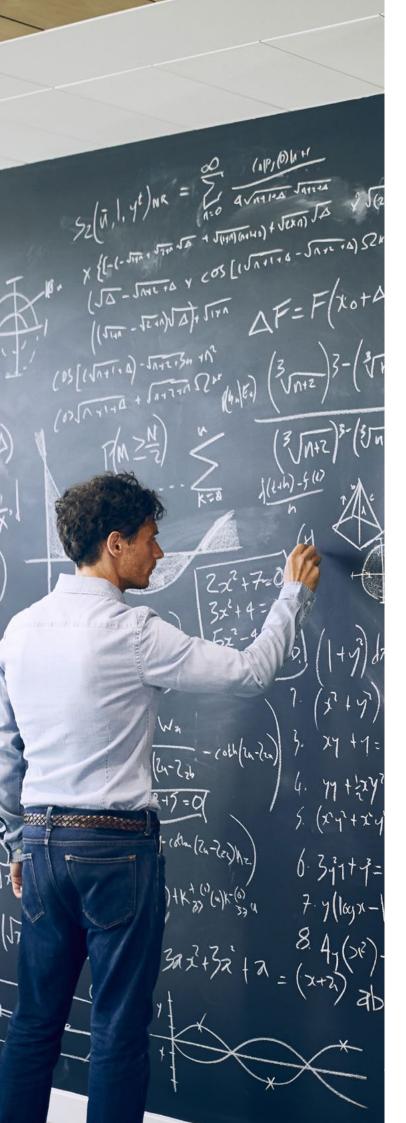# Seven persistent patterns driving cloud adoption today

Notes from the field

**IBM Institute for
Business Value**

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Experts on this topic

Ingo Averdunk

Distinguished Engineer,
IBM Garage for Cloud
linkedin.com/in/ingoaverdunk/
averdunk@de.ibm.com
@ingoa

As part of a worldwide team, Ingo is responsible for architecture and solutions for Cloud Service Management and Site Reliability Engineering (SRE). He leads cloud adoption and transformation initiatives and performs RedTeam reviews globally. Ingo is a member of the IBM Academy of Technology, the IBM Germany/Austria/ Switzerland (D/A/CH) Technical Leadership Team, and serves as the global profession co-lead for SRE in IBM. He co-authored *The Cloud Adoption Playbook* (Wiley, 2018), which documents proven strategies for transforming an organization with the cloud.

Kyle Brown

IBM Fellow, CTO Cloud
Architecture, IBM Cloud
and Cognitive Software
kyle-brown.com
brownkyl@us.ibm.com
@kgb1001001

Kyle leads a team that is responsible for helping customers adopt IBM cloud technologies and build applications using IBM cloud products. He is a world-recognized expert on topics related to cloud, Java, and software architecture. He publishes often, conducts webinars, and is the author of 10 books. In 2018, he co-authored *The Cloud Adoption Playbook* (Wiley).

Ndu Emuchay

IBM Fellow, Cloud Engagement
Hub Member, IBM Academy
of Technology
linkedin.com/in/ndu-emuchay
nemuchay@us.ibm.com
@NduEmuchay

Ndu has worked with some of IBM's largest clients, driving cloud transformation and engineering and establishing new ways of working. Starting in 2020, Ndu has led the Call for Code Emb(race) Spot Challenge in which IBMers from 22 countries collaborated on 20 innovative solutions that have the potential to positively impact society. These solution building blocks will be open-sourced in partnership with United Nations Human Rights and other organizations. Ndu is also the co-author of *The Cloud Adoption Playbook* (Wiley, 2018).

What patterns have changed in the way our clients are approaching cloud adoption?

The seven patterns we address in this report are:

1. Extending the business value of cloud across the entire enterprise

2. Balancing the old with the new

3. Modernizing mainframes and data centers

4. Coping with compliance requirements

5. Implementing Site Reliability Engineering and similar practices

6. Improving the experience of the cloud service user

7. Navigating the skills precipice.

We are three authors of *The Cloud Adoption Playbook: Proven Strategies for Transforming Your Organization with the Cloud*, published in 2018.[1] We had two objectives in writing the book. First, we wanted to make the case that enterprises could adopt cloud computing as a path to business transformation. Second, we wanted to capture and share the approaches we were using in our consulting and implementation work with large IBM clients.

We've never believed that transformation could be reduced to a repeatable recipe. But we did want to write about common "patterns" in cloud adoption—the challenges we were encountering the most frequently, and the ones that seemed to have the greatest effect on successful execution.[2]

The patterns we explore here are far from exhaustive. We don't cover platforms, for instance, because that topic warrants a much deeper exploration. The same goes for Kubernetes and containers, distributed cloud, edge computing, 5G, artificial intelligence (AI), and machine learning.[3] These technological innovations make new kinds of enterprises that run on the cloud possible. But it's important to keep in mind that constantly emerging technologies are all part of a bigger picture where high performance requires an equal level of *management* innovation.[4]

In this report, we reflect on our completed client work since 2018 and ask, "What has changed in the way our clients are approaching cloud adoption? What patterns have persisted? What new approaches are working to address those patterns?"

Cloud adoption is about how your business needs to change to take advantage of technology.

Pattern 1

Extending the business value of cloud across the entire enterprise

How does the cloud become central to your whole business?

One thing has become increasingly clear as we work with clients across multiple industries. Cloud adoption is not just about how you adopt technology to meet the needs of your business. It's about *how your business needs to change to take advantage of technology*. When you frame the problem this way, you have to pay attention to a very different set of objectives, key results, and KPIs. To be successful, you have to measure and capture the new value delivered to the business and its stakeholders, not only through the new technology, but through new ways of working and operating.

To illustrate, let's go back to 2016 and 2017. At that point, during the rise of global billion-dollar unicorn startups, cloud services were used mostly for developing and launching new applications. Large-enterprise CIOs began thinking about cloud as a place to house innovation workloads—new components of their businesses—often as part of distinct "digital" initiatives that ran outside the conventional IT organization.

The cloud is still the right place for innovation. But now, the cloud is becoming where you do the rest of your business as well; it's the foundation of a new way of operating the whole business. And the COVID-19 pandemic has accelerated changes in how enterprises interact with customers, suppliers, and stakeholders. In a period of only months, cloud-based interaction became the norm rather than the exception. According to a recent IBV study, 64% of global executives surveyed acknowledge a shift to more cloud-based business activities.[5]

Removing IT constraints

As an example of how cloud can change the way businesses operate, consider the practice of closing a business's financial books. For the last few decades, businesses have been operating in a particular way because their IT operates in a particular way. For example, the concept of a "batch window" comes from an *IT-driven constraint:* the reason the books won't be ready until the next morning is because the batch has to run overnight.

But what if, in a world where those financial systems of record have been modernized to run on the cloud, you didn't have to wait for a daily report? What if you could pull a financial report at any moment? You'd be notified of trends and changes almost as fast as they happen—and in time to react to them *as* they happen, rather than *after* they've happened.

So organizations are moving away from traditional ways of doing business that were often determined by technological constraints they've learned to accept. The shift is to new business methods that are driven by more flexible IT approaches. As a result, cloud adoption is focusing more on application modernization, or even traditional application replacement. Likewise, cloud service management and operations *around* these modernized applications have become critical to removing constraints and opening new possibilities.

Differentiating through speed

The demand for *business differentiation* is another strong trend we see in cloud adoption. In an environment where the capital and technological barriers to entry are low, disruptors and new market entrants can build higher-value services on the cloud quickly and can then offer those services to ecosystem partners or even the whole world.

In response, incumbent enterprises have to experiment rapidly to learn how to make their products and services differentiated in ways that the customer values. Subscription business models have become especially fertile ground for differentiation that delivers customer value over the lifetime of the customer relationship.[6]

Pattern 2

Balancing the old with the new

What is the right "middle ground" between legacy systems and cloud-native applications?

One concept we didn't emphasize enough in the *Playbook* is that of striking a "middle ground" between building all brand-new, cloud-native applications and living with the typical pre-cloud application chaos that most large enterprises continue to run and maintain. Should we modernize our current applications or adopt new services that have to be tailored to our businesses? How do we reach a viable, sustainable middle ground that allows us to effectively build, run, manage, and operate our applications, without having to rewrite them entirely? How do we achieve this without merely moving our cumbersome operational procedures to someone else's data center?

That tension between legacy and cloud-native applications continues in most of our work with clients. We see that many, if not most, of the easier candidates for modernization have already been executed or are planned for execution soon. In fact, research indicates that although 90% of companies globally were "on the cloud" by 2019, only about 20% of their workloads have moved to a cloud environment.[7] With the easier opportunities taken, only the harder ones remain.[8] These harder cases are often focused on core business applications, so there's tremendous value available, but unlocking that value is not simple or easy work.

As a result, we have to consider multiple paths to the cloud for these more difficult applications. In the *Playbook*, we wrote about the need for standardization in lifting and shifting existing workloads to the cloud. But we didn't cover the need to capture and redirect the cost savings from those migrations to the more complex work of application refactoring or replacement. Cloud adoption has to go beyond taking a single step (migrating the easiest workloads) and then standing still—you need to plot out an entire journey toward the goal of a more resilient, agile enterprise.

Pattern 3

Modernizing mainframes and data centers

Are there benefits that outweigh the risks?

Hardly a week goes by without a CEO or CIO telling us, "We're getting entirely out of our data centers. We're shutting our mainframes down and moving everything to one of the cloud hyperscalers." We simply didn't hear this three or four years ago. One of the reasons it comes up today may be cloud's excellent performance under the stresses of a global pandemic: the cloud has been stable and has permitted enterprises to reduce fixed costs during an uncertain business environment.

But there's an unsuccessful and a successful way to get applications out of data centers. The unsuccessful way is to simply move your aggregated, unmodernized applications from on-premises data centers to the cloud. In that case, your applications are still in disarray; they're just running in someone else's data center. A more strategic, fit-for-purpose approach delivers better outcomes.

In the same way, turning off the mainframe is a lot harder than people acknowledge. It's not as simple as rewriting your COBOL programs—which is itself not simple. It's dealing with all the data running on the mainframe, and dealing with the transactional and procedural and security structures that build up around that data. With mainframes, you're not just modernizing your Java or workloads, or your integration workloads, you're modernizing back-end transactional systems. This means you have to think about the structure and security of your data. It's changing how your business functions, so it's wise to be cautious.

The good news: it's becoming clear that the mainframe can be an ideal platform for cloud adoption. Modern mainframes are resilient, energy efficient, provide enhanced security, and can run the most modern cloud-native environments. But those are qualities of the platform, not necessarily the qualities of your software, especially if the software running on your mainframe is decades old. You can use "mainframe-as-a-platform" as a vehicle for bringing those old programs into the modern age, but this works only if you write software that takes advantage of the cloud.

Compliance has risen to the forefront of clients' attention.

Pattern 4

Coping with compliance requirements
Can they be managed and automated as code?

When we wrote the *Playbook*, we were focused on security as the foundational layer for cloud. And that remains absolutely true. You don't want your apps to suddenly disappear, and we face many more security threats today than we did two years ago. But if we updated the *Playbook* today, we'd be more likely to address "compliance and security" than "security and compliance." The emphasis has shifted to compliance.

Compliance has risen to the forefront of clients' attention, particularly adherence to internal governance, regulatory, and compliance policies. When the *Playbook* came out in 2018, many European privacy laws had not yet taken effect. Since then, such laws have become more stringent around the globe. For instance, California's data privacy laws are now the strictest in the US.[9]

The process of cloud adoption needs to address compliance in depth, because failures in this realm can lead to regulatory fines, lawsuits, cybersecurity incidents, and reputational damage. Cloud service providers can promote their products as being compliant with basic standards, but the enterprise using a cloud provider's services bears responsibility for the compliance of its cloud-based workloads. Understanding the client's role versus the cloud provider's role in compliance has been a challenge in many of our engagements. This is especially true as more clients acquire multiple clouds and multiple cloud providers.

The trend toward governance as code

Compliance, of course, is set up and enforced— governed—through policies. In 2018, when we talked about governance, we were referring to a process of bringing people together to set policies and enforce those policies. We were writing about a manual process. Now, over the past year, we've seen *governance as code* come to the forefront.

If you think about automating a manual process, that's similar to the idea of governance as code. Suppose you're working on compliance with healthcare privacy regulations. That's a particular set of security policies specified as a *configuration* and enforced on your environment and applications.

It's essential to specify what happens in those environments and what tools will be used, as well as helping to define configuration as code. Teams can then use this set of pipelines and templates to deploy software so that the right architectural controls are enforced at appropriate touchpoints.

For instance, suppose you want to specify a DevOps pipeline that allows a certain amount of flexibility at the development team level but also enforces a strict set of architectural control points. Governance as code can facilitate using accepted, core, tested frameworks. It can help you conduct tests of a particular type, such as performance testing. That's an example of an *architectural control point*—one that can be enforced by code through a policy engine. We're seeing that more and more frequently.

Pattern 5

**Implementing Site Reliability Engineering
and similar practices**

*How do you implement and integrate new
"cloud ways of operating?"*

When the *Playbook* came out, we were working at the
leading edge of applying Site Reliability Engineering (SRE)
to the enterprise. Today, when we participate in SRE
conferences, more of our clients are not just attending,
they're presenting the outcomes of their SRE
implementations.

From our perspective, SRE has arrived at the enterprise,
along with methods such as ChatOps, chaos engineering,
automation, and observability.[10] For example, as an
approach to incident management, we expect that ChatOps
will see a massive uptick. Virtually all enterprise customers
use Microsoft Office 365, and Microsoft Teams is part of the
365 package. While Teams wasn't developed as a specific
ChatOps tool, it can be easily be adopted as an enterprise
ChatOps standard.

Implementation success varies from client to client, but we
are seeing real value in these practices. The trick has been
to implement them across large enterprises. We're seeing
three common archetypes for adopting new practices:

– The first archetype involves setting up a new *peer IT*
organization that runs alongside the existing IT
organization. This new organization gets the freedom
to navigate, the budget to do things differently, and the
time required to experiment to find what works for them.
The peer and existing organizations are eventually
reunited. In the meantime, cross-pollinate, hold
residency programs, foster interchanges, and so forth,
creating an osmosis effect.

– The second archetype creates space for new practices
such as SRE, or other kinds of practices that need
breathing space to germinate, to evolve within the
existing organization. Nurturing these practices and
encouraging acceptance requires hard work, and it's very
easy for new practices to get diluted and eventually
abandoned (remaining in name only, as when agile
initiatives revert to being 95% "waterfall").

– The third archetype brings in outside talent, such as
coaches for SRE, DevOps, agile methodology, and so
forth. As with any of these archetypes, everyone must be
vigilant about tailoring the practices as necessary but not
cheating on core principles. With this archetype, it's easy
to underestimate the number of coaches required to
make sustainable progress. And often it's the people
managing the work that need the most coaching.

We've observed that the people the organization chooses
to lead the adoption of a new practice can be more
important than the adoption method itself. Some
individuals are intrinsically motivated to improve the way
things work now, and you want to focus on those early
adopters. These key people have reputational trust that
may not be reflected in an organizational chart. When they
move forward, a lot of others will follow.

That's how you start moving the organization toward new
practices: focus on the early adopters, with their
implementation of "lighthouse projects" and internal
marketing, and make them shining examples. With
persistent efforts, early adopters eventually reach the
"critical mass" required to sustain the new way of working.

The IT industry is at a
skills precipice—a hard truth
further driven home by the
COVID-19 crisis.

Pattern 6

**Improving the experience of
the cloud service user**
*How do we make the cloud easier
for users to adopt?*

We don't want to confront users of cloud services—DevOps teams, for instance—with the complexity of a growing multicloud footprint. We need to separate the service view, or consumption view, from the delivery view.

For example, viewers don't care *how* Netflix runs its massive scalable system on the back end. All they care about is that Netflix delivers *The Crown* on demand. That's the separation between the provider's view of service delivery and the consumer's view of service delivery.

As developers, if we want to use a Kubernetes cluster, we don't need to know the complex details about how the whole stack is built and how it works. We do need to know which clusters are available to us so we can quickly—and without undue complications—develop our code. We see many clients building a type of middle layer between cloud service providers and cloud services. This is where the services and APIs that users need to get their jobs done are packaged into a simple, easy-to-use platform.

The idea is to design a delightful user experience that puts the experience in the spotlight—whether those users are developers, colleagues, or external customers. Quantifying that delight is critical. Companies should develop new performance metrics to measure and validate these experiences—and to signal course corrections, as warranted.

Pattern 7

Navigating the skills precipice
*Where do we find the talent to sustain
and modernize?*

The final pattern we want to explore is common to every client we have engaged and continues to be perhaps the strongest influence on successful enterprise cloud adoption. That pattern is the shortage of skills required to generate cloud-powered business value at scale. Consider the patterns we've explored in this short report: all of them require not just new skills, but the *integration of many new skills.* The new "cloud way of working" requires new types of specialization—SRE skills and experience, for instance—and it requires those specialists to work in teams that include entirely different experiences and skillsets.[11]

The IT industry is at a skills precipice—a hard truth further driven home by the COVID-19 crisis. We use the word *precipice* intentionally: when a governor of a large US state (New Jersey) goes on national TV to plead for COBOL programmers because the state cannot process checks to its citizens, you've reached an unprecedented state.[12]

The scarcity of COBOL programming skills is a real bottleneck for application modernization. But even a concerted effort to *create* those skills via job training won't entirely solve the problem. We have to think hard about how to change and evolve the software that's running on these systems—and just running that same software in the cloud is not the answer.

How we go about actually writing that software is one of the biggest problems facing the industry. We have to get those core business applications into languages and systems that are sustainable over the long term.

The case for internal and organic skills development

Within the broader context of digital transformation, every employee needs to build new skills that align with the new IT service delivery models, and they need to do this daily. To win in the marketplace, it's not just about keeping pace, sometimes barely keeping up—the objective has to be staying at least slightly ahead. Has the organization laid out a clear roadmap for what digital transformation means to specific individuals? What is their ideal learning journey?

One critical point: strategies for hiring your way out of a skills shortage are magical thinking. Highly credentialed, top-notch talent would rather work for cloud-native enterprises.[13] And even if you could hire superstars, can you afford them over the long term? Is that talent retainable?

It's a struggle. Companies are realizing that the only way out is to start modernizing talent internally and organically.[14] If you want to retain your best talent and be able to hire the best people, you have to make them *want* to work for you. That requires creating a culture where innovation can flourish, and one that cherishes and rewards individual contributions as part of cohesive, cross-functional teams.

Summary
Keep asking the right questions

Most of the patterns we have addressed in this report have to do with problems that come up during execution, and we often think of cloud adoption *execution* as something that comes after cloud adoption *strategy*. In practice, though, strategy has to be an ongoing process that looks like continuing to ask three questions:

1. **What is the business value we are trying to unlock?**
   Even today, we see cloud adoption programs that behave as solutions in search of a problem—the mechanics of the adoption effort have gotten ahead of the process for developing compelling business cases, and for making those business cases part of a coherent portfolio of business technology investments. Stay focused on building a better and more valuable portfolio.

2. **What does cloud make possible?**
   The net effect of ongoing innovation in cloud technologies and advanced business technology practices is that you can solve problems with them today that you couldn't solve without them yesterday. The point of understanding things like Kubernetes and containers is to see if and how they solve a problem that has been preventing you from unlocking business value.

3. **What is holding us back?**
   Cloud adoption programs take place in the middle of the complex, adaptive systems that are large enterprises. You're probably not paying nearly enough attention to the parts of the journey that hinge on human behavior: politics, incentives, job security, reporting structures, budget ownership, "turf battles," organizational silos, and so forth.[15] Focus on growing the pie so that everyone involved can share the rewards.

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