your organization to keep getting the best you can out of the cloud. This includes constantly monitoring your spend, focusing on your security and compliance posture, and innovating based on the feedback you are receiving. Do not punish failure, but encourage innovation, creativity, and feedback. A shorter feedback loop will result in better software, quicker deployment of features for customers, more efficient operations, fewer issues, more cost savings, and better value. ■

MOVING FORWARD

When you think about cloud, consider these key questions to get to the heart of what cloud really is:

When your developers want to provision services on demand, can they do so automatically, without the need to fill out a help desk ticket?

Do your CISO and governance, risk, and compliance teams not only support your cloud transformation but advocate moving even faster?

Are you using the truly transformative services that cloud platforms offer today, or did you simply "lift and shift" VMs out of your data center into a public cloud?

Are you paying only for what you use—not just with AWS, Azure, or Google™ but also with your SaaS applications and even your on-premises hardware?

When you approach cloud with the right perspective and implement proven best practices and methodologies for a streamlined cloud transformation program, your company will achieve the greatest benefits with the least risk.

02

MAKING THE MOVE TO CLOUD

- Engaging talent
- Finding the right IT mix for your company
- Why continuous improvement is critical to master early in your cloud journey

ENGAGING TALENT: THE CLOUD TRANSITION MODEL FOR YOUR PEOPLE

Your move to cloud has a cutover date. Your people do not. Here are the steps managers should take to reduce uncertainty throughout their cloud transformation.

When cloud project leaders are asked how the transition to cloud is going, they usually default to technical types of responses: They have successfully closed two data centers, decommissioned 20 servers, moved 200 workloads, or cut the time it takes to do a certain task by 30 percent. These metrics are important, but they are not the whole story.

Cloud leaders often leave out the more immediate and often under-considered question of how the transition is going for the people.

Are people embracing the changes cloud is bringing to their daily work? Are they confident they can do their jobs well in a cloud-focused environment? Do they feel as valued by the organization as they did before? These are all valid issues workers involved in a cloud project are dealing with sometimes visible, sometimes under the surface.

Issues around change, of course, extend way beyond the cloud. And they crop up in every organization that brings on a new project, realigns departments, or merges with an outside group.

Are people embracing the changes cloud is bringing to their daily work? Are they confident they can do their jobs well in a cloud-focused environment? Do they feel as valued by the organization as they did before?

A transition model

The dynamics of organizational change are well laid out in William Bridges' Transition Model (see Figure 7). Bridges, the late author and management consultant, stressed the importance of managing transitions in the workplace. He described "transition" as the psychological process of adapting to change. In his model, transition consists of three phases: Endings, or letting go of the past; moving through a Neutral Zone; and making New Beginnings.

Transitions can be difficult to navigate in any field. For example, we know a technician whose job in a mammography lab was simplified significantly by her department's move from analog to digital systems. What used to involve multiple steps (prepping the patient, positioning multiple plates, taking multiple images) was reduced almost to the press of a button. Her job got easier, and the department became more productive. Patients were happy with the change, as appointments were shorter and they received results faster. Yet, the technician still struggled with the change, taking months to become comfortable with the new process.

This can also happen to employees involved in a cloud transformation initiative. Take systems engineers who are being transitioned to cloud architect positions. They are taking on an exciting new job that is important to the organization's move to the cloud, but it may not be perceived that way by everyone. As people are faced with change, they experience a series of losses: loss of control, loss of confidence, loss of competence, and loss of their identity. The systems engineers may have been happy in their old job. They were subject-matter experts, had deep knowledge of the organization, and knew who to go to and how to get things done. That legacy of knowledge may no longer be important in their new role, leaving them feeling less needed or important.

FIGURE 7: **KEY CLOUD TRANSFORMATION MATURITY DOMAINS**

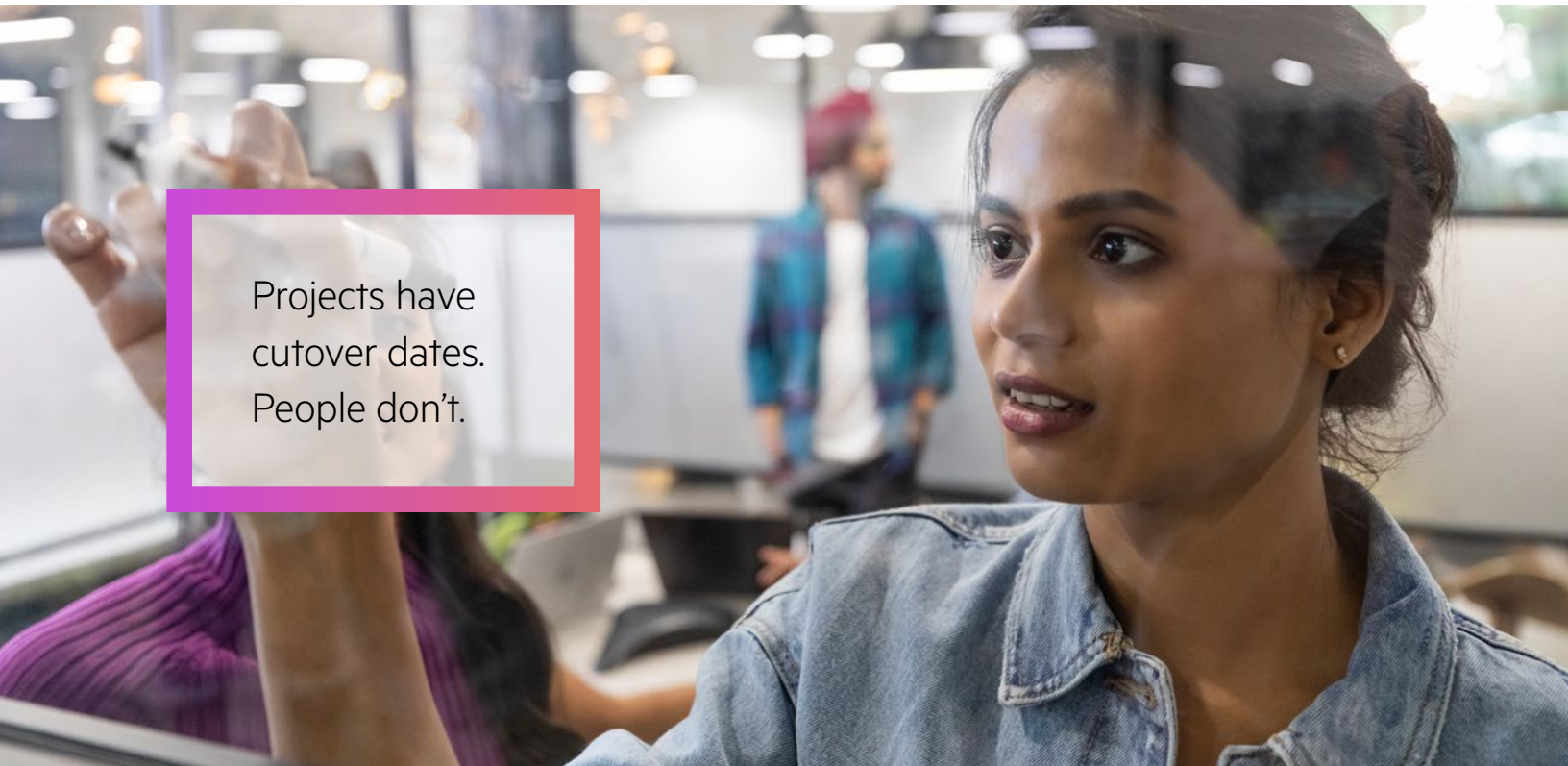
The human impact

Cloud makes organizations more agile. With cloud, iterations and changes can occur on a more frequent basis than ever before. This generates huge benefits for the company as a whole, helping it enter new markets and be more competitive, as well as meet customer demands more efficiently. But these changes also create human impacts organizations need to address. Changes in job titles, responsibilities, and even hours of work may not happen all at once or reach all corners of the organization at the same time. But what is certain is that a transition to cloud will eventually bring about more change.

In the Bridges model, some people do not adapt to change as well as others. They are reluctant to let go of the past. Organizations need to develop a strategy for them to move to the next phase, the Neutral Zone, where the past is gone but the new behavior is not yet fully formed. If the person is not embracing the changes brought about by cloud, leaders should not instantly conclude that the person does not "get it." Leaders should instead ask themselves whether they are providing the information and learning resources to help people through the change.

Managing employees during a cloud transition is about much more than just learning new technical skills. In the cloud, the way things are done is entirely different. Going from a waterfall-type project management model to agile, Scrum, DevOps, and continuous delivery represents a totally new way of operating.

Cloud also breaks down silos, requiring employees to work with business units they may not have interacted with before. Now the employee has to engage in a cross-functional team with new people and unfamiliar skill sets.



Seventy percent of change initiatives fail because the people part of the equation is left out. Leaders have to explain clearly to a person that their move to become a cloud technologist will involve changes in their work process, title, and role in the organization. When change happens, the person needs to know what is changing, how it is changing, and why it is changing. Specifically, employees need to know what you want them to stop doing, start doing, and continue doing.

Cloud requires more than just retraining

When it comes to cloud, retraining is a given. However, managers do not always do the proper amount of retraining, and they seldom prepare their employees for it. To make any training effective, you have to engage the employee's willingness before you teach the new skills. Say you are going to train someone on DevOps. That person needs to have the internal motivation to learn what DevOps is and why it is important to them. Unless you can communicate what it means for them, what is in it for their department, and how it is going to benefit the company as a whole, they may not be motivated to develop DevOps skills quickly enough to meet the expectations of the business.

It costs a lot to hire someone new and upskill them. So if you already have a team, make sure you are managing that talent to the best of your ability. Focus on building confidence and motivating individuals to want to do this new job.

Managing the process

Although cloud enables agility and rapid change, a transition to the cloud takes time. To get where they need to go, organizations have to create a plan and make sure they are pushing forward on all fronts—leveraging the right tools, acquiring the right resources, and configuring the organization to compete in the new environment. People are a critical part of the plan and very often the key to success or failure. There is no clear cutover for a team, and managers need to dedicate time and effort to the individual transitions their employees are going through to help them move along the path to success.

Steps for how managers manage employees through their transition journeys

Communication is the key to success. Be clear about what is changing and what is not. Never underestimate the number of times employees need to hear the same consistent message before it really sinks in. For each phase of William Bridges' Transition Model (see Figure 7), here are some specific recommendations to help manage people through the transition.

For managing Endings:

- Specify what is and is not over.
- Talk about how the change will impact the entire team.
- Create an open-door communication practice, and actively seek feedback from all parts of the organization.

For those in the Neutral Zone:

- Establish temporary rules of engagement. Allow people to experiment. Projects have cutover dates; people do not.
- Be clear about performance expectations.
- Be compassionate and empathetic.

For people ready to start New Beginnings:

- Be open to shifts and corrections.
- Highlight quick wins.
- Clearly articulate the new identity and the new world for your people. Make sure they know what it means for them and the organization.

> "Every IT challenge is also a people challenge. So the first thing is inspiring people about where we're going with cloud and how they can come with us on this journey."
>
> STELLA WARD, CHIEF DIGITAL OFFICER, CANTERBURY DISTRICT HEALTH BOARD

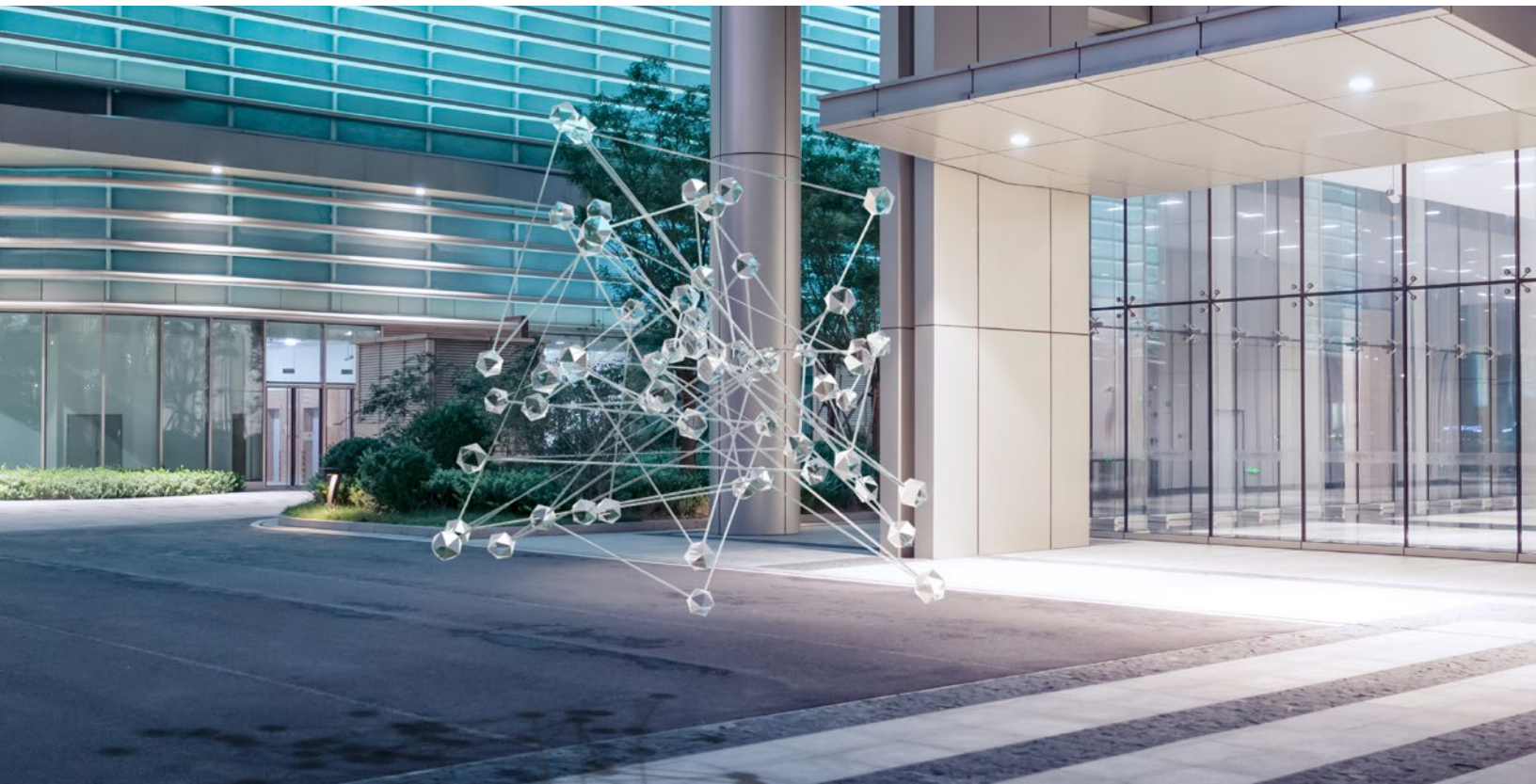
FINDING THE RIGHT IT MIX FOR YOUR COMPANY

The choices organizations make will saddle them for years to come. Creating the right mix of resources is crucial to putting your company on a path for success in the future.

Take a long look inside any large company's IT infrastructure and you will find a complex, sometimes convoluted mix of resources, both physical and virtual. There is a public cloud platform or two, likely a private cloud, plenty of on-premises servers, and an assorted assemblage of applications connected in various ways.

How did it get like this? Was every decision and every connection carefully planned out, aligned perfectly to deliver a business service with laser-like precision? Chances are, they were not. More often than not, decisions are made based on immediate needs that make sense today but may not tomorrow.

One of the primary decision drivers is cost. Everybody wants to be budget conscious. So they choose platforms and pathways that save a little for a while but might end up costing more in diminished productivity over time.



Another decision driver is data location. Companies need responsive applications, and the distance between the apps and the data matters. When data gets separated from applications, performance slows down, so organizations end up running their apps near their data. But data is effectively unmovable. Once it is planted, it sets down roots like a tree, so applications that need access to the data tend to be near the platform where the data lives.

The facts are, IT setups grow in fits and starts, and platforms often get shoehorned in odd ways. Yet, the choices organizations make can saddle them for years to come. Therefore, creating the right mix of resources is crucial to putting an organization on a path for success in the future.

The key factors

Assembling the right mix comes down to three factors:

1. Asking the right questions
2. Analyzing the impact of app and data placement
3. Maintaining consistency in the process

And to set these factors in motion, you need two things: organizational buy-in (aided by the Cloud Business Office) and the help of a good technology tool.

What are the right questions?
First, we must ask the questions that will frame the business objectives of the company. For years, cost was the overriding factor and in some cases, it still is. If a company wants to be a competitive, low-cost provider, it needs to create a mix that both delivers value to the market and keeps its own costs low. If a company has other objectives in mind—speed to market, escalating M&A activity, global expansion, being a differentiated leader in its industry it might make different decisions about how it wants to sculpt its cloud program.

Second, we must understand what guardrails a company needs to enforce. In theory, a client organization can pick whatever platform it wants—AWS, Azure, Azure Stack, OpenStack, bare metal, etc. In reality, a particular company may have limits imposed in ways that exclude some of those choices.

Key guardrails

- **Security and compliance:** Are there security regulations, compliance rules, country-specific rules, or state rules regarding data limits and the choice of locations? Consider data residency issues between countries and even states. The impact of placing the data in a highly regulated data privacy country could be devastating to the success of the program and potentially to the company.

- **Culture and organization:** How skilled is the workforce, and how culturally ready is the company to shift from one platform to another? If the organization is used to Azure Stack and has no experience on Google Cloud Platform, it might tilt toward Azure if it wants to expand on the public cloud. Speed of deployments based on skilled staff is a core principle of any program.
- **Process and governance:** How disciplined is the client company in terms of process and governance? Can IT make decisions and force developers and communities to adhere to those decisions, or is the process ad hoc? If teams are not aligned, whether it be for technical or political reasons, the speed of deployments is greatly reduced. Understanding the business needs and the guardrails imposed on an organization starts to provide clarity around how it will structure its mix of resources.

Different mixes for different situations

There is no optimal formula that suits every company. The right mix for one organization will be different from the next. One company may have the exact same app portfolio as another, but it has different business goals and different guardrails limiting its choices.

There are more than 40 factors to take into account when making decisions on the best mix of platforms and services. Cost, of course, is one. Others include performance, latency, risk, data needs, network connections, architectural considerations, and security. One key question is, just how important is each individual business goal or guardrail to a particular organization?

Again, each company is different. So, when the CBO starts debating the merits of one scenario vs. another, it needs to weigh the value of each factor against others. Does the company value performance over cost? Is it willing to pay a little more for better latency or a slightly better customer or end-user experience and sacrifice cost for elasticity? Is it willing to pay more for this, less for that, make sacrifices here to deliver optimal performances there?

Technology's role

Decisions about complex mixes of platforms and services ultimately get made by people, following intense analysis and lengthy debates. But technology tools can also play a role in the process. With so many factors in play and so many nuances to consider in an individual company's situation, CBOs are turning to tools that can apply some order to what can often be a chaotic exercise and answer key questions, including:

- What is the right mix of hybrid cloud platforms for my applications?
- How cloud-ready are the applications?
- Which applications should be the first movers?
- Which applications need to be refactored before moving to the cloud?
- What is the fastest path to migration planning?
- What level of confidence do I have in the analysis?
- What are my application dependencies?

The results generated from technology tools are directional in nature and provide a consistent framework to ask the important questions. They can help identify both low-hanging fruit and top opportunities. You can build multiple business cases that propose different mixes of services that steer toward particular business outcomes.

Taking action: Setting up migration workbenches

Cloud platforms are no longer restricted to the hyperscalers—AWS, Azure, and Google Cloud Platform. The new cloud adoption models include scalable hardware platforms for on premises too. Considering this significant change in purchasing and flexibility, IT teams must prepare their application migration and refactoring programs for any cloud platform that offers the right mix of considerations, such as cost, flexibility, security, risk, privacy, and a host of other factors.

IT teams must prepare their application migration and refactoring programs for any cloud platform that offers the right mix of considerations.

Your teams will need to consider technology, processes, and people to move application workloads to the right cloud and do it by leveraging a factory model. There is a deep desire among many clients to adopt truly cloud-native, agility frameworks. Most understand the benefits of the cloud and have directed executive IT leadership to reduce their costs and find consumption models—whether on premises or in the public cloud—that offer pay-as-you-go services.

A migration workbench is a team of engineers that performs a specific set of migration tasks. There are six migration workbench types, as follows:

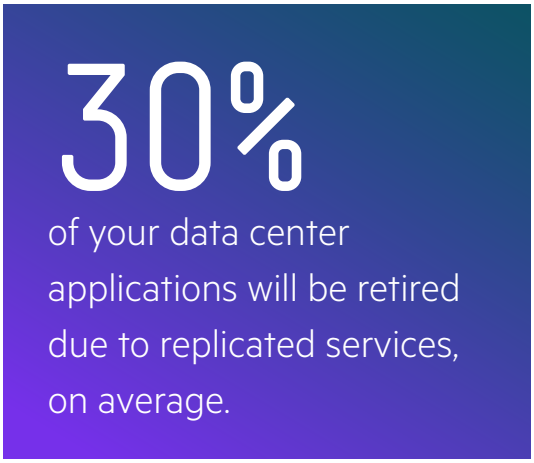
Rehost: Generally referred to as "lift and shift," this workbench is a machine-to-machine migration of the application and data to the cloud platform. This is the easiest of the migration tracks and can be done using automation for most of the tasks. However, you will not realize all the cloud benefits because the applications have not been developed or rewritten for the cloud.

Replatform: The replatform workbench is a team of engineers that performs minor, but critical replatforming functions to enable the application servers and software to run on the new platform. Typically, this involves environment-level, not code-level, changes, including:

- OS and/or database version upgrades
- Significant DNS and networking changes
- INI and configuration file changes

Refactor: Refactoring an application occurs when code-level changes are required. This should include code scans for blockers that would prevent migration to the cloud. Leverage proven software tools that scan .NET and Java code for problem areas that may restrict migration to the cloud. Refactoring is a complex function and requires the team to have domain skills in cloud services, as well as security and infrastructure knowledge.

Retire: Retiring applications appears to be straightforward, but many clients overlook a lot of the benefits. On average, 30 percent of your data center applications will be retired due to replicated services within the cloud platforms. In addition, there are often applications running in data centers that are maintained for compliance requirements only. These could be retired early in the cloud by building the system in software, testing it, and then turning it off, thus using the services only when needed. This creates significant cost savings.



Replace: Replacing applications is more complex and very dependent on the business unit or application owners. However, the replace workbench is required if the total data center footprint is eliminated.

Retain: Unless you have a zero-footprint goal, you will likely have to retain some portion of your application estate. Retaining applications is really about end-of-life scenarios and how you plan to decommission the platform. The challenge is not how to retain the applications but how the cloud-based applications will engage with the retained applications. Often, the retained applications are centers of gravity. They are huge databases and legacy systems that have hundreds of connections to other services. If you are consolidating data centers and need to move these applications, sorting out the complex spider web of connections is the job of the retain workbench.

We all need help. No one succeeds at their cloud program building on an ad hoc basis. Adding resources as they are needed with no comprehensive plan will only lead to confusion and failure. There needs to be a process in place to determine the right fits for your particular organization. Working with an organizational construct like a CBO, solutions like Right Mix Advisor, and migration workbenches, hybrid cloud projects can and do succeed. ■

WHY CONTINUOUS IMPROVEMENT IS CRITICAL TO MASTER EARLY

Continuous improvement is a seasoned concept that has taken on new resonance in recent years, helping to define a movement that is changing the course of modern technology.

The term *continuous improvement* dates back to the 1950s, when management pioneer W. Edwards Deming first described it as a "system" that incorporates feedback for the benefit of the system itself. The Process Excellence Network went on to define the term as "the ongoing effort to improve products, services, and processes by making small, incremental improvements within a business."

The concept of continuous improvement is central to the DevOps revolution that's shaping technology workflows across industries. Gene Kim, one of the movement's early protagonists, embedded the term in his Three Ways of DevOps framework for managing process, procedures, and policies with a DevOps philosophy. Kim's first two ways set the stage for continuous improvement: 1) emphasizing the performance of an entire system rather than a silo of work, and 2) amplifying the feedback loop. The third way drives the concept forward: developing a culture of continuous experimentation, learning, and improvement—essentially a culture of incremental innovation.

Think holistically and act fast

At a high level, continuous improvement is a lofty and worthy goal for ambitious organizations. But how do you put it into practice? What are the benefits of doing it right? And what are the costs of doing it wrong? The most important step for DevOps organizations is ensuring that continuous improvement gets infused into processes, procedures, and culture early on. Organizations that wait too long find themselves scrambling to plug holes rather than thinking holistically about building a system dedicated to ongoing innovation.

DevOps in the cloud requires continuous improvement in three principal areas:

- First is the software itself. To build, design, and deliver a quality application, organizations need to have mechanisms in place to test and inspect the app itself.
- Second is a cloud environment that supports the app being designed, built, and delivered. Is the cloud performing well and meeting the organization's needs? Controls are needed to optimize the environment on an ongoing basis.
- Third are the processes you use to produce software and the cloud environment itself. This cuts a level deeper. To be a true, peak-functioning DevOps organization, you need to make process part of the improvement cycle, all the way down to how you are implementing your processes.

Continuous improvement requires a steady stream of feedback from customers, both internal and external. This applies to software companies as well as to enterprise IT software providers. To do this, organizations need to implement a rock-solid logging and monitoring strategy. This requires a centralized mechanism to capture customer feedback, track it, log it, and integrate it back into the knowledge system. Tools need to be robust and capable enough to work in context with the organization's cloud platform.

Test early and often

Automated testing plays a big role in an advanced software delivery process. Installing a series of tests—for performance, security, integration, and system usage—is a first step. But the true value is not just in automating the testing framework but in integrating all functions, creating a system that feeds the continuous improvement loop. Continuous integration pulls the functions together. Putting software development practices in place that leverage feedback, automate the practices, and amplify the feedback flows will generate steady improvements in the overall delivery process. The real trick is to speed things up to the point where feedback flows in fast enough to fuel daily commits. Letting commits pile up until release can be a nightmare. To continuously improve, you need to embrace continuous integration.

In the cloud, you can automate the building of infrastructure and integrate it with software applications. Managing the environment in code (infrastructure as code) allows an organization to steadily improve the performance and scale on an ongoing basis.

To be a true, peak-functioning DevOps organization, you need to make process part of the improvement cycle—all the way down to how you are implementing and developing your processes.

The third area of improvement is to fully master and incrementally improve the way you design, build, and deliver your software delivery processes. This is where the true power of DevOps lies.

To be a true, peak-functioning DevOps organization, you need to make process part of the improvement cycle—all the way down to how you are implementing and developing your processes.

Using a tool like value stream mapping is a good start. This helps an organization understand its processes end to end and gets all stakeholders involved in the software development lifecycle. The exercise creates a visual map of the whole process, identifying where the lag times and bottlenecks are. Using this information, stakeholders at all parts of the process can work together to strengthen the loop.

Continuous improvement is a concept that has been around a long time yet is still driving change in modern times. It is not a program that is just implemented, wrapped up, and reported on. To work well, a continuous improvement initiative has to be continuous—ongoing, without a formal end. It is a journey, and it is everybody's job to make that journey a success. ■

MOVING FORWARD

Cloud journeys can take some interesting, sometimes awkward, sometimes inspirational turns. To help keep your teams aligned, consider the following questions:

How do you know if you are on the right track to success?

What are the signs that you are stuck and struggling to make progress?

What does success look like at this point in your cloud journey?

What can you do to make sure you stay pointed in the right direction?

Cloud transformation journeys do not always follow straight lines. As you move further into your journey, try to fine-tune your platforms to align with the goals you set for your transformation and your overall corporate strategy.

03

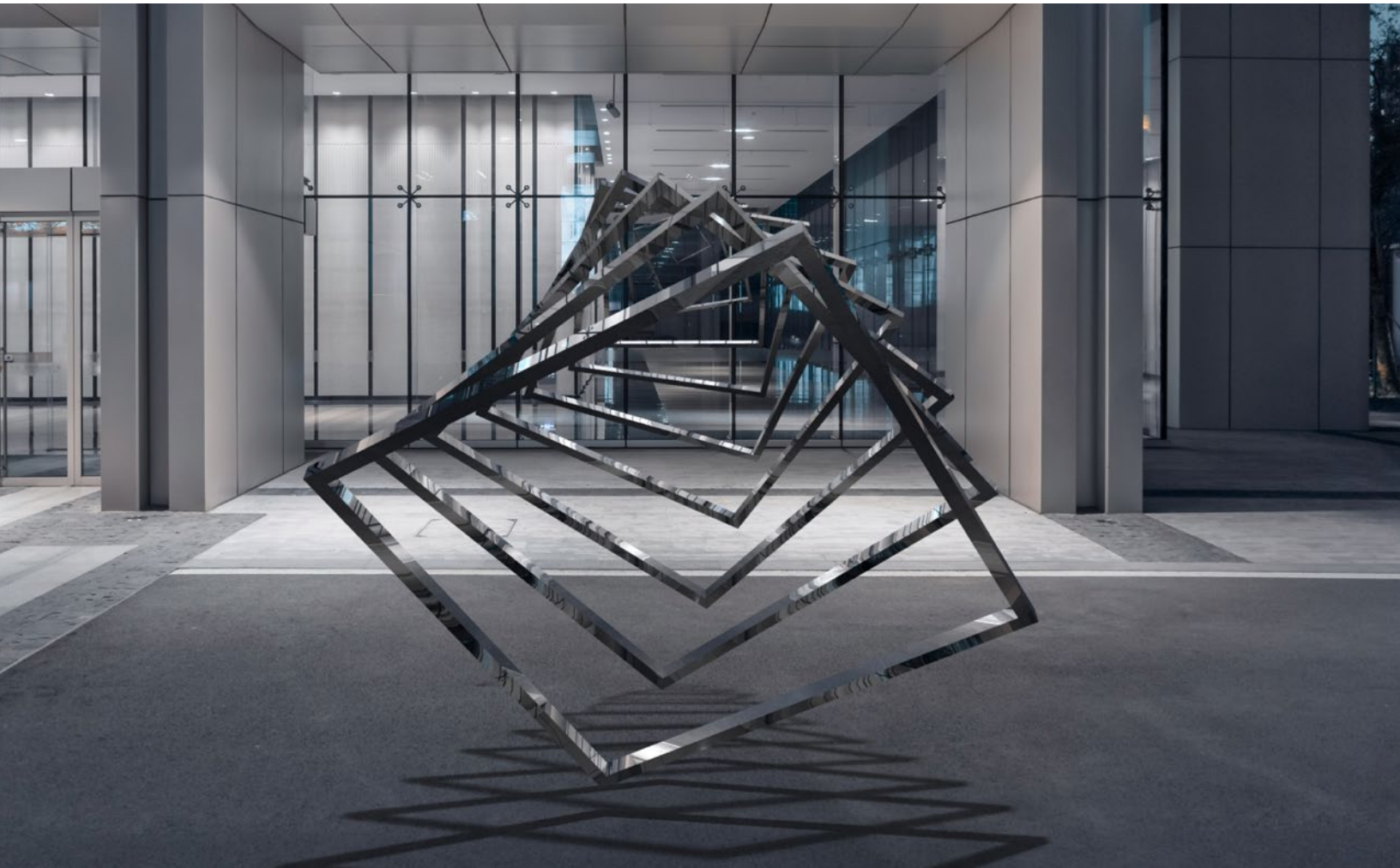
STREAMLINING CLOUD OPERATIONS

- Six principles for streamlining cloud operations
- Governance models in a new cloud world

SIX PRINCIPLES TO CONSIDER FOR STREAMLINED CLOUD OPERATIONS

Leveraging these core principles will provide a guiding light as your organization designs, builds, and operates your cloud estate.

We have all heard about the principles used by Amazon, Google, and Microsoft in developing their cloud platforms and the outcomes they produced. The API became a first-class citizen; the pay-for-use model became the norm; and platform services were created to offer more significant capabilities with reduced management overhead. But what does all that mean for those of us architecting the applications and workloads to run on these platforms? The following explores a few of the core principles to keep in mind as you design, build, and operate your cloud estates.



1. Utilize minimum viable tooling

Many cloud architects run into the like-for-like, or tool-centric, approach when trying to plot their journey to the cloud. The IT or security department declares that in order to migrate, it needs Splunk/ServiceNow/[insert your favorite tool name here] before any workloads (including dev/test) can be migrated. This decision greatly increases the upfront complexity required to get running in the cloud and is often overkill for the workloads being deployed. Instead of taking this approach, consider adopting a more capability-focused mindset, evaluating the specific capabilities required to support the workloads being deployed.

This plan of attack allows you to reduce the initial complexity and opens up your thinking to consider cloud-native solutions. For example, in your initial dev/test deployment, do you really need a full deployment of Splunk, or only a small subset of its features? Could you deploy the cloud service provider's native logging/alerting capabilities or use a SaaS solution in the short term to cover that requirement?

Consider adopting a more capability-focused mindset, evaluating what's required to support the workloads being deployed.

2. Do not build what you can buy

Borrowing a lesson from the world of lean manufacturing, you should ask: How can we eliminate waste from processes that do not add value to our product? Translated to the world of cloud technology, this emphasis on utility means that unless the function is a core component of your business's value proposition, it makes little sense to divert resources to build, implement, and manage a solution that could easily be acquired from or run by a third party. For example, in the on-premises world, almost every company builds, runs, and maintains significant infrastructure to support corporate email. Yet while email is a critical business function, it is generally not part of the secret sauce that differentiates a company's product.

In the cloud world, you have the option to use managed services to offload such functions, letting you focus on those secret-sauce services and functions that are core to your business's success. Whether it takes the form of managed cloud services such as database as a service (DBaaS), higher level capabilities like artificial intelligence and machine learning offerings, or third-party tooling, when done with proper consideration, this offloading approach can greatly improve your agility and velocity without compromising your critical business functions or security posture.

3. Automate, automate, automate

One of the key steps to effectively leveraging cloud services is to step away from the console and build everything you can using automation. The end goal is to have the number of manual steps in the deployment of applications and infrastructure as close to zero as possible. While the primary benefits of taking this approach, such as consistency and repeatability, are obvious, the secondary gains, such as improved auditability, are just as important.

The process of automating your deployments can seem like a daunting task given the realities of often hundreds of components, complex connectivity diagrams, and tightly coupled dependencies. In the majority of cases, the best way to go is to start small and take an iterative approach, beginning with a collection of scripts or playbooks, building on them, and eventually developing a full deployment pipeline.

Embrace immutability

The next logical step on your automation journey is to use immutable infrastructure. This concept entails deploying servers (or containers) that you never log into or modify once deployed. If there is a bug fix, patch, or configuration change, you simply update your automation (image build scripts, application deployment code, etc.) and redeploy. Not only does immutable infrastructure enable you to achieve greater reliability and consistency, but it also significantly reduces the attack surface by removing the need to expose services such as RDP/SSH on instances. The destroy/deploy model also limits the total lifetime of any one instance and thereby reduces the effective dwell time of an attacker.

> Design deployments so that the process becomes more like building a Lego model, reusing various modules to achieve business goals.

Consider composability

As you design your cloud estates, you should also consider the composability of your design. To borrow a rule from the programming world, "Don't repeat yourself." In other words, design deployments so that the process becomes more like building a Lego model, reusing various modules—infrastructure as code, immutable infrastructure, and managed services—to achieve business goals. To enable your modules to be "composable," you need to ensure they are parameterized (e.g., there should be no hard-coded variables). Composability allows your code to be used in a broad range of situations.

4. Take a security first approach

The major cloud service providers run some of the most secure data centers on the planet, and the majority of security issues that make the news stem from a misconfiguration of services or poorly implemented guardrails by the consumers of public cloud. To ensure that your business does not end up as front page news for the wrong reasons, it is imperative that security stops being a bolt-on option and instead becomes a core component of everything done in the cloud. This change is easily the largest cultural evolution that has to occur in an organization to ensure a successful and secure cloud journey. Implementing this principle involves "shifting left," integrating security into the entire process, from initial design through to site reliability engineering. Your security teams must learn more about infrastructure and coding practices, and, conversely, your infrastructure and development teams need to become knowledgeable about security practices. A good example of this cross-domain interaction can be found with secrets management. The security team provides input on tool selection by working with both the development team, to implement secure coding practices for handling secrets, and the infrastructure team, to deploy the tooling and application in a secure and scalable manner.

Security automation

This is a fairly new concept in the world of security, but it is a necessary change to make if you are to manage highly variable environments without growing your security teams exponentially. Automating the remediation of common security issues allows near real-time responses and ensures a more consistent resolution of vulnerabilities. A significant side benefit of this automation is that your security teams can be freed up from mundane issues to work on more complex tasks such as threat hunting.

Continuous compliance

As the usage of cloud services and the velocity of deployments increase, you need a way to effectively monitor your cloud estates for non-compliant configurations. Continuous compliance tools including HPE's Managed Cloud Controls, Continuous Compliance software provide a near real-time view of the compliance of your cloud estate. When coupled with a solid security automation practice, these services become powerful tools for keeping your environment secure.

5. Seek cost transparency

One of the larger nontechnical challenges in the cloud journey is managing cost. The shift from CapEx to OpEx can be quite disruptive, and it is critical to ensure that each business unit and team can see its costs clearly. This requirement mandates a strong tagging design and is often more valuable than the ability to forecast spend.

6. Determine your multicloud appetite

This is one of the most asked questions. While multicloud is a noble goal, it is important to remember that tackling a multicloud environment involves a significant increase in complexity and should be approached only once you have first established a firm handle on managing a single cloud. A key challenge when developing a multicloud strategy is to determine which applications should be hosted on which cloud. This requires analyzing the dependencies and requirements for each application against the capabilities and benefits of each cloud provider, to decide which application goes where.

Conclusion

While it may be impractical in the near term for most enterprises to follow 100 percent of these principles, they present tangible goals to strive for. Leveraging these principles as guiding lights in cloud design and deployment will not only ensure better architectural decisions but also greater reliability, while simultaneously delivering the velocity your business is seeking.

GOVERNANCE MODELS IN A NEW CLOUD WORLD

In the cloud, sound governance is the basis of all cloud operations. But simply grafting your on-premises governance policies onto your cloud infrastructures just won't cut it.

Without a solid set of governance practices, an IT organization would be wandering around in the wilderness. It would have no formal program to take stakeholders' interests into account and no structure to ensure that IT is supporting ongoing business strategy.

This assertion is especially true for IT organizations operating in the cloud. Issues that are simple to manage in an on-premises environment get increasingly more complex when IT leaders no longer have physical, hands-on access to equipment. This challenge is exacerbated by the fact that the speed of change increases dramatically as you shift to cloud-oriented deployment practices. To take advantage of what the cloud has to offer—automation, scale, velocity, agility—organizations need to create governance policies specifically suited to the cloud.

Embedding governance in systems

One thing to remember when you develop a governance plan is that it is not just about the systems themselves—it is also about people. The technology is relatively straightforward, but organizations tend to ignore the people and process issues, which are not.

When you take manual tasks out of the process, it is important to embed governance decisions in your systems. Companies need to think about how governance and the work people do will be handled differently in a long list of operational management functions, including change management, configuration management, asset management, service desk, and logging and monitoring.

Governance is still required in cloud environments, but there are places you can streamline and automate tasks. Some areas, such as governance in security, can be adapted fairly seamlessly from the policies in your on-premises environments. In other areas where it is tactically different, you need to create new policies and procedures. Following the proven governance models and best practices below will help streamline your cloud governance strategy.

Foundational governance practices

IT governance is a set of practices designed to ensure alignment between the business vision and IT strategy, which facilitates the oversight of these enterprise demands through consistent management, cohesive policies, guidance, processes, and decision rights for a given area of responsibility.

IT management is tactically focused and primarily concerned with the effective, stable, and optimal execution of technology operations, in support of any existing governance strategies.

Change management

Change management is one of the easier functions to adapt, yet it is a common bottleneck as development and deployment processes become automated. The overall process stays the same in the cloud, but you need to find ways to streamline it wherever possible, such as finding decisions that can be standardized and automated. Since changes in the cloud can be done much faster, you are looking for ways to leverage automation and speed up the approval process while still balancing risk.

Most companies have a robust process to govern change, which includes a change approval board that sets a commonly accepted throughput and frequency (establishing what is too slow, too infrequent). Rapid cycle time between the business need and production deployment drives the most value out of the cloud. (This is your time to value.)

A common place to accelerate change management is anywhere you can adopt a preauthorized, lower risk, "standard" class of change within the process, which would flow through automatically. If you do not have an existing standard change process with automatic approvals for certain changes, you need to develop that out of the gate.

Once that new workflow is adopted, establish a regular optimization review of your change process. Drive to minimize the changes that require a trip to the change review board by standardizing as much as possible over time. This approach is key to driving down your cycle time and increasing your velocity.

Configuration management

Just as in traditional IT management, you need to build secure hosts in the cloud. In fact, host-based security is paramount, since cloud security is workload-centric vs. environment-centric. The biggest change for configuration governance in a cloud context is a singular focus on removing manual review/config steps. The goal is to develop "gold images" and "gold configurations" and drive toward immutable infrastructure.

Configuration management is essential, because the more you automate and "shift left" before execution, the better. To extract the most value out of the cloud, you will want to streamline configuration management workflows and embed automation as early as you can. In the cloud, humans do not touch environments, and you do not change configurations on the fly. If that initial system image is wrong, you replace it with a new image that has all the capabilities you need. Getting to this nirvana takes time, but making sure you understand out of the gate the changes necessary for configuration and patch management is essential.

Asset management

Everyone claims to have a strategy for managing their IT assets, but most companies do not execute their strategies well. In the cloud, it's critical to have a structured program with a simple identification scheme able to handle short-lived resources.

If you do not have those elements, the gap needs to be addressed as you move to the cloud. On-premises assets can live long lives. You buy a server and it can take weeks to months to acquire and deploy it. That device may live in the data center for one to five years or longer. Assets in the cloud get recycled much faster: You can spin a server up, use it, and spin it back down in 10 minutes. This short lifespan may not get captured by legacy asset management processes. You cannot manage what you cannot see, and in the cloud, you cannot validate your asset management accuracy by walking around and taking a manual inventory. So, it is important to understand early in the process what you have and to identify what is essential to track in your environment.

Service desk

Organizations need to anticipate how to integrate new alert data from the cloud estate and handle changes to how some tasks are executed. With event, incident, and problem management, the first thing you have to do is integrate your cloud environment, alerting flow into your service management tool set, either through ServiceNow or another platform. The human processes initially stay the same: An event gets raised and goes into the service desk; if there is an incident, it gets resolved.

While the processes stay the same, how are you going to resolve the issue changes? This will be an incremental change at first, but the increasing adoption of automation will drive the breadth of issues getting resolved without manual intervention. Now, you can have issues raised and closed automatically through the adoption of architecture and operational principles of autoscaling, self-healing, and immutable infrastructure.

While you can reuse a great deal of your existing service desk capabilities, you will need to plan for the alert integration from your cloud estate and begin to think through the classes of issues that can be streamlined and addressed through automation.

Logging and monitoring

While existing logging and monitoring strategies can easily be modified to support data inflow from the cloud, there are a few key differences to consider. First, while you can often reuse existing log aggregation or security incident and event monitoring platforms, you will need to integrate them with cloud provider data flows.

Next, you will need to make sure your team understands the key differences between on-premises and cloud architectures. Training IT and security operations personnel on cloud architecture helps ensure they are responding to real signals and not noise based on legacy architectural assumptions.

Finally, you should begin to consider the storage needs for your logging data. Key questions to consider are where the logging "source of truth" resides (the cloud estate or on premises) and how that location may change as your adoption of cloud evolves. You will have access to near infinite storage but should not store what you do not need: Your budgets are not infinite! Cloud architectures can allow you to easily create additional enclaves of logging data for various purposes (troubleshooting, forensics, R&D, archiving, etc.). While this flexibility is valuable, defining your access and usage pattern will help you manage potential egress charges. Furthermore, developing a data retention strategy based on your regulatory or business requirements for cloud estate logs is important from the outset. Keep it simple to begin with, and leverage cloud provider tools. ■

MOVING FORWARD

Do not underestimate the value of process automation. Misalignments can have significant ramifications for an enterprise conducting a cloud transformation. Be prepared:

Do you have working processes in place? What would it take to adapt these?

Can they hold up to a change in customer demand?

Is the organization mature enough to withstand a quicker release cycle?

Are you prepared to handle frustration or pushback from process change?

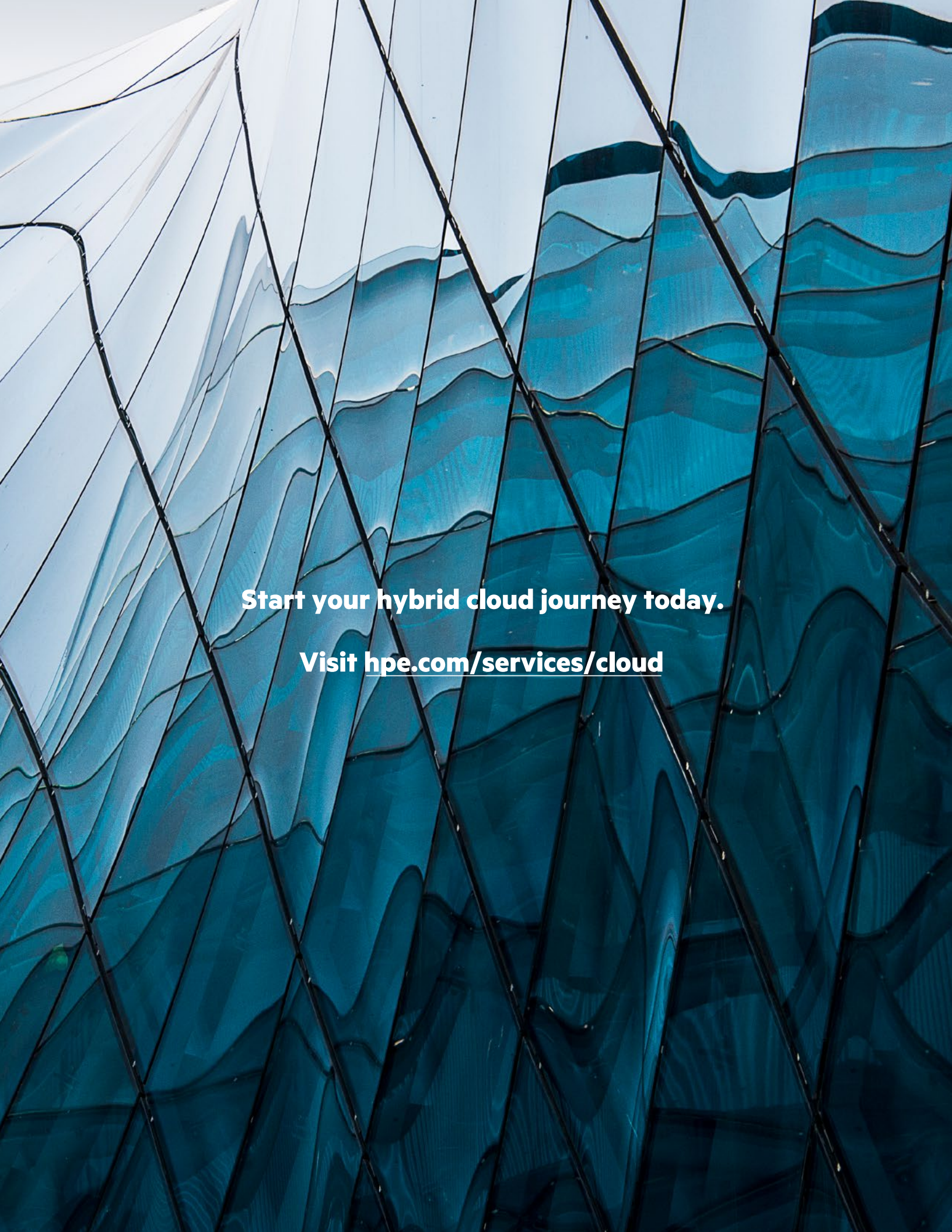
The one thing organizations cannot do is underestimate the effort process automation requires. They need to commit to it and institutionalize it, to wring out the value of the cloud they are expecting.

SUMMARY

Every cloud project is different, which means there are no cookie-cutter approaches to success. But there are best practices companies can follow that will help them deal with challenges that may crop up along the way. The most successful companies in integrating cloud are those that are open to changing the way they operate to align with the needs of cloud projects. Take a step back and plan. Support a culture of cloud learning and provide opportunities for people to take on new cloud roles. Open up new lines of communication to get departments thinking along the same lines. Understand your cloud maturity baseline and then plan from there.

There are many issues that can hinder a successful cloud adoption program. You may be hindered by a lack of resources or leadership support, but building a solid transformation program and acquiring necessary expertise from an experienced partner can help on all these fronts.

Cloud initiatives can be challenging to pull off. But with a little ingenuity, the right people in the right roles dedicated to the effort, and a prescriptive methodology, cloud initiatives can transform your business for the future.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