Building Tomorrow’s Enterprise
Your handbook for cloud success

Spring 2021
Digital transformation is redefining customer experiences, business models, and operations across industries. The public cloud fueled the first wave of transformation, offering speed and agility to build and scale new applications and capabilities.

But public cloud only gets you so far. In fact, fully 70 percent of apps and data remain outside the public cloud, due to data gravity latency, IP protection, performance and app entanglement.¹

The next wave of digital transformation will be defined by viewing cloud as an experience that can be brought to all your IT investments, wherever they reside. In doing so, you will be able to fully unlock the value of all your apps and data, turning them into a source of innovation, as we progress into the age of insight. You can refocus on your customers, clients, citizens, and partners, solving business problems and answering the big questions using the right, workload-optimized platforms delivered as a service.

Making this transformation successfully is not merely a technological issue. While cloud is an experience, enabled by technology, it is also a way of working, a set of behaviors and skills, and a culture that must be present throughout your organization.

This edition of The Doppler focuses on the steps you need to take to navigate a cloud-everywhere transformation successfully and some of the best practices that will help you along the way. We’ve organized the articles into a framework that starts with defining just what you want from your transformation.

In “Planning the next steps in your cloud journey,” we map out a framework for basing your next moves on a solid understanding of where you currently are in your cloud journey. To help you realize the objectives you’ve laid out, we detail the requirements for a methodical and data-driven implementation plan that covers people, process, and technology. And in “Cloud-first operations require a new approach to governance,” we examine the principles you can use to bring cloud thinking and processes to your IT governance and management capabilities.

Bringing the cloud experience to all your applications and data requires the same kind of discipline, commitment, and leadership as a public cloud migration. But the benefits in terms of the agility, innovation, and economic flexibility that you can bring to your operations will position you for the next wave of digital transformation.

Regards,

KEITH WHITE, SENIOR VICE PRESIDENT AND GENERAL MANAGER, GREENLAKE CLOUD SERVICES, HEWLETT PACKARD ENTERPRISE

¹ “Cloud Pulse 1Q20: Survey Findings,” IDC, May 2020
-defined outcomes

There are many reasons to drive a cloud transformation. To execute on the right strategy, be clear on yours.

-plan your next steps

Effective cloud transformation is based on an understanding of where you are and where you’re going next.

-implement cloud everywhere

Enable your people for a successful cloud transformation.
Finding the right mix of IT for your workloads.
Modernizing applications for the cloud-everywhere experience.

-streamline cloud operations

Cloud-first operations require a new approach to governance.
Putting continuous improvement into practice.
SECTION 1: DEFINE YOUR OUTCOMES
There’s no question that some of the most enjoyable journeys in life can be of an ad hoc nature. Hopping in the car for a spontaneous vacation or an unplanned cross-country drive with only the endpoint in mind can be memorable and a lot of fun. But when your destination is a cloud transformation, getting started without a defined outcome in mind, or identified steps to lead you there, is a recipe for disaster. Organizations that want to undertake a cloud-everywhere transformation should ask themselves a fundamental question: “Just what kind of transformation—or transformations—will we need to accomplish?” Or put more simply, “Why are we doing this?”

Define cloud for your organization

First and foremost, you need clarity on what cloud means for your organization. This sounds like a simple question, but answers can vary widely, and correctly defining cloud can have far-reaching impacts for your organization. Some might define cloud as automated provisioning of services on premises; others may define it as software as a service; others may think purely of public cloud.

The reality is that cloud is not a destination or a specific technical platform but an experience. Cloud is a different operating model for IT, one that injects automation and agile practices to deliver an agile and flexible business that can continuously adapt and succeed in any market environment.

Focusing on experience and outcomes departs from the usual way organizations traditionally have solved their IT issues. Rather than worry about speeds, feeds, features, and performance, organizations will get further by determining how they want to operate and what they hope to get done. They can use as-a-service technologies to change the way the organization performs specific functions, and they can drive outcomes that improve overall IT capability and deliver improvements to the business process.

People, process, and technology

Success with cloud transformation relies on the people who are involved at all stages of the transformation, the processes the organization sets up to enable the people to be effective, and the technology choices that enable the transformation (see Figure 1).

The most common desired outcomes of a cloud transformation are enabled by this combination of people, process, and technology:

• Culture change is at the intersection of people and process. Organizations are looking to find ways to break away from the status quo and the mentality of “this is how we have always done things.”
• Time to value is accelerated by getting the best out of the status quo and the mentality of “this is how we have always done things.”
• Innovation is driven by people applying technology to come up with new ideas. Cloud models help organizations use data, experiment, and innovate much faster than they were able to before.

Infrastructures, platforms, and workloads

The technology choices enterprises make during their cloud transformation shape their outcomes. These choices tend to fall into three categories: transformations that deal with infrastructure, others that focus on platforms and data, and a third set that redefines workloads. And never forget that woven throughout all these transformational activities is the necessity of considering the people involved, their current and new roles, and their buy-in to the process.

Organizations need to determine the type of transformation they hope to accomplish and then move to adopt the right technology—or combination of technologies—to get where they need to go. Starting with a thorough evaluation of the current
state of operations across their enterprise, they need to ask the question, "How do we do this?" And then they need to be prepared to answer any logical follow-up questions, the most important of which are, "What is the experience we're looking for" and "What are the outcomes we expect to drive?" How does the cloud-everywhere approach, and an overall as-a-service technology delivery model, change the way you do business?

Quite often, this is also the first strategic fork in the decision process: Is the desired outcome to save money or drive revenue? While these outcomes are not mutually exclusive, the underlying mindset can often drive different approaches to the eventual outcome.

At the core, the reasoning is simple: Unless you have a modern IT operating model, it’s very difficult for you to be able to drive business model innovation that relies on technology. It’s really about figuring out how to enable IT to pivot at the speed of business.

Infrastructure transformation
Delivering a cloud-everywhere experience almost mandates the use of an as-a-service delivery model. Infrastructure transformations give organizations the opportunity to "consume" infrastructure in a different way than they're used to. Rather than getting into an endless cycle of buying more server or storage capacity, organizations can adopt an elastic, consumption-based infrastructure model.

Offloading infrastructure management to a third party helps the business take advantage of optimized and predictable costs and helps IT achieve operational simplicity. Leveraging such an IaaS model themselves enables the business to align infrastructure spending to demand and drive continual rounds of cost savings. This ensures they are paying only for what they need, when they need it.

Platform and data transformations
Organizations that are focused on rapid innovation will want to make platform and data transformation a priority, leveraging technologies such as containers, database services, or private cloud resources. This allows data to be used differently and apps to be developed differently. For business, it’s about encouraging the development of prioritized services that help get work done. They also help the organization get to market faster and take fewer cycles to generate bottom-line value for a project.

For IT, it’s about becoming more agile and effective. Supporting DevOps and agile initiatives, these transformations free up resources for value creation, facilitate faster global deployments, open up opportunities to leverage infrastructure as code, and enable teams to do a better job meeting business goals and requirements.

Workload transformations
With workload transformations, customers consume and use workloads as a service to support new business models and approaches. This can encompass a wide range of horizontal workloads such as ERP, desktop and productivity tools, and MLOps, or industry-specific workloads such as electronic health records, financial trading, or factory automation.

Business can achieve several outcomes by strategically shifting workloads to the cloud: They can streamline security and compliance, execute more efficient business processes, implement more predictable and value-driven cost structures, and create a steady flow of innovative app and data solutions for customers.

IT, meanwhile, can shift more of its focus to delivering end-user services. It can also open opportunities for individual departments—rapid changes at the departmental level, which often resulted in shadow IT being deployed, can now be done with the full blessing and support of internal IT. In moving much of the infrastructure maintenance to an as-a-service provider, existing IT resources can be more effectively utilized and deployed.

Conclusion
Digital transformation and delivering the cloud-everywhere experience can seem like an overwhelming task, especially when organizations are sorting out priorities for a post-pandemic environment. The good news is there are a lot of new technologies and services, especially under pay-as-you-go and as-a-service models, that weren’t available in the rush to cloud over the past few years. You can now drive positive outcomes, and a cloud-everywhere experience, while maintaining your hybrid cloud mix and taking advantage of the latest IT and business models.

The key is to ask the right questions and set the right path. Understand what your options are, what your objective is, and what you’re trying to achieve.

Sean Foley, a senior business technology leader at HPE, and Steven Fatigante, director of hybrid cloud transformation solutions at HPE, contributed to this story.
SECTION 2:
PLAN YOUR NEXT STEPS
PLANNING THE NEXT STEPS IN YOUR CLOUD JOURNEY

Effective cloud transformation is based on an understanding of where you are and where you’re going next.

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Most IT leaders freely admit this about cloud computing: It’s important to their organizations, but the journey is frustratingly tough, expensive, and never-ending.

Without realizing it, the notion that cloud transformation is something you march toward, as if it’s an end point, is the source of most angst for corporate technologists. They have been trained to believe that once they’ve migrated a good portion of their apps and data to the public cloud, their long and arduous efforts will prove worthwhile as operating costs start falling and efficiency steadily rises.

That’s hardly the case, because cloud doesn’t work like that. It’s not a destination. Rather, it’s all about extending so-called cloudified experiences to people whenever and wherever they use applications and data to drive business value. Nobody cares if what they are accessing sits in a public, private, or hybrid cloud environment, co-located or on premises. People just want quick, easy access to whatever tools and data will enrich their personal and professional lives.

Creating an extensible hybrid cloud architecture that is well managed and tailored to specific needs isn’t easy. Indeed, few companies today are able to bring together the people, processes, and technology needed to make this happen.

An effective plan to advance your cloud transformation takes stock of where you are and advances your cloud maturity across people, process, and technology in a measurable, achievable, and incremental way. Embrace these four best practices for cloud maturity:

**Identify value and pain ‘opportunities’**
Before embarking on a cloud transformation initiative, figure out what cloud means to you and how that aligns to what your organization is trying to accomplish.

This sounds simple enough. But ask 10 IT leaders within an enterprise how they think about the opportunity of cloud, and you’ll likely get 10 vastly different answers. One way to get everyone on the same page is to set objectives around your value chain and pain chain.

A value chain is the full range of activities an organization pursues to bring products or services to market. The pain chain is the exact opposite of all that. It is a mechanism for identifying and understanding inefficiencies and obstacles standing in the way of success. These might include availability and resilience measures for apps and infrastructure, technical debt, or operating model friction.

Whatever the case, addressing such issues must be part of any cloud strategy with clear key performance indicators and metrics assigned to objectively measure the impact and results of your cloud solution.

**Align and enroll critical internal stakeholders**
Don’t shoulder the load alone. Even with the smartest strategic vision and plan, providing consistent cloud-everywhere experiences to end users is time consuming and even the smallest mistake made by overtaxed internal staff can lead to lengthy rollout delays and significant cost overruns.

For cloud experiences to become reality, executives, critical partners, and change agents must align on critical aspects of the program. Most notably, the right people—both inside and outside the organization—need to collaborate around:
• Security – Most of the work in early hybrid cloud engagements must build security into the cloud computing fabric. This cannot be an afterthought. Seven in 10 companies storing data in public clouds get hacked because of basic security blunders. Cybersecurity, therefore, must be job one for any cloud computing initiative.

• Enterprise architecture – Cloud leaders typically adopt standards-based approaches to accelerate outcomes and maintain continuous compliance. Organizations should work closely with experts in the field to emphasize design and implementation patterns that are extensible by application archetype. Standardization would take place after observing results from initial implementations and migrations.

• Infrastructure – CIOs, almost as a rule, are constantly fighting the challenge of technical debt—legacy infrastructure that’s costly to maintain or replace—and that presents challenges in lengthy provisioning times, demand-capacity management, and downtime avoidance. This is often a catalyst for change as internal partners come together to deliver cloud experiences enabling real-time, automated provisioning of services to address such infrastructure pain points.

• Application development – Application developers often want to move as fast as agile methodology will allow, leveraging cloud-optimized services along the way. Initial partnerships with app development teams should seek to understand the workload portfolio, determine appropriate placement targets for each workload, modernize or migrate workloads as appropriate, and deliver cloud approaches to improve these processes.

Define your hybrid cloud formation

Being able to deliver experiences across a hybrid cloud environment starts with determining which formation is needed. This structure can come together only after considering a number of factors, including:

• Legal and regulatory compliance – Local or regional standards governing how and where data is kept.

• Deployment model – Your preassigned mix of public, private, hybrid, co-located, and community clouds.

• Delivery model – The complete portfolio of as-a-service options, such as infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS).

• Service catalogs – The curated and well-managed services you’ll make available through the cloud.

• Workload locations – The plan for what will run where and why.

• Strategic vendor relationships – Strategic relationships that can significantly reduce your time to value and total cost of ownership (TCO) while improving the initial quality of your hybrid cloud formation.

Establish a Cloud Business Office (CBO)

A CBO can help centralize decision-making and communications 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 implementation to ongoing operations. Its members, a mix of full- and part-time leaders, are given daily responsibilities for the successful adoption, execution, and oversight of cloud infrastructure. (See Figure 1.)

Specifically, the CBO is responsible for many common cloud-related functions, such as:

• Strategic, fiduciary, and operational governance – The CBO governs key functional elements of the cloud computing program to keep everything operating as planned—and on track.

• Orchestrating hybrid cloud experiences – The CBO ensures that the cloud program maintains its focus on delivering cloud experiences that deliver against business outcomes, objectives, and imperatives throughout the enterprise.

• Forging critical internal partnerships – The CBO can also break down organizational siloes and assemble the right teams to address key aspects of the cloud program. These could include everything from oversight and steering to policy and technical standards definitions or risk management and compliance.
THE 8 CLOUD MATURITY DOMAINS

Assessing your own organization’s maturity is possible by evaluating its growth in eight different areas, or domains. Specifically, how you’re progressing with your:

1. **People:** Most technical personnel at large enterprises adopting cloud either lack the required skills or don’t have the time to focus on new cloud initiatives. Companies overcome this by investing in talent, training, recruiting and retention programs.

2. **Innovation:** Mature companies also combine various innovations to achieve their goals. Depending on their specific objectives, this could include cloud-native structures, code pipelines, multicloud platforms, artificial intelligence and machine learning, container structures, code pipelines, multicloud platforms, specific objectives, this could include cloud-native innovations to achieve their goals. Depending on their Maturity domains also combine various initiatives. Companies overcome this by investing in skills or don't have the time to focus on new cloud enterprises adopting cloud either lack the required personnel), technologies (the platforms and systems that you leverage to run your business), and processes (the value your organization provides in the form of orchestrating workloads that can be retired altogether.

3. **Applications:** Cloud maturity invariably involves progressive, data-driven processes for identifying the right mix of service and deployment model for each workload at any given point in time, taking into account security, performance, and economic parameters for the workload and the needs of the business at that point. A data-driven workload placement strategy aligns application modernization or migration investment to business need, facilitates prioritization, and may even highlight some workloads that can be retired altogether.

4. **Data:** Having a solid handle on your data fabric is also a sign of cloud maturity. This means having visibility into your data and being able to address anything influencing it, including governance and lifecycle management issues, geographic regulations and sensibilities, shifting formats and structures, and database trends. Mature organizations take advantage of MLOps practices to enable data scientists to work with AI/ML tools, using data from across the IT estate.

5. **DevOps:** Mature organizations have the tools and software, automation techniques, PaaS management systems, policies and procedures, and coding practices to ensure they're delivering the right application experiences to end users everywhere.

6. **Operations:** Mature organizations additionally adopt a consistent, universally applied operating model that delivers value, streamlines transformation efficiency, tracks progress, and implements improvements along the way. Many organizations struggle to deliver business value because they are leveraging inefficient, legacy operating models that lack consistent implementation.

7. **Security:** They also excel at baking cybersecurity into every cloud-related platform, application, and process under their purview. Risk and compliance matters are high priority, and they implement multiple checks and balances to optimize their cybersecurity postures.

8. **Strategy & Governance:** Finally, the most mature organizations look at cloud transformation as an ongoing process of continuous improvement in which strategies are updated to support emerging business models, innovation, and experimentation. It is helpful to think of your enterprise capabilities in three distinct categories, which must operate in unison to deliver upon the promise of hybrid cloud. These include institutional capabilities (those of the enterprise and its associated personnel), technologies (the platforms and systems that you leverage to run your business), and processes (the value add your organization provides in the form of orchestrating licensed solutions plus custom software you develop as part of your product and service delivery).

These maturity domains are all interconnected, and to be successful in the cloud, companies must address all of them. That does not mean you have to focus on every domain right away. But to make progress, you should absolutely understand your current level of maturity.
SECTION 3:
IMPLEMENT CLOUD EVERYWHERE
Any transformation, at its core, is about people. Why? Because meaningful, sustainable, and effective transformation of any kind requires change in the way organizations—and their people—operate and behave. This is especially true when it comes to cloud transformations, which are all about injecting agility into the way an organization works. That requires technical change, of course, but in some ways, that’s the easy part.

We have found that many cloud transformation programs fail to achieve their promise of agility and speed because of one common obstacle: the natural response of people to resist, or even actively obstruct, technology and process change.

Fundamentally, cloud—regardless of your choice of technological underpinnings or workload placement—involves bringing a transformative mindset and approach to IT in support of business objectives. It threatens traditional IT roles and responsibilities and forces the adoption of new processes and skills, reducing the demand for certain roles and increasing the demand for others.

When cloud transformation leaders are asked how the transition to a cloud experience is going, they tend to default to technical responses: They have cut the time it takes to do a certain task by 30 percent, for example, or re-platformed 200 workloads. These metrics are important, but they omit the more immediate and often under-considered question of how the transition is going for the people it affects.

Are people embracing the changes that “cloud first” brings 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 valid issues workers involved in a cloud project are dealing with—and not always in obvious ways.

A model for organizational change management

Is a cloud adoption initiative any different from any other organizational change management project? What we’ve learned over the years is resistance to cloud transformation initiatives is essentially the same people-related opposition you see in any major enterprise transformation project. Consequently, we can turn to the same tools provided by the organizational change management and process re-engineering fields.

Let’s examine these phases of transition from the employee’s perspective:

Phase 1: Initial excitement

- In the early phase, people are excited and open-minded about what benefits the program will have for the company. Once more details emerge, they start asking how the initiative will impact their roles and those of their team. They become more informed and more inquisitive. They start to realize the program’s potential consequences on their day-to-day duties.
- Behavior can then shift from cooperation to resistance. People seek refuge in multiple forms of denial, such as rejection and diversion. They start to make comments such as, “This too shall pass,” and, “We’re special—cloud won’t work for us given our unique business requirements.”

Phase 2: Realization of effort and complexity

- The realization phase is the most critical time in the cloud adoption lifecycle. If questions go unanswered, employees will start to build their own narratives, almost always ill-informed. Fear and panic can start to thwart motivation.
- Staff may start to handicap themselves or their teams with unrealistic goals and poorly thought out execution plans. They may seek delay tactics such as extensive analysis, over-engineering, or the addition of unneeded complexity.

ENABLE YOUR PEOPLE FOR A SUCCESSFUL CLOUD TRANSFORMATION

People are key to a successful transformation, but they can also be your biggest obstacle. Here are practical steps to help you navigate the change.

PAUL BARNHILL, CLOUD TRANSFORMATION PRINCIPAL, HPE POINTNEXT SERVICES
Their personal goals no longer align with the company’s goals. They seek to preserve the status quo at any cost, regardless of their employer’s business objectives.

**Phase 3: Integration**

- Eventually, the chaos of realization passes. Integration is the phase where employees and stakeholders start to discover how the cloud transformation affects them specifically.
- The group learns that cloud skills are in high demand and increase their value in the marketplace. People start to have a vested interest in a positive outcome. They set expectations and norms on others and try to align to the company’s new way of thinking.
- Group members in this stage may need more support than might be expected. They can become easily frustrated when things fail to work perfectly the first time. Although team members may feel good, they are also concerned that the initiative may fail, forcing them back to the uncertainties of the realization phase.

Employees need reassurance and new methods for forging through the unplanned difficulties of this phase.

**Phase 4: New confidence and continuous improvement**

- Finally, we come to a transition point where cloud becomes the new norm.
- If the change is well conceived and assimilated, the group is now in agreement and performance is in full alignment to the new cloud established practices. Team members feel a sense of accomplishment and are open and honest about what’s at stake should they fail.
- Those directly involved in the project start to actively recruit new believers. Their implementation crawl is becoming more of a fast walk or slow jog.

**Your people engagement plan**

What must be understood is that individuals will experience this transition at a speed and magnitude unique to them. Transitions can be difficult to navigate in any field and are common to employees involved in a cloud transformation initiative.

Take systems engineers who are being transitioned to DevOps engineers. They are taking on an exciting new job that is important to the organization’s move to cloud-first practices, but they may not perceive it that way. Even though they can see company outcomes improving, they may still struggle, taking months to become comfortable with the new process and responsibilities.

As people are faced with change, they experience a series of losses: loss of control, loss of confidence, loss of competence, and even loss of their identity. They 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 less important.

Since everyone’s acceptance of change is unique, organizations much create a plan to engage employees and stakeholders. A governing body of cloud transformation deciders—a Cloud Business Office (CBO)—has proved an effective mechanism to manage the changes brought by cloud transformation.

A thoughtful change strategy addresses three dimensions of people engagement: 1) recognize the impact of change on people, 2) establish the activities that positively identify those affected, and 3) know how and when to address potential issues.

Management needs to identify who is impacted by the cloud transformation, identifying stakeholder groups such as program sponsors, change agents, influencers, and resisters.

**The next step is to outline activities to support each group. We find the process more powerful if organized into the following six organizational change management disciplines:**

1. **Leadership and executive sponsorship:** Committed and engaged leadership reinforces throughout the organization that the change initiative is a priority that will endure. By focusing employees at all levels on the outcomes, leaders can manage employees through the “realization” phase and into “integration.”

A successful change strategy involves a well-thought-out plan that addresses the needs of employees at all levels, from the executive suite to the基层 workers. By understanding the unique challenges and opportunities presented by cloud transformation, organizations can create a supportive environment that fosters growth and innovation.
2. Stakeholder management: Effective cloud transformation engages clients and suppliers as well as the employees and defines expectations and measures of success. An effective CBO establishes a clear view of the steps in the transformation and helps stakeholders understand where the transformation is in its maturity, the next steps, and the wins that have been achieved.

3. Communication: A multilevel communication plan addresses the organization, team, and individual levels on how the transformation will roll out. Be clear and consistent about what is changing and what is not. Never underestimate the number of times employees need to hear the same message before it sinks in.

4. Reskilling, education, and training: Retraining is a given with cloud transformation. Hiring new talent is time consuming and expensive, so as far as possible, given with cloud transformation. Effective cloud transformation engages clients and suppliers as well as the employees and defines expectations and measures of success. An effective CBO establishes a clear view of the steps in the transformation and helps stakeholders understand where the transformation is in its maturity, the next steps, and the wins that have been achieved.

5. Performance incentive programs: A transition to a cloud-first operating model brings opportunity to revisit what performance means and how you reward employees. By aligning metrics to successful outcomes, leaders can motivate employees to embrace the transition and adapt their skills and behaviors appropriately. Individual and team resistance will hurt success, so the organization must adapt appropriately.

6. Organizational alignment: A cloud-first approach fundamentally changes the way things are done. Models such as Scrum, DevOps, and continuous delivery require new ways of operating. This goes beyond individual skills to breaking down silos and requiring employees and groups to interact in new ways and often with new business units they may not have interacted with previously. This, as much as the technology, is what makes cloud transformational.

FIGURE 2: STAGES OF ENGAGEMENT

CHANGE MANAGEMENT PERFORMANCE CURVE: HOW EMPLOYEES REACT

- **Assess and Focus**: Establish executive sponsorship and identify stakeholder groups. Assess readiness.
- **Design and Set Direction**: Define your minimal scope—begin with people, process, and technology. Prepare to test assumptions of cloud's benefits.
- **Test, Learn and Demonstrate**: Anticipate challenges to the cloud scope definition. Small organization changes start to prove viable; others test program's overall durability.
- **Scaled Migration, Full Migration**: New challenges test learnings; implementation leads to education, training, and engaged ownership.
- **Phase 3: Integration**: New confidence and continuous improvement
- **Phase 4**: New confidence and continuous improvement

Haphazard approaches to hybrid cloud and modernization typically result in a less-than-optimal—and costly—mishmash of resources. Here’s how to fix that. Take a look at any large company’s IT landscape and you will find a complex mix of resources. Here’s how to fix that. Take a look at any large company’s IT landscape and you will find a complex mix of resources, both physical and virtual: a public cloud platform or two, likely a private cloud, plenty of on-premises servers, an assortment of applications connected in various ways, and a growing edge estate.

Having the best of both worlds makes sense for most organizations. They pursue hybrid because it allows them to reap the low cost, agility, and scalability advantages of public cloud infrastructure while also benefiting from the high availability, security, and regulatory compliance advantages that on-premises IT brings. And as more data is created at the edge, organizations are looking to take advantage of more powerful compute and analytics tools placed at the point of data creation to make better decisions, faster.

Ideally, if organizations can provision infrastructure and optimize their operating model, they’ll also be capable of delivering consistent cloud experiences to anyone accessing network resources, no matter where they may be.

But are they anywhere close to achieving this vision? Not likely. Indeed, most organizations began their march toward cloud adoption and modernization with two more simplistic goals in mind: get to the cloud ahead of competitors and do so without disrupting ongoing operations. For many, there was no grand strategy guiding this journey. Rather, choices were made based on immediate needs or emotions that, in some cases, ended up causing substantial challenges down the road and increasing the total cost of ownership.

**Straightening out the mess**

For many organizations, it’s all become a difficult-to-manage mess because they laid the foundation for their hybrid cloud formations in fits and starts rather than as part of a carefully planned strategy.

**FINDING THE RIGHT MIX OF IT FOR YOUR WORKLOADS**

Is your cloud strategy built on a solid business case? A data-driven approach to workload placement will help you proceed with confidence.

ROBERT CHRISTIANSEN, VP, OFFICE OF THE CTO, HPE ENTERPRISE.NXT
It doesn’t have to stay this way, however. It’s not too late to change. The key is to take a deep breath and fully commit to doing whatever it takes to achieve the right mix of IT resources.

**Doing so comes down to three factors:**

- **Asking the right questions**
- **Analyzing the impact of application and data residency**
- **Maintaining standards-based compliance in the process**

You need to know where you stand. Asking insightful questions enables you to better understand and align to the true business objectives of the company. For years, cost reduction and avoidance was the overriding factor. In certain cases, it still may be. But your organization might have some other combination of objectives in mind—time to value, escalating merger and acquisition activity, global expansion, or market differentiation. These goals should be factored into any hybrid cloud infrastructure roadmap as well.

It’s also worthwhile to assess decision drivers around data residency and gravity. Companies need responsive infrastructure, as well. Cost, of course, is a major factor for many organizations. Others include performance, latency, risk, data protection needs, network connections, architecture, and cybersecurity.

Again, every organization is different. So, when your Cloud Business Office—a group your company should establish if it hasn’t already—starts debating the merits of one scenario over another, it needs to weigh the value of each factor against others. For example, does the company place performance above costs? Is it willing to spend a little more for better latency or slightly better customer or end-user experiences? Is it willing to pay more for this, less for that, and sacrifice some of its sacred cows to optimize performance everywhere?

Successful strategies are built on a sound business case that is driven by total cost of ownership and return on investment.

**Technology’s role**

Decisions about complex mixes of platforms and services are ultimately made by people engaged in long, heated debates. But other technology tools can also play a role in determining the right IT mix for cloud infrastructure. With so many factors in play and myriad nuances to consider, CBOs are turning to a variety of business intelligence and analytical tools, many powered by automated technologies like artificial intelligence, to derive data-driven decisions and recommendations more quickly and efficiently on important IT questions.

**Questions to ask during this analytical phase include:**

- Which applications would benefit most from a move to public cloud?
- What is the prioritization, based on benefit vs. cost of a cloud migration program?

There is no optimal formula to suit every company. The right mix for one organization may be the worst approach for another, even when their products or services are roughly the same. The only real way to determine what’s best for your organization is to perform a comprehensive analysis across the IT landscape. Cost, of course, is a major factor for most organizations. Others include performance, latency, risk, data protection needs, network connections, architecture, and cybersecurity.

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MODERNIZING APPLICATIONS FOR THE CLOUD EXPERIENCE EVERYWHERE

Practical guidelines to help you balance transformative investments while keeping the best of what you have.

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A data-driven workload placement strategy that prioritizes investments based on business impact and feasibility can help maximize the success of your cloud transformation. Most organizations have made the easy moves to public cloud, usually for applications with fewer dependencies, lower data gravity, or less demanding security, performance, or governance requirements than other apps. But once they’ve made those easy migrations, they hit a wall. Beyond these early movers, the cost, risk, and technical feasibility of a move to public cloud can become too great. The better solution—as defined by objectives like cost reduction, performance and availability, improved security posture, and risk mitigation—is to bring the cloud experience to those workloads.

Some organizations, however, find themselves stalled even in their initial modernization and migration steps. Unless you begin as a cloud-based company, without any legacy application constraints, you can find yourself operating with two cost and operating models. And the glaring truths become clear as the monthly invoices flow in for cloud services alongside legacy IT, which leads to increased total cost of ownership.

How can businesses avoid the trap of straddling both the old and new to achieve full digital transformation? Is there a predictable outcome if they follow a different path and approach? Can organizations do this with the same urgency that drove the initial rush for cloud experiences but achieve success with all their business applications?

The effort, duration, and opportunity cost of large-scale portfolio modernization and migration efforts can have a significant impact on an organization. It takes effort to discover completely; to clear out and distill the so-called noise; to maintain accurate, real-time data through each step of the lifecycle journey; to select the right priorities; to create momentum for the change; to leverage the right technologies; and, all the way through to assembling and motivating great staff, to achieve the goal. (See Figure 1.)

To determine the right application roadmap approach, it’s necessary to understand how your applications and IT services are related.

The first step toward this understanding is business discovery. This involves creating a top-level view of what the business needs to operate, who owns what, how much capacity and room for growth you have, and how business services are being delivered. This process should not be about which vendors, infrastructure, hardware, and software have been selected. Rather, it should capture which functions the business needs from IT services to operate, including the volume and ability to scale up or down as circumstances dictate.

Once you have completed business discovery, you can move to application discovery, which involves mapping applications to business services. This is where you start gaining more granular visibility into the service-level agreements (SLAs) associated with a workload or application and the workload’s relationship to the value chain of the business.

FIGURE 1: APPLICATION MIGRATION ROADMAP AND OPTIONS

- Stage 1: Re-host to composable infrastructure
- Stage 2: Fast deployment and redeployment
- Stage 3: Simple maintenance and remove legacy components
- Stage 4: Migrate to cloud model on composable
- Stage 5: Agile maintenance and scale-out on demand
The idea is to holistically capture and analyze application functional areas, the owners, lifecycle information, development or feature timelines, and roadmaps. You’ll also want to discover how each functional component perceives the criticality of its assets at an individual level. Surprisingly, many organizations do not recognize the need to connect all of these components until a critical business service is no longer available.

**Leveraging containers and microservices in your modernization**

Software development has rapidly become all about containers, microservices, and other cloud-native techniques. They are popular for many reasons, one of which is the way they manage data, or state. Stateless applications neither read nor store data about their state. Microservices running in containers realize benefits from being stateless, as this enables scalability, security through isolation, continuity, and faster deployment times. But while statelessness is not a problem for simple web apps, enterprise applications frequently need to retrieve, process, and store data.

The modern enterprise app is built on containers that spin up, do their job, isolate runtime failures, and then spin down. This requires careful coordination with many layers of infrastructure and software services. You can see that the complexity mushrooms when any application can receive data that resides in persistent storage from one microservice, perform an operation on that data, and hand off to another microservice.

At the same time, enterprise DevOps teams are growing in leaps and bounds, and so are their storage requirements. More and more stateful workloads are run in containers as monolithic applications are refactored and new microservices-based applications are built and deployed. Technologies now exist to run monolithic legacy applications in containers without refactoring, so you can get the flexibility benefits of containers while minimizing refactoring cost and time.

Persistent storage support for containers is a critical issue if the benefits of containers are to be extended to stateful application. By implementing container management and microservices technologies that support persistent storage and statefulness, you can bring cloud agility to enterprise apps while managing complexity and mitigating risk.

**Pay attention to your data strategy**

As you bring the cloud experience to your existing applications and data, you need to pay attention to where your data resides. Chances are that some of it is in a cloud or multiple clouds, and some of it is in structured, unstructured, and semi-structured sources on corporate servers. There may be several copies of some of the data. Administrators may create duplicate datasets or subsets because it’s too risky to allow user access to the original dataset.

This complexity results from the lack of a comprehensive data strategy and can threaten companies by endangering the SLAs they have with customers and partners. When legitimate but stressful applications like machine learning and large, analytical queries are running, the afflicted enterprise cannot ensure that scheduled events will start and complete on schedule.

In contrast, a comprehensive data strategy makes it practical and affordable to run a multipurpose system that takes full advantage of the value of data, bringing useful applications (projects) into production in a timely manner. Analysts, developers, and data scientists are able to work with a comprehensive and consistent collection of data and add new data sources without breaking the bank or overwhelming IT. To achieve this, a data fabric must have certain important capabilities:

- **A global namespace:** All data must be available through the single, consistent global namespace, whether it resides in on-premises IT or a public cloud or is distributed at the edge.
- **Multiple protocols and data formats:** The data fabric must implement a broad variety of protocols, data formats, and open APIs, including HDFS, POSIX, NFS, S3, REST, JSON, HBase, and Kafka.
- **Automatic policy-based optimization:** It must provide a way for the enterprise to specify where data is stored and whether it is in hot, warm, or cold storage.
- **Rapidly scalable distributed data store:** Enterprise data needs can grow quickly and precipitously; the data fabric needs to make this happen, not obstruct it.
- **Multi-tenancy and security:** Authentication, authorization, and access control must be enacted in a consistent manner, no matter where the data is or what type of system it runs on.
- **Resiliency at scale:** Even under high usage, the data fabric must provide instant snapshots, and all applications must have the same view of the data when they are taken.

**Don’t be afraid to ask for help**

We all need help. No one succeeds pursuing a cloud transformation on an ad hoc basis. There needs to be a process to determine and execute on the right mix for your organization at a given point in time. Working with an organizational construct like a Cloud Business Office and a systemic approach to modernization, you can bring the cloud experience to all your applications and data.
SECTION 4:
STREAMLINE CLOUD OPERATIONS
CLOUD-FIRST OPERATIONS REQUIRE A NEW APPROACH TO GOVERNANCE

Sound governance is the basis of all cloud operations. So, to bring the cloud experience to all your IT, you need to update your existing governance policies.

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Without a solid set of governance practices, an IT organization is wandering around in the wilderness. It lacks a formal program to consider stakeholders’ interests and ensure that IT is supporting the ongoing business strategy.

This is especially true for IT organizations transforming to any type of cloud-everywhere experience. The same rapid change that cloud brings to business can also create chaos in management and control. To take advantage of cloud everywhere, organizations need to create governance policies specifically suited to the cloud experience.

Embedding governance in systems

Governance plans need to focus not just on systems but also on people and processes. The technology is relatively straightforward, but people and process issues are not. When you take manual tasks out of the process, it is important to embed governance decisions in your systems. Organizations need that long list of well-documented operational management functions, including change management, configuration management, asset management, service desk, and logging and monitoring in order to determine how they will operate differently in a cloud-everywhere world.

Look for places you can streamline and automate tasks. Some areas, such as existing governance in security, can be adapted almost seamlessly. In other areas, you will need to create new policies and procedure that are cloud focused and retain visibility and control over the total economic picture as your IT mix adapts to the cloud business environment.

Foundational governance practices

As IT environments become more distributed and complex, visibility and control take on greater importance. We see areas for continued development of rigorous best practice given the unique challenges of hybrid, multicloud IT.

Understand your economics

A well-designed hybrid cloud strategy is underpinned by a concrete business case, with a defined economic strategy represented by a total cost of ownership and return on investment model. Initially, these models act as hypotheses that need to be tested and updated as the organization gains experience and knowledge with workloads running where they fit best across a hybrid cloud estate.

However, with the increased velocity, automation, and rapid scale of a cloud approach comes a risk of losing visibility and control over your IT economics. Automation and tooling can help enforce and enhance your economic strategy by providing guardrails on spending, enforcing right-sizing, and providing valuable insights into how your economic hypotheses need to evolve as real workloads are running.

Your approach to visibility and control over economics should focus on the following objectives:

- Accuracy and completeness of financial data across your IT estate
- Allocation of investments based on organizational and departmental priority
- Cost optimization based on objectives and analysis and informed by operational experience
- Insights into current and modeled future-state financials
- Reporting for faster, better quality decision-making

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. While the workflows in the process remain the same, it must be streamlined wherever possible by finding decision points that can be standardized and automated. Since cloud models facilitate faster change, you are looking for ways to leverage automation and speed up the approval process while still balancing risk.

Most organizations 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 needs and production deployment drive the most value out of the cloud. (This is your time to value.)

Common places to accelerate change management are anywhere you can adopt a preauthorized, lower risk, standard class of change within the process, which would flow through automatically. A starting point for this is a standard change process with automatic approvals for certain changes.

Once that new workflow is adopted, establish a regular optimization review of your change process. Minimize trips 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
The biggest change for configuration governance in a cloud context is a singular focus on removing manual review and config steps. The goal is to develop gold images and gold configurations and move 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 a cloud-everywhere approach, you need to streamline configuration management workflows and embed automation as early as you can. In cloud operations, 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 plateau takes time, but make sure you understand, at the start, that the changes necessary for configuration and patch management are essential.

Asset management
Everyone claims to have a strategy for managing their IT assets, but most organizations do not execute their strategies well. With cloud everywhere, focus on having a structured program with a simple identification scheme to handle short-lived resources.

If you do not have those elements, the gap needs to be addressed as you move to a hybrid cloud environment. You cannot manage what you cannot see, and in an environment where resources reside on and off premises, 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.

Compliance for a new paradigm
Applying automation to security and shifting left helps accelerate an enterprise’s pipeline processes and accelerates time to value, but it does not remove the responsibility to manage compliance with security policies and regulatory obligations.

Ensuring compliance with regulatory and control obligations in a dynamic cloud-everywhere landscape requires a new approach to governing compliance. Regardless of where your workloads run, regulatory obligations still apply, and the increased velocity and rate of change in a hybrid cloud estate means compliance must be continuous.

Leverage automation tools to monitor, report, and manage the state of compliance across your edge-to-cloud IT as necessary. This new approach to compliance will evolve the overarching governance requirements, since a tighter relationship between the environment and expected controls is possible through automation.

These obligations can place a tremendous burden on organizations if they don’t have the knowledge, skills, and tools to effectively evaluate compliance across their IT estate. Issues you need to address include:

• How to evaluate compliance across a distributed cloud environment with multiple providers
• How to remediate out-of-compliance resources
• How to manage compliance when users can constantly turn on and off resources
• How to provide visibility into compliance to users across the organization
• How to easily prepare for an audit

A side benefit of continuous compliance is an easing of the support burden technology teams incur during audits. Providing auditors with the ability to see not only the current state of compliance but the continued, ongoing, and constant governance of compliance will increase trust for this new operating model while, once again, decreasing the labor burden and increasing time to value.

Service desk
Organizations need to anticipate how to integrate alert data from across the IT estate, encompassing data centers, public clouds, and edge locations. While the processes stay the same, how are you going to resolve the issue? This will be an incremental change at first, but the increasing adoption of automation will allow you to have issues raised and closed automatically by adopting 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 alert integration from the hybrid 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 be modified to support hybrid cloud workloads, there are a few key differences to consider. First, you will need to make sure your team understands the differences in managing hybrid cloud architectures and services versus managing traditional IT. Training IT and security operations personnel on the appropriate architecture helps ensure they respond to real signals and not noise based on legacy assumptions.

Most critical, however, exponential data growth from increased multicloud infrastructure, application, and network traffic has outpaced the ability of most monitoring and event platforms to effectively leverage data to detect, alert, and prevent security events. According to one estimate, more than half of the security-related digital exhaust is not even being used in security analytics because the data cannot be accessed and processed in time. Effective cloud operations implement scalable data aggregation and analytics capability to maintain event management integrity.
PUTTING CONTINUOUS IMPROVEMENT INTO PRACTICE

Continuous improvement is a seasoned concept that has taken on new resonance in cloud operations.

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The term continuous improvement dates back to the 1950s, when management pioneer W. Edwards Deming first described it as a system that incorporates and recirculates feedback for the benefit of the system itself.

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 proponents, embedded the term in several of his texts, including “The DevOps Handbook” and “The Phoenix Project.”

Think holistically and act fast

Continuous improvement is a lofty and worthy goal, but how do you put it into practice? The most important step is ensuring that continuous improvement gets infused into processes, procedures, and culture early, since holes can be hard to fix later.

Continuous improvement requires a steady stream of feedback from customers, both internal and external. 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.

Test early, test 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. The true value, however, 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 in place software development practices that leverage feedback, automate the practices, and amplify the feedback flows will generate steady improvements in the overall delivery process.

The objective is to speed things up to the point where feedback flows in fast enough to fuel daily commits.

In a cloud-everywhere environment, you need to 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.

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

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.