

The image features a woman standing in the center of a futuristic hallway. The hallway is illuminated with vibrant pink and red light, creating a high-tech atmosphere. The walls are dark, and the floor is reflective. The woman is wearing a dark, form-fitting outfit. The overall scene is framed by a large, glowing pink shape that resembles a stylized 'A' or a doorway.

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**The high tech
cloud imperative**

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Executive summary

The high tech sector has a unique relationship with the cloud. Companies specializing in areas like consumer electronics, enterprise compute, semiconductor and communications don't just use the cloud to improve IT operations. They also make the products and tools used to build the cloud. For high tech, cloud is more than just a platform-as-a-service (PaaS) offering that can reduce costs. Cloud is a disruptive force that can transform not just product lines but the entire business. Whether that transformation is for good or for ill is up to the companies involved.

The word disruption refers to change, an interruption in the normal course of events. And one of the most important functions of change is to open up space for opportunity.

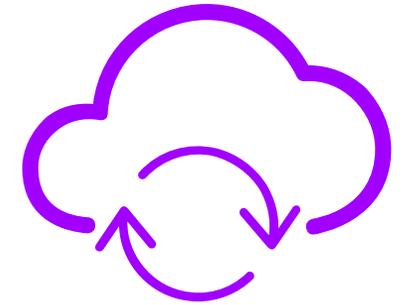
For legacy hardware providers with substantial investments in serving the OEM and on-premises market, it can be easy to view the cloud as a threat to their business model. After all, many of the end-users who once bought and installed compute equipment in buildings are now accessing cloud instances as part of a hybrid multi-cloud. Within a very short time horizon, however, clinging to those legacy models will be about as effective as a communications provider

continuing to charge for calls or Internet by the minute. Change is here—the only choice high tech companies have is whether or not they are going to embrace it.

Reframed as a strategic opportunity, the cloud equips high tech companies to unlock new business initiatives and avoid being outpaced by the competition. Former hardware providers can switch to software-defined offerings, for example, with or without cloud ecosystem partners. Cloud creates a whole new set of customer needs, with associated demand for products. The use of cloud-centric tools and techniques streamlines development and supports innovation. From an operational standpoint,

a strategic hybrid multi-cloud delivers the high-performance, resilient, elastic and secure computing platform needed to support modern product development.

Shifting into a cloud-centric model requires commitment to change. Organizations need to reimagine all processes, from their product roadmap to their business models to their go-to-market strategies. By embracing the cloud from development through operations, high tech businesses can speed product development, increase agility, optimize manufacturing and most important, position the organization for a stable and profitable future.



ORGANIZATIONAL REINVENTION

Source: Accenture analysis 2021

Introduction

Mention the effects of cloud in business circles, and you'll probably hear benefits such as scalability, elasticity, decreased IT costs and labor, and increased reliability. While these are undoubtedly important, focusing exclusively on these points could result in missing the bigger picture: Cloud is a disruptor with the ability to completely remake markets.

This particularly holds true for high tech (e.g., semiconductor, consumer electronics, communications, enterprise technology, etc.), for which cloud represents both tool and market. As a disruptor, cloud has the potential to destabilize many legacy technology providers. Semiconductor manufacturers, for example, have traditionally focused on selling silicon to server OEMs, who package them into offerings for vertical markets. Cloud doesn't just serve a few verticals, it serves multiple diverse market segments. It is not about a set of customers, it's about a set of capabilities.

As a disruptor, cloud also presents a tremendous opportunity for legacy providers to reinvent themselves for the cloud era. Embraced throughout the organization, from product roadmap to overall business strategy, cloud can help companies drive innovation, develop new revenue streams, modernize engineering and enhance business agility. The result is a more competitive organization that is better equipped to respond to a fast-changing global marketplace. With the transition already underway by many major players, the question for high tech companies is not whether to transform but how to do it as efficiently and effectively as possible.



Industry context

The high tech sector faces a unique set of challenges, created in part out of its own success. Customers expect rapid release of new products with new features, enhanced performance, high reliability, and shrinking size, at lower prices.

With the emergence of 5G and the Internet of things (IoT), the market for “plug and play” offerings is rapidly being eclipsed by demand for customized, highly functional devices.¹ Product development has become complex and resource intensive. Pressure to speed time-to-market is relentless. Manufacturing depends on byzantine global supply chains and specialized high-precision equipment. With complex, tightly interwoven processes, breakdowns anywhere in the manufacturing chain can cascade throughout the process. The complexity of operations also makes high tech players more vulnerable than usual to disruptive events like severe weather and, of course, the most disruptive event of all, COVID-19.

High tech has a relationship to the cloud unlike that of any other market sector. It both uses the cloud and supplies the products that form the infrastructure. As a result, the competitive landscape has become

highly intertwined. Yesterday’s customers like Amazon and Apple might be today’s competitors. Today’s hardware company is tomorrow’s software-as-a-service (SaaS) provider. The only constant is change, and the tools that equip organizations to manage that change effectively are in the cloud.

As with most disruptors, cloud can be friend or foe. It’s tempting for legacy hardware providers to view the cloud as a threat to their business model. After all, they’ve made tremendous investments in the facilities, supply chains and engineering talent to serve their traditional markets. The problem is that now their customers are transitioning from buying and installing hardware in their own buildings to hybrid clouds that combine on-premises clouds for sensitive workloads with capacity accessed from public cloud service providers (CSPs) for much of the rest. Meanwhile, the traditional customer base is shrinking. High tech

companies that remain static in the face of these market dynamics will not only let the competition pass them by but risk getting run over in the process. Cloud represents a powerful tool for addressing new markets and driving new business.

By adopting updated business models, legacy organizations can transform their businesses and introduce new revenue streams in the process. For an example, look no further than NetApp, long established as a hardware company. Recognizing the changing market, they separated the OS from their hardware so that it could be offered to clients as an OS on top of a virtual machine (VM) accessed from a hyperscaler (see below). The result is equivalent to a NetApp storage array running in a public cloud environment, making it easier and more economical to manage. NetApp embraced the growth of the CSPs, aggressively changing its business model to seize the market opportunity.

Cloud Snapshot
NetApp

“NetApp as a business is moving to the cloud.”

MARK CHADWICK

Managing Director, Strategic Partners, NetApp

A long-time legacy hardware supplier, NetApp has taken advantage of the cloud to both reimagine how it serves customers and apply those same tools to its own practices.

“From a vendor perspective, we’ve been working very closely with the CSPs to transition some of the products in our portfolio to run in the cloud,” says Mark Chadwick, managing director, strategic partners at NetApp. “That introduces mobility, flexibility, scalability, and other benefits largely found through cloud deployments.”

NetApp cloud developers aren’t just building these products for end-users.

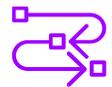
“Our engineering teams are actually leveraging the cloud for their development,” Chadwick says.

“It’s a way to both increase agility and demonstrate the effectiveness of the products to the customer base.”

It’s all part of the company’s strategic shift to a more cloud-centric posture. “NetApp as a business is moving to the cloud,” Chadwick says. “We’ve quit building data centers. We’re doing more and more with the hyperscalers. So, for a lot of the offerings that NetApp actually builds, our own internal IT is the first customer.”

State of cloud in the high tech industry today

High tech businesses can benefit from the cloud in three primary ways: through improved product development, by leveraging the cloud to create new customers and revenue streams and, of course, through operational improvements.



Cloud is changing product roadmaps

Because high tech players are both builders of the cloud infrastructure and tools, and also users of the infrastructure and tools, their product roadmaps are uniquely impacted by the cloud.

Customer requirements can push hardware companies to reimagine their offerings. Dell collaborated with VMware, for example, to release VMware Cloud Foundation on Dell EMC VxRail, an all-in-one automated platform designed to streamline cloud migration and management.² Cloud also alters the calculus of the product roadmap. Once upon a time, chip companies

developed processors designed to serve the widest range of customers. In our brave new cloud world, a single hyperscaler can provide sufficient economies of scale to justify a custom product (see Intel, page 14).

Meanwhile, market dynamics are providing the demand, with 59% of executives saying they've increased investments in hybrid cloud during the pandemic.³ This has driven hyperscalers toward partnerships to build additional product offerings such as cloud control planes that can be used to manage what could become a staggering number of cloud administrative consoles. Chip companies are supporting such product needs by offering customized chips.

The unique relationship of high tech to the cloud also affects the choice of cloud deployment in a way unlike that of any other industry. For these companies, the value of today's cloud includes the creation of test environments and the use of the products for daily operations in their own organizations. This, in turn, provides the opportunity to demonstrate to customers the effectiveness and quantifiable benefits of those products.



New challenges and opportunities in the marketplace

To truly take advantage of the cloud, high tech companies can't simply focus on the same hardware solutions they've built in the past. They need to think in terms of reinventing themselves, their business models and their products.

As an example of new business models, consider the trend toward "as-a-service." Cloud has ushered in the as-a-service consumption model. High tech providers need to think about how to deliver their services to their customers in a consumption and/or as a service-type model. "We are at an inflection point in the market," said Antonio Neri, president and CEO, HPE. "Everyone recognizes that customers want technology delivered as a service."⁴

In our view, few high tech players have legitimately solved the as-a-service problem, either in terms of providing or monetizing this service. As these high tech companies work to transform, cloud-based product-development tools will help speed the transformation.

To expedite this type of pivot, a number of incumbent high tech players are making strategic acquisitions of more nimble cloud counterparts. VMware bought Pivotal, adding developer-centric offerings to VMware's Kubernetes run-time infrastructure and management tools.⁵ HP purchased Silver Peak, which brings SD-WAN functionality designed to accelerate cloud transformation for enterprises.⁶ Chipmaker AMD acquired Xilinx,⁷ gaining access to that company's FPGA technology for supporting intelligent networking, critical 5G infrastructure and emerging technologies like machine learning (ML).





Operational improvements

Strategically performed, data-center consolidation and a lift and shift to an optimized multi-cloud environment can provide high tech organizations with the same types of benefits as any other industry. Improving the delivery and economics of IT services frees up technical talent at all levels to work on value-added projects. It also frees up capital for more strategic priorities.

Although plenty of companies are still developing applications in house and running hybrid clouds, there is an increasing number of custom clouds targeted at a specific industry or even application. By leveraging these industry-specific clouds, high tech organizations can avoid spending engineering hours on customizing commercial clouds or even building home-grown versions. The SAP Cloud Platform is a PaaS offering that enables users to write application extensions and other custom code.⁸ Elsewhere, Salesforce has a PaaS.⁹ This begs the question of whether the “plain vanilla” cloud is being supplanted by industry-specific offerings. As organizations increasingly use the cloud to

offload specific tasks that are not part of their core value proposition, will the generic cloud be relegated to the background?

Another way to use the cloud to improve operations is by applying it to manufacturing analytics, using the input from the industrial. Whether in the fab or assembly line, sensors can capture data, run it through edge devices for preprocessing and immediate decisions while sending data to the cloud for comprehensive analytics. Analytics software can monitor asset condition and performance on a minute-by-minute basis to detect quality issues and asset defects at very early stages.

If environmental conditions exceed thresholds or packaging is defective, for example, the system can identify issues so that they can be addressed immediately. The result is reduced scrap, improved product quality and less unscheduled downtime, which can save millions of dollars per hour. The cloud provides flexible, optimized computing resources to convert enormous volumes of data into actionable intelligence. These same techniques can also be used in the data center to simplify monitoring and ensure reliability.

The ultimate realization of these efforts is the development of the digital twin, a “living” model of an asset/production line/facility that mirrors the condition and performance of the physical equipment. The digital twin provides a powerful tool for optimizing performance and maximizing insights. Cloud deployments, in combination with ecosystem partners, provide practical implementations that let manufacturers focus their energies and resources on the products and services they provide and not on analytics.

The cloud also provides affordable and flexible high-performance computing (HPC) capabilities necessary to support building artificial intelligence (AI) models. AI engines are capable of not only identifying failure patterns but of modifying the system before the user even realizes a problem exists. The AI engine for storage platform, for example, might be set up to detect a looming shortage of memory allocation. The AI would not only send an alert to the system administrator but also automatically allocate additional storage to the processes to preempt any problems.

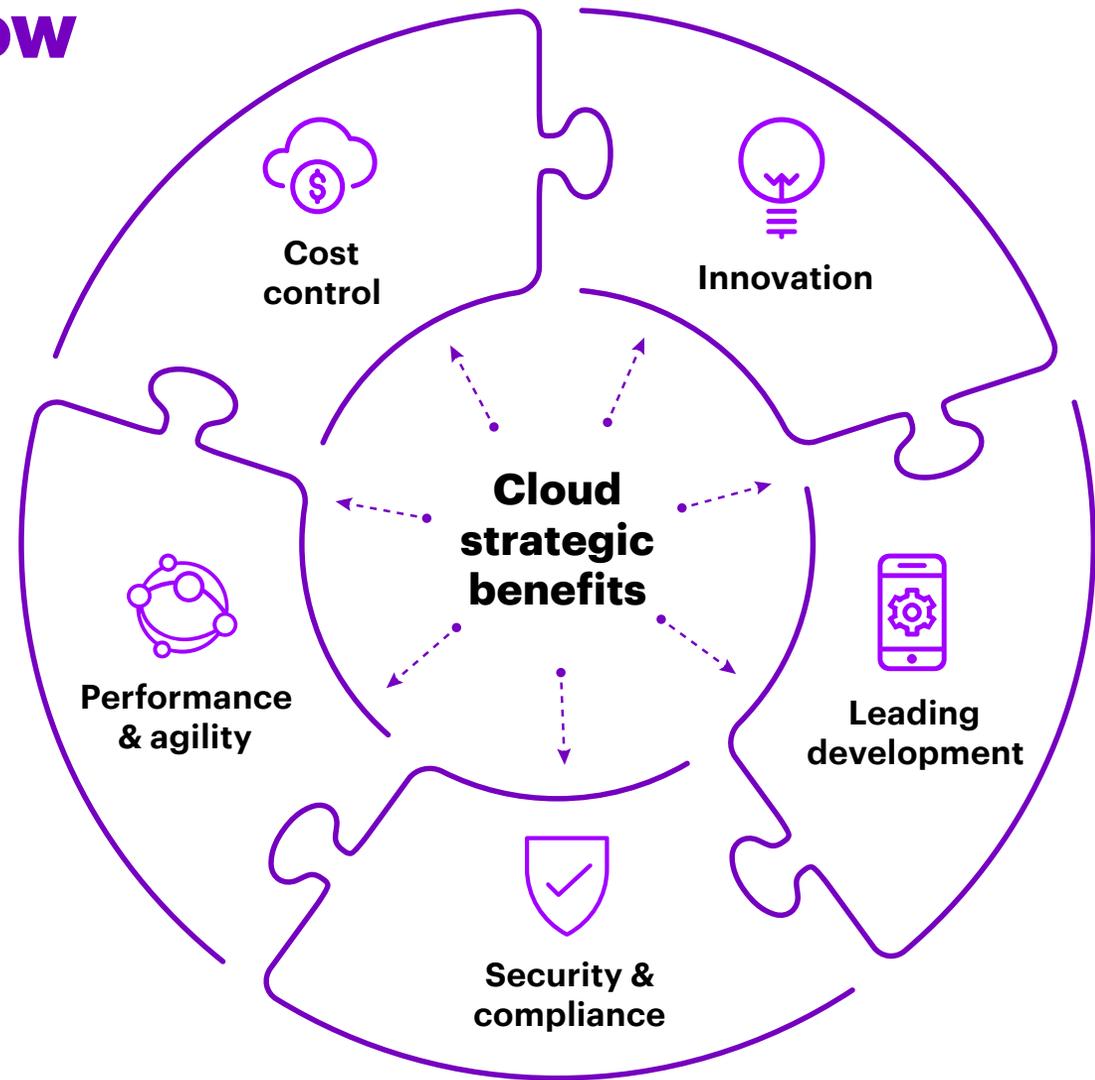
The value case for cloud now

An effective multi-cloud environment can address many of the pain points experienced by high tech companies. It provides specific improvements in the following areas:

Innovation

Shifting engineering operations to the cloud can dramatically accelerate innovation. Consider semiconductor EDA. Given the complexity of today's chips, the amount of computing power needed for design, testing, validation, etc. is rising by as much as fivefold annually. Just replacing the existing hardware with updated solutions isn't a cost-effective solution as Moore's Law can't keep up with this growth rate.

Meanwhile, high tech chip companies want to spend their resources on developing products, not upgrading their data centers. The solution is to use cloud to provide flexible capacity for engineering, development, high-performance compute (HPC), supply-chain collaboration and high-volume manufacturing (HVM) analytics. Stakeholders at all levels, from engineering to manufacturing through operations and management, are now equipped to rapidly and reliably respond to changing market demand.



Leading development in the cloud

Cloud has ushered in the democratization of technology, with cloud-based AI offerings like natural-language processing and robot programmed automation, crowd-sourced coding and low-code platforms.¹⁰ These cloud-based tools have made it easier than ever for employees across the enterprise to innovate and help the business exceed customer demands.

The cloud enables an efficient approach to developing, maturing and bringing products to market. It starts with the concept of cloud-native development—building applications by tapping libraries of pre-existing micro services. In addition to extensive libraries of APIs, host of open-source tools are available, such as Jenkins, Docker, Ansible, and more. These offerings speed the process and improve quality, enabling developers to easily and quickly try out new ideas. The result is an environment that fosters a culture of agility and innovation.

The focus in development today—any kind of development—is one of continuous, integrated development, build and delivery. The approach first emerged as DevOps, extended to DevSecOps with the focus on security. That concept has morphed into DevXOps, where the X indicates continuous development of any other important aspect of the business.

If the primary concern is maintainability and reliability, then, DevConfigOps becomes a focus. It isn't just a process, it's a philosophy. Cloud supports the approach by providing an agile infrastructure. Instead of buying and provisioning servers, developers can access self-service portals with menus and tools and in seconds have the development environment they need.

The cloud environment increases transparency in design. Everyone on the development team, has joint access to design files, test results and analytics. The organization has a single repository for design

data, supply-chain updates, resource consumption metrics and manufacturing key-performance indicators (KPIs) for process control and condition monitoring. It becomes easy to automate key steps and present clear chains of accountability. The result is more effective development, higher product quality, streamlined operations and lower cost of ownership.

These changes don't just improve and speed product development, they also help high tech players attract and retain talent. The most skilled and inventive engineers want to work on the latest projects using the latest tools. The right multi-cloud strategy creates an environment in which product engineers evolve into cloud engineers. The result is not just faster development but a more engaged workforce.

Security and compliance

For many years, organizations avoided public cloud due to security concerns. A workload on the public cloud was only as secure as the most vulnerable application or OS, the thinking went. CSPs have developed highly robust partitioning and methodologies, frequently installing top-tier subscribers on dedicated servers. That does not completely mitigate the threat of side-channel attacks but it is worth noting that the security and compliance team at your average hyperscaler is generally larger than the entire IT shop at a traditional company. As cloud has matured from aspiration to necessity, organizations are moving to increased satisfaction as the need to protect their intellectual property and customer databases remains critical.

In this era of fast-growing regulatory frameworks, public clouds also offer key tools to help streamline and document regulatory compliance. For high tech companies, who have their hands full with product development may be more exposed to regulatory measures by virtue of their product categories, while public clouds offer many tools for achieving and maintaining compliance.

Performance and agility

The high tech sector often leans heavily on high-performance computing (HPC) capacity for engineering workloads, which is enormously costly, difficult to size appropriately and time intensive to manage. A semiconductor HPC environment, for example, typically includes multiple thousands of cores and hundreds of petabytes of storage, expanding by double digits year-over-year.¹¹ As demand in our world grows for emerging technologies such as the IoT, 5G and associated applications like autonomous vehicles, high tech companies need to be agile enough to rapidly release new products. By shifting their development HPC clusters to a strategic multi-cloud environment, organizations can take advantage of virtually unlimited compute cycles and storage to execute the billions of workloads they need to run annually in order to continually update their product portfolios.

This premise is true for non HPC workloads as well. A well-executed multi-cloud environment lets high tech businesses scale resource use to the needs of the moment, accessing burst capacity for compute-intensive activities while taking advantage of peak saving when possible. Additionally, applications can be re-factored as cloud native for faster, easier development and deployment of IT and design applications.

Cost control

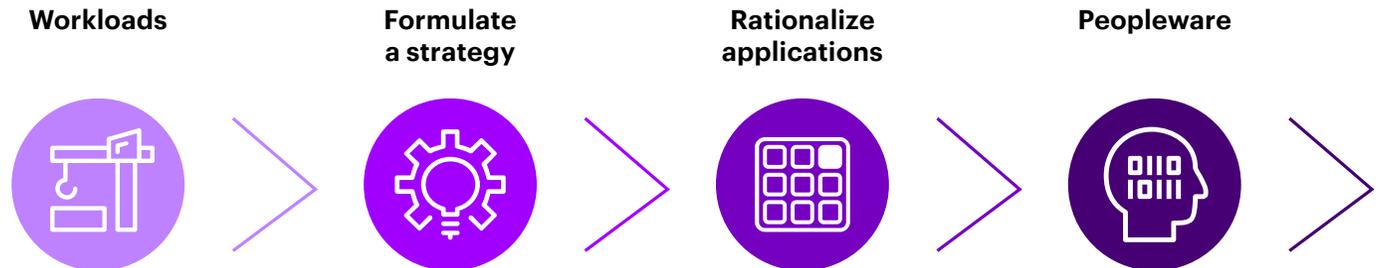
As we have discussed above, operational cost savings is a key outcome of a well-managed multi-cloud environment. Strategic multi-cloud environments provide companies with the capacity they need for minimal upfront capital investment. Organizations can still maintain on-premises functionality for select workloads or a baseline of operations. They should leverage public cloud offerings to optimize spend across their IT and OT infrastructure, however, allowing the organization to focus on innovation rather than hardware and software.

Moving to action

As we've been discussing, how a high tech company moves to the cloud is just as important as whether it moves to the cloud. Rushing to do a lift and shift to the public cloud is the fast track to failure. Especially for the high tech market, there is no generic cloud process for the types of benefits we have discussed. There is, however, a sequence of steps for getting started.

Begin with the workloads

You can't develop an effective strategy until you know what you have and what you need. By evaluating applications, workloads and assets, high tech firms can gain a better understanding of their baseline. What do these applications and assets accomplish? How effectively do they do it, and what does that cost? IT shops will also understand interaction of these workloads, supporting better dispositioning of these workloads into a multi-cloud environment, thus providing an optimized performance landscape post migration (see Intel below).



Source: Accenture analysis 2021

Cloud Snapshot **Intel**

“The way we go to market is changing dramatically.”

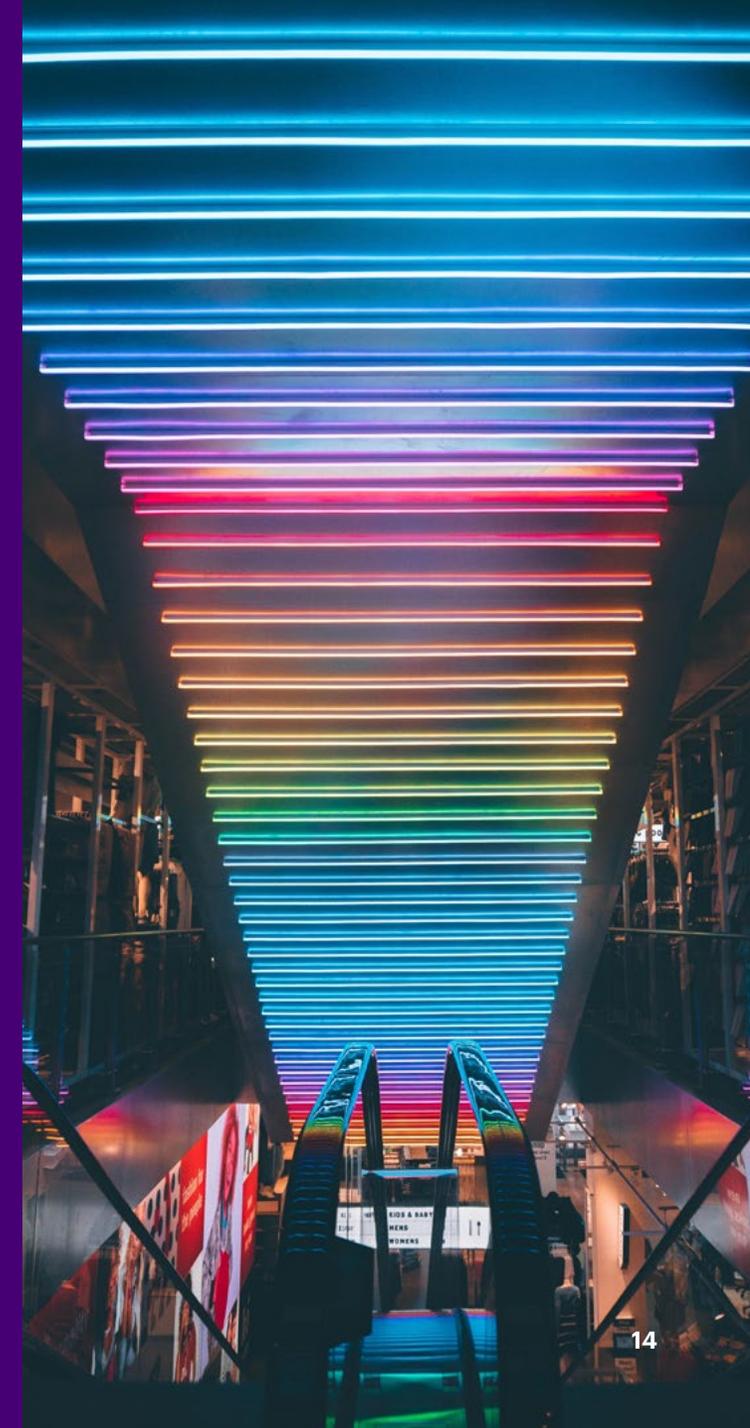
ROSE SCHOOLER

Corporate VP Global Data Center Sales, Intel

The traditional server business model was built around selling silicon to server OEMs who supplied customers in vertical markets. Cloud has introduced several options for our customers to consume compute, spanning from a traditional on-prem model to public cloud, and everything in between. The influence points are changing, and to address opportunities, businesses must adjust to the changing environment.

“The way we go to market is changing dramatically,” says Rose Schooler, corporate VP global data center sales at Intel. “The old value chain is necessary but not sufficient. When that end customer says, ‘Hey, I don’t know whether I want to go on prem or I want to move to the public cloud, or take a hybrid approach,’ our people need to know which cloud service providers have which instances with what capabilities for which workloads.”

Ultimately, a successful pivot to the cloud requires a reevaluation of the whole organization. “Product definition needs to change,” says Schooler. “Sales and marketing need to change. Which customers we work with and how from a software-enabling perspective needs to change. The cloud really requires a whole retooling of our product and go-to-market strategy.”



Formulate a strategy

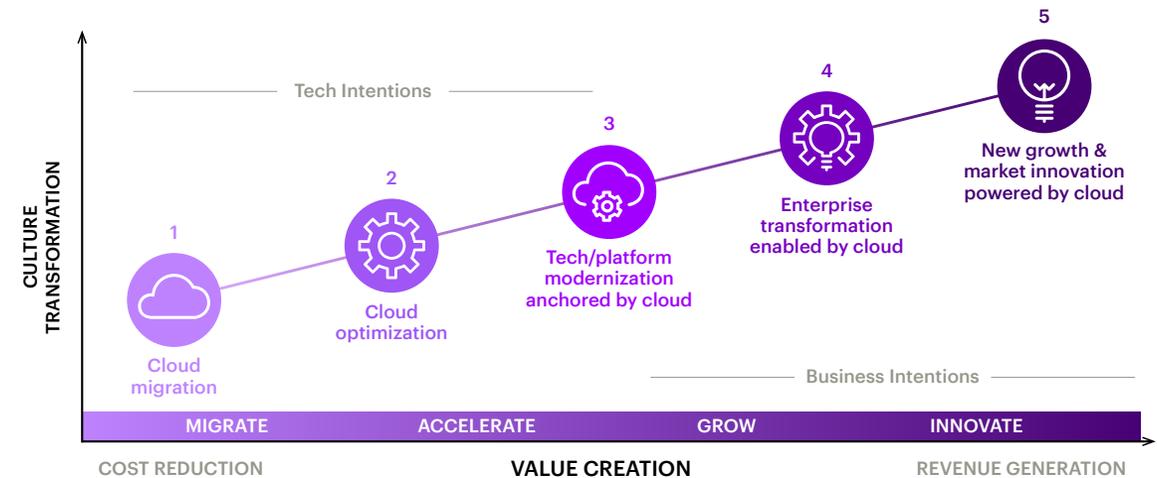
One of the most common misconceptions around cloud is that the simple act of shifting workloads to the cloud will deliver substantial cost savings. That is not necessarily the case. To realize effective ROI from a cloud migration, the transition needs to follow a well-thought-out roadmap. First, identify your key business goals (e.g., transform to a services provider, speed development cycles by 20%, move to a modern development environment, etc.). Determine the cloud deployment and services strategy that will deliver on this vision. Build a secure environment that can handle the diversity of your workloads.

Rationalize applications

Determine which applications can take advantage of the cloud and which can't. Applications that require minimal modifications can be easily re-platformed. Those that need more significant changes should be re-factored. Some applications should be migrated to new off-the-shelf software or to a SaaS platform. And nearly every organization will have legacy applications that should be reimagined and entirely rebuilt using cloud-native methodology (with those freshly minted cloud engineers), to extract maximum value and support business goals.

Don't forget the peopleware

Moving to cloud involves more than just hardware and software. The move to cloud involves changes to human factors in terms of working methodology, organizational structure, personnel and overall mindset. It's not just the workloads that need to shift, it's the corporate culture. Depending on how the cloud transformation is managed, that corporate culture can be either an accelerator or an obstacle. Focus on addressing change head-on with top-down leadership. Define the path, align the organization and accelerate the transformation. Don't forget change management and remember always that the transformation is a process and not an event. See the path below.

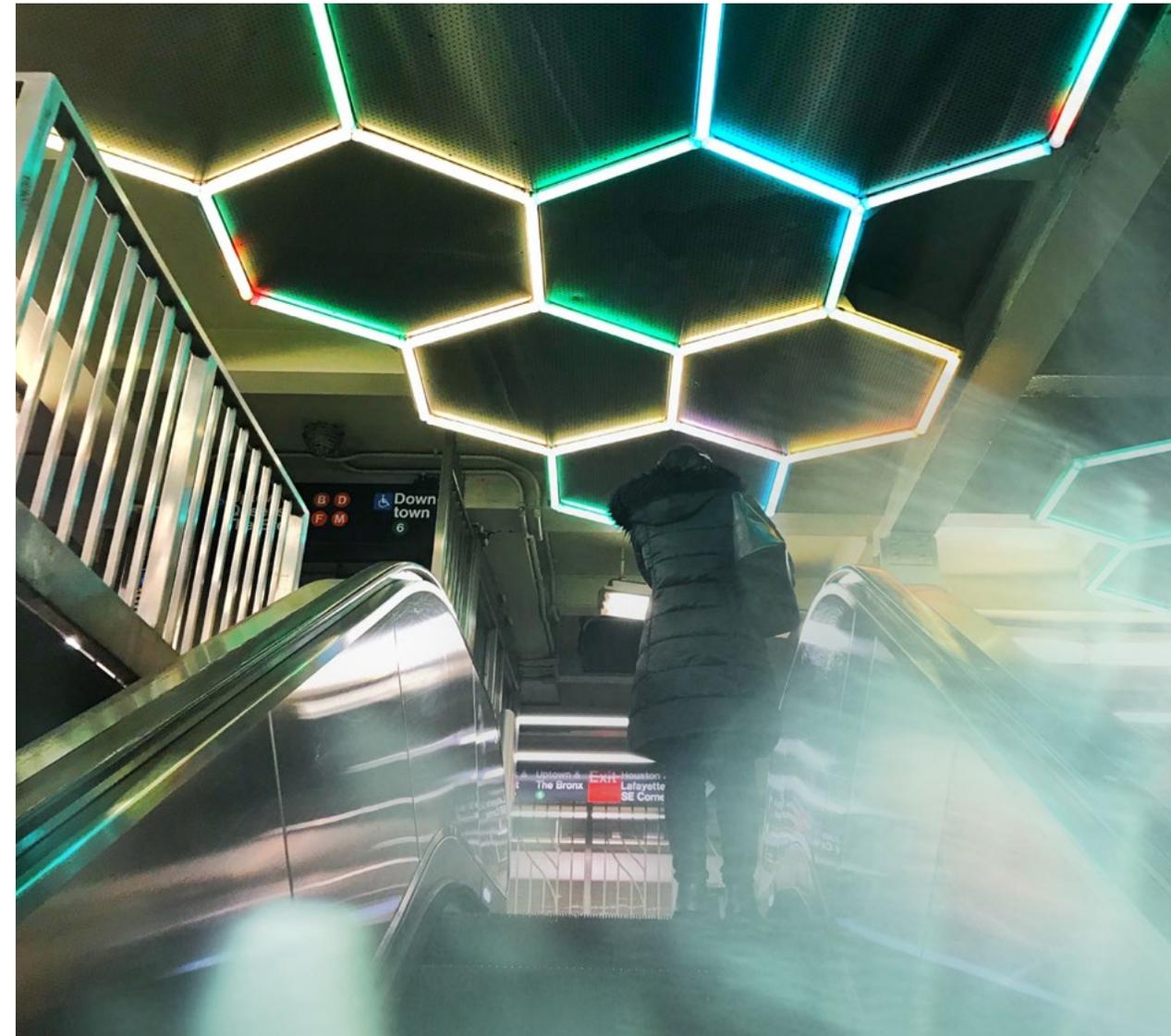


Source: Accenture analysis 2021

Conclusion

For high tech companies, the cloud should be more than just a computing platform, it should become part of their DNA. It's a guide that can inform the product roadmap, it's a sophisticated toolkit that they can use to change their development process, create new revenue streams and even reimagine their business models.

By embracing cloud, organizations can unlock new business opportunities and avoid being outpaced by the competition. Realizing these benefits requires a strategic rollout, however, not just on when and how to deploy but also which combination of clouds and cloud capabilities will best serve the business. The mindset should not be cloud always, it should be cloud smart. Perhaps most important, find a trusted partner with strong relationships with the cloud ecosystem to help navigate your transformation—the journey can be challenging but very, very fruitful.



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