



Business Transformation through Multi-cloud

Interoperability is the Key to Success

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Introduction

As cloud computing has become mainstream – with more than 90% of enterprises having adopted it in some form¹ – focus is shifting from simple efficiency gains to digital transformation. With this shift comes a change in cloud strategy: to achieve expected business outcomes, enterprises need to adopt specific cloud platforms based on specific need. In other words, one cloud does not fit all – a multi-cloud approach has become central to overall cloud strategy.

The multi-cloud approach, while resolving some issues, presents a new set of challenges. In many cases, the result of taking a multi-cloud approach is “cloud silos,” in which each cloud operates independently, and, therefore, fail to deliver the expected business value. What the multi-cloud initiatives need to succeed is an interoperability strategy.

When interoperability is at the core of the multi-cloud strategy, workloads run in unison to drive business agility, reduce the cost of technology, and harmonize processes. Further, the approach to multi-cloud interoperability needs to be inclusive and consider factors such as multi-paced maturity, legacy investments, the cloud vision and investment roadmap, industry, regulations and compliances, and security.

The key building blocks of an interoperable multi-cloud include designing workloads for interoperability, leveraging a service discovery and management platform, enhancing the integration landscape, and being aware of multiple open standards initiatives in the industry.

While technology is an important enabler of multi-cloud interoperability, enterprises also need to consider other factors such as talent and collaboration in order for implementation to succeed. Another important consideration is thinking ahead – as the multi-cloud program matures, its characteristics will change and evolve.

In this report, we explore enterprise-based multi-cloud interoperability:

- What is the current state of multi-cloud, what is driving adoption, and why are enterprises not realizing the anticipated benefits?
- Why should enterprises care about multi-cloud interoperability?
- What are the building blocks of multi-cloud interoperability? How should enterprises enable interoperability in a new versus an existing environment?
- What are the key success factors for adopting multi-cloud interoperability? How should enterprises plan for the future?

1 Everest Group research with 200 CXOs from large enterprises (more than US\$1 billion in revenues)

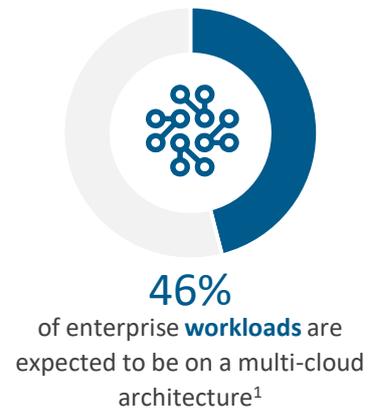
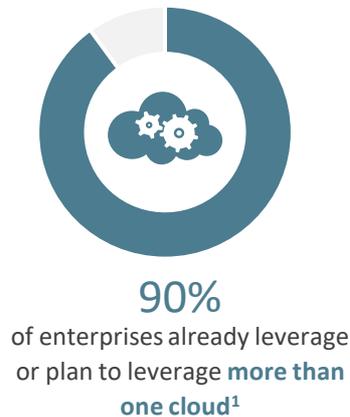
Increasing multi-cloud adoption

Our research suggests that multi-cloud adoption is on the rise for a variety of reasons.

EXHIBIT 1

State of multi-cloud adoption

Source: Everest Group (2019)



Key reasons multi-cloud is gaining traction

Enhances workload performance – Enterprises have found that not all workloads perform equally on all clouds. For example, many want to keep sensitive workload on their internal cloud yet leverage public or hosted cloud for other benefits. A multi-cloud strategy is essential to access best-of-breed capabilities and align business objectives.

Avoids vendor lock-in – A multi-cloud strategy enables vendor diversification and prevents lock-in. This benefit is important for enterprises to ensure that they can adopt the most relevant platforms for their business objectives and move among cloud stacks as needed.

Reduces service disruption – A multi-cloud model orchestrates workloads across clouds and, therefore, reduces the risk of service disruption if one cloud goes down. A well-designed multi-cloud approach also increases security, as each cloud provider delivers added security to handle the load of disrupted servers.

Better negotiating power – Cloud providers offer discounts on list prices to attract customers. An enterprise's ability to move its workloads among different clouds ensures its ability to negotiate favorable commercial constructs from the most desired internal or external cloud provider.

Mergers and acquisitions – Though not a business driver, mergers and acquisitions do force enterprises into multi-cloud adoption. Following a merger or acquisition, many enterprises prefer not to force cloud provider rationalization, instead exploiting the benefits of keeping multiple clouds.

¹ Everest Group research with 200 CXOs from large enterprises (more than US\$ 1billion in revenue)

Interoperability – the missing link to enterprise success in multi-cloud

While multi-cloud offers a plethora of benefits, most enterprises are unable to realize its true value. In fact, in engaging multi-cloud, many enterprises create a much more complex environment with higher costs and no significant improvement in business outcomes. The prime reason for this circumstance is the unplanned adoption of different clouds without an interoperability construct. Not accounting for interoperability when adopting multi-cloud results in multiple challenges for enterprises.

Challenges in a non-interoperable multi-cloud

Poor business agility – Cloud providers are increasingly promoting native platform offerings that cannot be migrated easily outside their platform stack. An enterprise that does not consider interoperability during cloud adoption ends up with workloads operating in their siloes, unable to deliver the intended business agility.

Increased complexity and cost of technology – The more cloud platforms an enterprise has, the more control planes, people, and tools it needs to manage. An environment not designed to make clouds interoperate becomes ever more complex and costly with each technology adoption.

Failure to achieve positive business impact due to limited cloud scaling – Without interoperable clouds, enterprises create process silos across design, deployment, and management, with limited cross leverage of standard procedures to derive business value. These silos hinder the organization's ability to scale cloud adoption and realize business benefits.

Enterprises are giving their lines of business more autonomy to drive cloud agendas. They believe such freedom will drive more business agility and, in turn, help them cater to dynamic business demands. However, these objectives are impaired when enterprises fail to take interoperability into account when adopting cloud services. A cloud adoption rooted in interoperability will allow each business unit to move at its own pace, using the best-suited cloud service. As long as there is an interoperability strategy, the business need not be concerned about negative impacts of multi-cloud selection.

Measures by hyperscalers to enable interoperability

Hyperscale providers are taking tentative steps toward addressing the concerns around multi-cloud interoperability. Providers such as AWS and Azure, through their AWS Outpost and Azure Stack offerings, respectively, have attempted to extend their public cloud offerings to enterprise data centers. These solutions aim to create the same public cloud experience in an on-premise data center and allow for interoperability across a single provider's cloud environment but not necessarily interoperability among multiple providers. Google has taken a slightly different approach with Anthos, an enterprise hybrid and multi-cloud platform. Anthos claims to allow enterprises to run applications on-premises, in the Google Cloud, and other third-party cloud providers such as AWS and Azure. However, Anthos requires enterprises to modify their applications. Enterprises should be aware of hyperscale providers' offerings, but also know that true multi-cloud interoperability might not be something these hyperscale providers desire.

Classic multi-cloud versus an interoperable multi-cloud

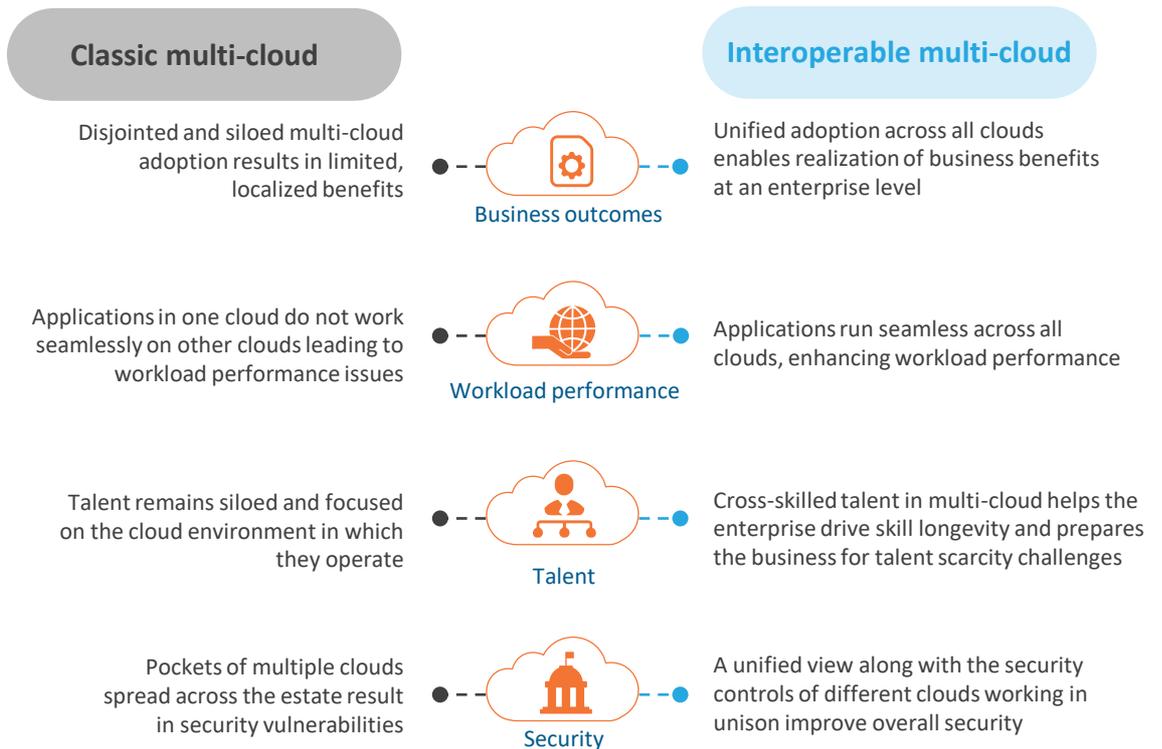
While multi-cloud adoption is not new, most enterprises' multi-cloud adoption approaches lay a weak foundation for transformation. A classic multi-cloud is characterized by the presence of more than one cloud in the environment without much thought to orchestrating other vital elements. Different teams leverage different clouds, focusing on specific benefits. This localized approach inhibits the organization's ability to realize broader benefits and exposes the business to security risks.

On the other hand, an interoperable cloud orchestrates data and services to enable various clouds to operate more effectively together. This approach allows for both local and organization-wide benefits and security, addressing such issues as poor workload performance, cloud tech lock-in, environment complexity, resource sprawl, and cost overrun.

EXHIBIT 2

Classic multi-cloud versus interoperable multi-cloud

Source: Everest Group (2019)



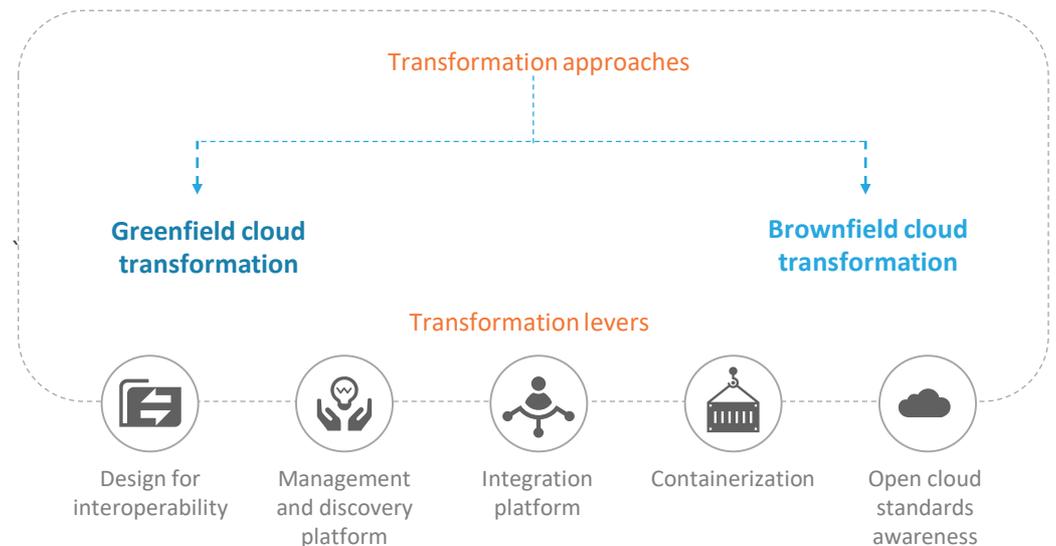
Multi-cloud interoperability building blocks

Enterprises can think of enabling multi-cloud interoperability in two broad buckets – greenfield cloud build and brownfield cloud transformation. Depending on where an enterprise is in its overall cloud transformation journey, it can leverage a mix of both approaches to move to an interoperable cloud environment.

EXHIBIT 3

Building blocks of multi-cloud interoperability

Source: Everest Group (2019)



Design for interoperability

Enterprises should plan to introduce elements of multi-cloud interoperability as early as possible in their development cycle. Doing so will help them to align strategy and vision with on-the-ground efforts, as well as eliminate waste and avoid lock-in.

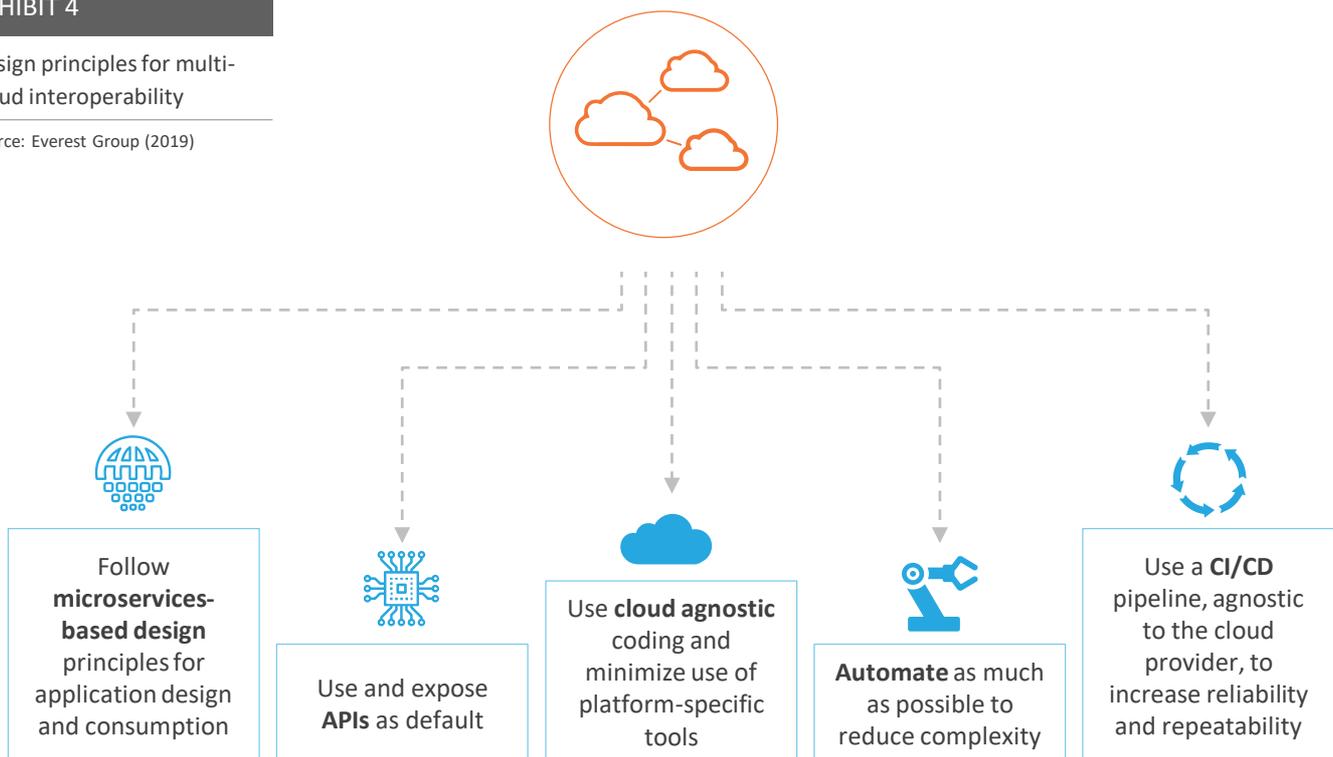
In order to enable interoperability with multiple cloud services, workloads should be designed with service-centric principles and should be able to utilize and expose APIs. Developers need to write cloud-agnostic code, minimize the use of platform-specific tools, and avoid hardcoding private information.

Enterprises should plan for multi-cloud interoperability even if the current deployment is for on-premise, private cloud, or a single cloud. Planning ahead reduces the technical debt and effort required to re-architect the application later. Planning from the start and designing with an intent will make multi-cloud architecture more practical.

EXHIBIT 4

Design principles for multi-cloud interoperability

Source: Everest Group (2019)



Management and discovery platform

For a successful interoperable multi-cloud operating model, enterprises need to address the challenges of service discovery, orchestration, and management of diverse cloud environments. Cloud management and discovery platforms provide enterprises with tools to manage applications' deployments and operations, their datasets, and underlying infrastructure across the diverse multi-cloud environments.

Enterprises should consider a management and service discovery platform that can provide visibility across the environment. The platform should provide a simplified view through the aggregation and integration of data from multiple cloud environments. It should assist in multi-cloud interoperability through access and authorization management, resource discovery and management across environments, financial management, service integration, automation through service catalogs to support self-service provisioning, and cloud brokerage. For mature enterprises, the management platform could use data, policies, and governance already defined within systems or processes. For less mature enterprises, configuration of the discovery and management platform can guide them through the establishment of these policies and processes.

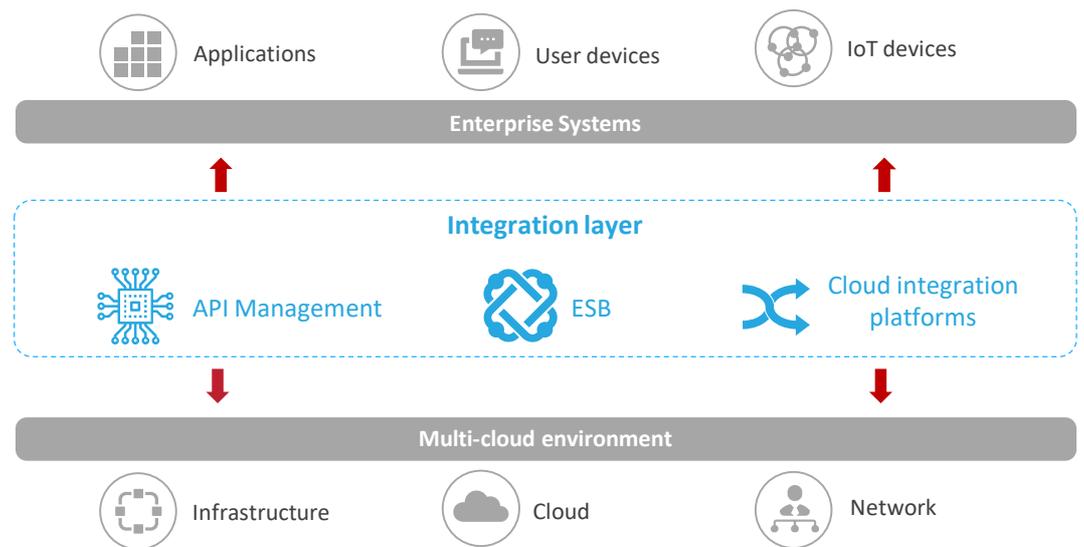
Integration platform

Enterprises increasingly face the challenge of enabling applications and data sources deployed in multiple cloud environments to work together. They have traditionally depended on point-to-point solutions to integrate specific applications or platform endpoints. Multi-cloud interoperability requires enterprises to address complex integration requirements that exist within and among multiple clouds. Multiple point-to-point solutions result in a highly complex environment with solutions that are often difficult to scale, lack flexibility, and require significant maintenance.

EXHIBIT 5

Integration platform enabling multi-cloud interoperability

Source: Everest Group (2019)



Enterprises need a comprehensive component-based integration platform that enables different cloud resources to seamlessly work in unison. Most enterprises have multiple generations of technologies, such as Enterprise Service Buses (ESBs), data integration tools, B2B gateway software, Managed File Transfer (MFT) platforms, cloud integration platforms, and API management platforms. Enterprises need to reassess their approaches to integration platforms along with their multi-cloud strategy to rationalize the number of integration platforms. They have to select a combination of technologies that will optimally resolve integration complexities while being cognizant of factors such as the technology landscape, past investments, the talent skillset, cost, and management.

Containerization

An increasing number of enterprises see containers as the answer to multi-cloud interoperability and portability challenges. Containers allow enterprises to move freely among cloud environments and even back on-premise by enabling virtualization of applications and their dependencies. Platform-agnostic container solutions are key to achieving this level of flexibility so that enterprises can easily adapt as their needs evolve. Platform-agnostic container solutions built on leading open source cloud frameworks could provide enterprises with the flexibility to work with any infrastructure or application type and unify its applications – both legacy and new – under one platform.

Open cloud standards awareness

Whenever possible, enterprises should leverage standard APIs, protocols, and data formats. One possible way to enable widespread multi-cloud interoperability is through standardization. Various standardization efforts are ongoing across the globe such as Distributed Management Task Force (DMTF), Cloud Standards Coordination (ETSI), Advancing Storage and Information Technology (SNIA), CloudAudit, Cloud Security Alliance (CSA), TC CLOUD, Object Management Group (OMG), and IEEE. Enterprise architects, developers, and operations teams should be cognizant of cloud standards. Open APIs that target multi-cloud interoperability and open protocols could be leveraged to create vendor-agnostic multi-cloud interoperability.

59% of enterprises are adopting containers for microservices¹

30% of enterprises are running microservices in their production environments¹

“An effort to produce a cloud infrastructure that allows industry players to cooperate in the development of interoperable modules is needed”

- IEEE, *Issues on developing interoperable cloud operations* (2016)

¹ Everest Group research with 200 CXOs from large enterprises (more than US\$ 1billion in revenues)

Conceptualizing interoperability in multi-cloud

The dynamic nature of digital businesses will necessitate the adoption of a multi-cloud model where each cloud deployment must interoperate. The framework outlined below may help enterprises to conceptualize cloud interoperability.

EXHIBIT 6

Framework for implementing multi-cloud interoperability

Source: Everest Group (2019)



Technology

Enterprises need to refresh their outlook on existing and planned technology investments. An interoperable multi-cloud needs to orchestrate legacy and newer technology environments; enterprises need to prioritize which of the technology stacks need be interoperated in a multi-cloud model. Force fitting interoperability across stacks can be counterproductive.

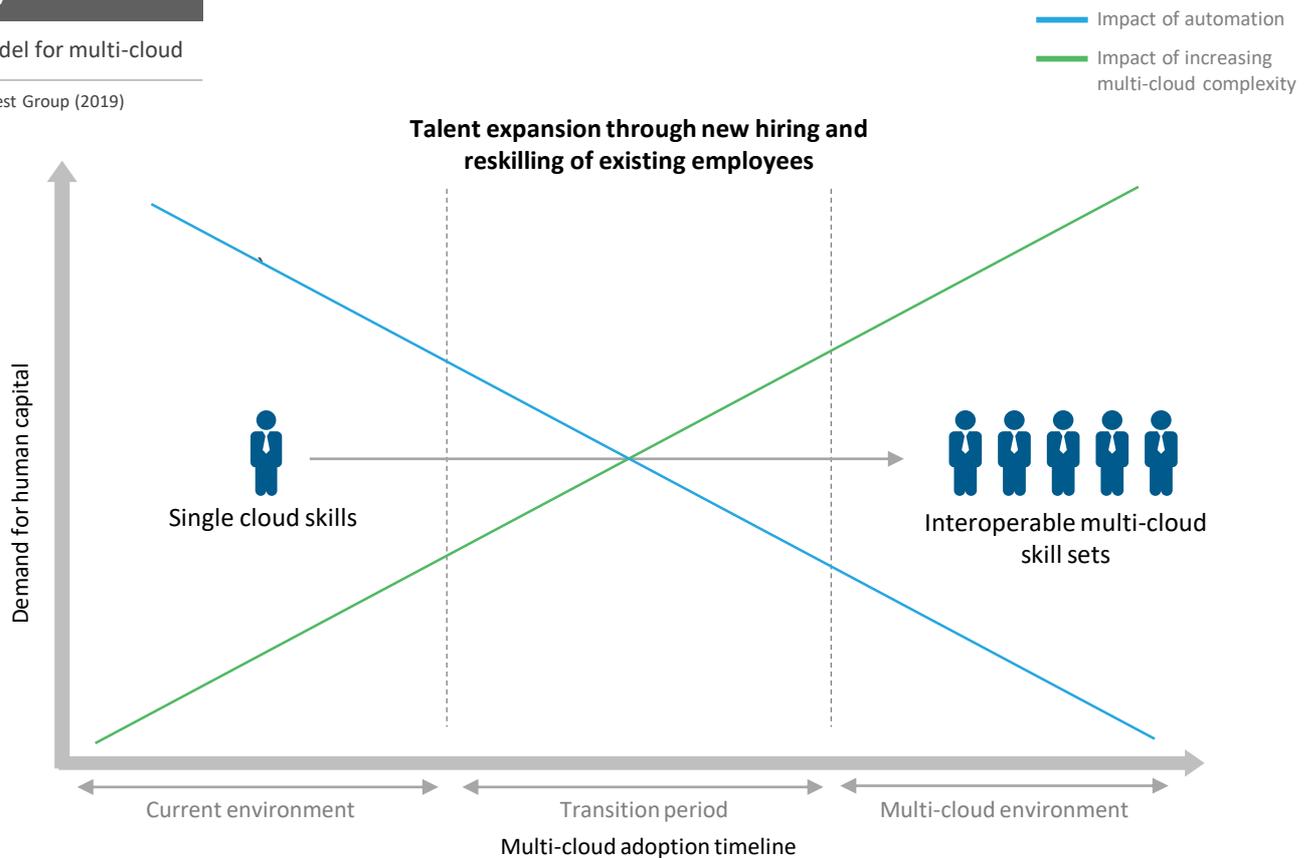
Talent

As enterprises adopt an interoperable multi-cloud, their skill set mix will change significantly. Multi-cloud complexity will continue to increase with the proliferation of offerings by cloud providers. Technology complexity combined with a need to understand business context will dramatically increase the need for cross-functional skills across multiple clouds.

EXHIBIT 7

Talent model for multi-cloud

Source: Everest Group (2019)



Enterprises will need a focused approach to developing talent for an interoperable multi-cloud, including reskilling/upskilling and hiring, new talent assessment models, investments in training and development, and effective automation leverage.

Collaboration

The full benefits of interoperability will be elusive without internal and external collaboration, in particular around two key components:

Stakeholder alignment – The first step is to bring together all key stakeholders – both internal and external – to assess the environment and understand the importance of interoperability. External stakeholders can include technology firms, service integrators, and startups, among others.

Cultural change – Different teams should follow a uniform operating model to leverage the best of all clouds. They should have the flexibility to leverage any cloud they want (internal/external), as long as interoperability is a key decision criterion. The teams should ensure that any application transformation keeps interoperability at the forefront.

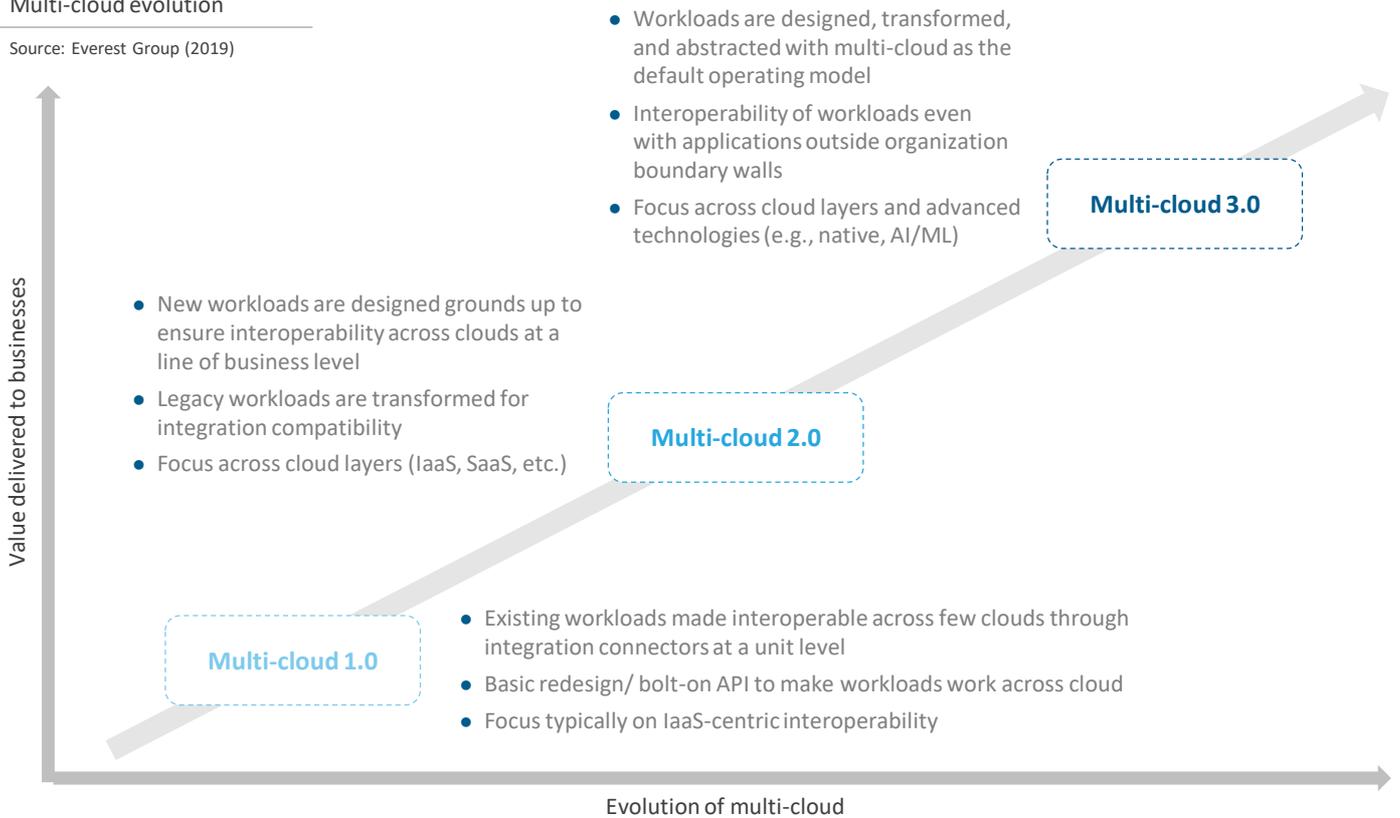
Longevity

With increased enterprise adoption, multi-cloud will continue to evolve. Enterprises should not approach their interoperable multi-cloud strategies from a single-point-in-time, but instead recognize the need to be dynamic and continuously evolve. Multi-cloud 3.0 will be characterized by omni-cloud adoption across all enterprises with high interoperability and a focus on deriving business value from cloud and other adjacent technologies.

EXHIBIT 8

Multi-cloud evolution

Source: Everest Group (2019)



7 statements to inspire thinking

Enterprises can use the following 7 statements to inspire their thinking around how to evaluate the need for an interoperable multi-cloud.

1. We are evaluating moving our workloads to a multi-cloud environment
2. We are already on multi-cloud but are not getting the business benefits we expected
3. We are not happy with our cloud provider and are evaluating alternative options
4. Different workloads in our environment work better on different clouds
5. Our cloud application landscape has become too complicated to manage
6. Multi-cloud has not enabled us to break the process silos
7. Our senior leadership has mandated that we have an environment with more than one cloud

If you agree with statement 1, you must consider interoperability before migrating applications to cloud.

If you agree with at least three statements from 2-7, you should consider making your multi-cloud environment interoperable. You can leverage a mix of transformation levers identified in brownfield cloud transformation and greenfield cloud build.

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