Cloud Strategy Leadership

Gartner Insights on How and Why Leaders Must Implement Cloud Computing

EDITED BY
David Mitchell Smith, Vice President and Gartner Fellow

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Introduction

Have you or your CIO <mark>expressed any of these concerns?</mark>

The cloud is not secure.

Pure cloud is the only option.

Companies can only use one cloud vendor.

No strategy is necessary to start implementing cloud.

These are just a few of the myths that surround the world of cloud computing. In truth, cloud computing has several variations and combinations, ranging from no cloud to pure cloud, depending on the organization's needs.

The C-suite will look to the CIO to answer questions about cloud computing and to help define a strategy to successfully integrate cloud into the day-to-day workings of an enterprise. As cloud computing makes its way into its second decade, the options and combinations are expanding to fit each company need.
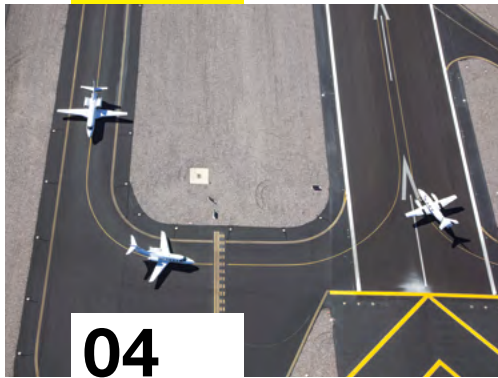
With this book, CIOs can familiarize themselves with various types of cloud options and begin to create a framework to move their enterprise toward leveraging cloud computing. CIOs will also learn about security in the cloud and what type of talent is necessary for a successful shift.

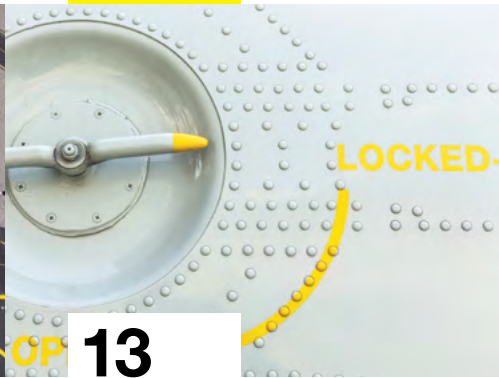**<mark>David Mitchell Smith</mark>**
Vice President and
Gartner Fellow

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The Need for
Cloud Strategy

Earlier this year, the CIO at a large construction materials company realized that by updating its aging IT infrastructure and modernizing the business, the company could expand into other markets and open opportunities for an additional $4 million in annual revenue. Additionally, an updated digitized system would save the company $1 million per year in supply chain costs.

But when the CIO took the idea to the CEO, she was concerned about the risks of moving all the systems to a cloud service, particularly given that the company worked with a few highly sensitive government contracts. Additionally, peer CEOs had shared cautionary tales about trying to move to cloud, and she was hesitant about the initial investment.

The CIO knew the CEO was interested in the potential additional revenue and saved costs, and knew he needed to counter the myths that accompany mentions of the word "cloud." So to gain buy-in from the CEO and board to move forward, he explained that first they would create a cloud strategy to focus their cloud efforts on select business goals. Next, he explained a framework that would move certain parts of the business, such as logistics systems and ordering systems, to the cloud, while ensuring government contracts remained compliant with regulations. As an added bonus, he explained that cloud services would enable the company to scale up during the busy summer months, and scale down during the slower winter months. After dispelling myths and providing a plan, the CIO convinced the CEO to begin the process.

After a decade of cloud it may come as a surprise that the issue of cloud computing is still perplexing to many CIOs. Although cloud computing is a foundation for digital business, Gartner estimates that less than one-third of enterprises have a documented cloud strategy.
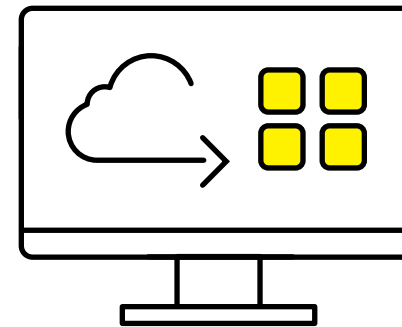
Gartner defines cloud computing as a style of computing in which scalable and elastic IT-enabled capabilities are delivered as a service using internet technologies.

"Having a cloud strategy will enable you to apply its tenets quickly with fewer delays, thus speeding the arrival of your ultimate business outcomes."

Donna Scott, Gartner Research Vice President and Distinguished Analyst

"A cloud strategy clearly defines the business outcomes you seek, and how you are going to get there. Having a cloud strategy will enable you to apply its tenets quickly with fewer delays, thus speeding the arrival of your ultimate business outcomes," says Donna Scott, research vice president and distinguished analyst.

As part of the cloud strategy, CIOs need to educate their CEOs and boards of directors about the need to invest in cloud as a style of computing that drives greater speed, agility and innovation through this democratization of IT. In doing so, they should use their digital business strategy to justify the investments needed for cloud computing.

Digital business requires speed and agility that cloud computing provides through the use of cloud services that become available to a broader set of users through a self-service interface. Users "help themselves" to these cloud services, stimulating creativity and innovation.

"Organizations that do not have a high-level cloud strategy driven by their business strategy will significantly increase their risk of failure and wasted investment," says David Cearley, vice president and Gartner Fellow.

The cloud strategy must also explore the end goals and what makes sense for the enterprise's mission. Buyer's remorse is not something an organization can afford when adopting a cloud service, says Daryl Plummer, vice president and Gartner Fellow. As you would with any other expensive product or service, start with research. What do you want out of it? How will you measure the impact and ROI?

The key is not to think about it as installing a set of technologies, but instead, adopt a cloud service from an outcome perspective. What do you want the cloud to accomplish, and what will the enterprise gain from the migration? Keep in mind that simply moving things to the cloud doesn't automatically make them more efficient or meaningful to the business. As you review cloud options and begin to create a cloud strategy, keep the end goals in the conversation.

"Organizations that do not have a high-level cloud strategy driven by their business strategy will significantly increase their risk of failure and wasted investment."

David Cearley, Vice President and Gartner Fellow

Explore the cloud spectrum

With so many cloud options, including those that implement partial cloud capabilities, it can be difficult to decide what option is the right one for each enterprise. It is vital that technology strategic planners select the option most aligned with the goals and needs they've established. There is value in all approaches to cloud, whether the strategy is pure cloud or not, depending on the enterprise and end goals.

"Cloud computing represents one of the most misunderstood, yet valuable, innovations in current IT and business strategies. However, the value of cloud computing is reduced by the inability of many end-user organizations and managed service cloud providers to sort through technology provider cloud options to find the correct mix of cloud and cloud-related capabilities that they need," says Plummer. "Misaligned expectations will cause many cloud projects to fail."

Cloud and cloud-related offerings can range from cloud-enabling technologies to pure cloud offerings (see Figure 1). This creates a spectrum of capabilities you will need to consider. Whatever option you choose, it needs to support intended value propositions.

FIGURE 1: The Cloud Spectrum

"Cloud computing represents one of the most misunderstood, yet valuable, innovations in current IT and business strategies."

Daryl Plummer, Vice President and Gartner Fellow
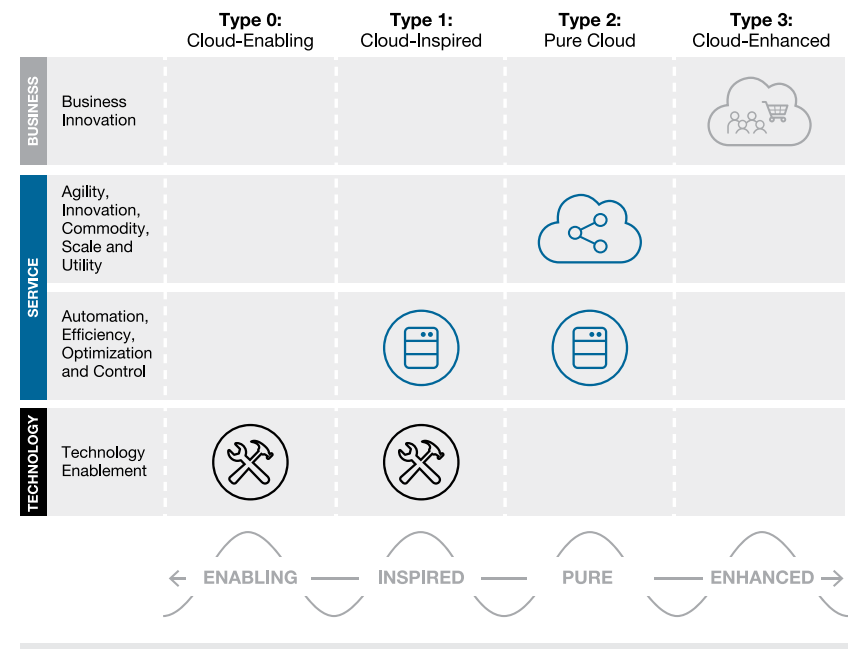
Type 0: Cloud-Enabling

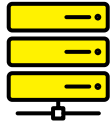Cloud-enabling is not cloud computing; however, it does include the technologies that allow customers to adopt cloud models. This includes technologies such as visualization software, physical servers, WAN networks and data center colocation.

These technologies support companies that wish to build a private cloud, and form the building blocks via necessary architecture and physical setup. They should be used to make cloud delivery more reliable, efficient or agile.

Type 1: Cloud-Inspired

These technologies are closer on the spectrum to a true cloud model, but lack several key pure cloud attributes such as cloud APIs and usage-based pricing. The goal for these technologies is not purity, but rather maximum levels of consumer control and specific hosting desires.

Companies that select these technologies are less concerned with the benefits of pure cloud and more concerned with a higher degree of customization and control while attaining some level of virtualization, standardization and automation.

They do not provide for true hyperscale, full self-service, ultra-rapid provisioning, or provider variety and speed of innovation.

Type 2: Pure Cloud

Pure cloud options are generally, though not always, delivered in the public cloud over the private. Pure cloud includes examples such as Amazon Web Services, Salesforce, Google App Engine and Microsoft Azure.

Pure cloud enables innovation brought about by continuous delivery of new service capabilities, and if the business goal is maximum agility, pure cloud options are a good fit.

This area of cloud offerings is growing rapidly — although the bulk of IT remains in cloud-inspired — as many enterprises move from "cloud maybe" to "cloud first."

Type 3: Cloud-Enhanced

These are cloud offerings built on top of pure public cloud computing. This type of offering assumes that public cloud computing already exists and builds on top of it to capture value from cloud services.

Examples include streaming video services, machine learning platforms, security as a service and GE's Predix platform, the "social network for machines." This area is focused on providers generating new business growth in cloud-enhanced areas rather than traditional cloud areas.

The goal is to discover how enterprises can uniquely benefit from public cloud computing.
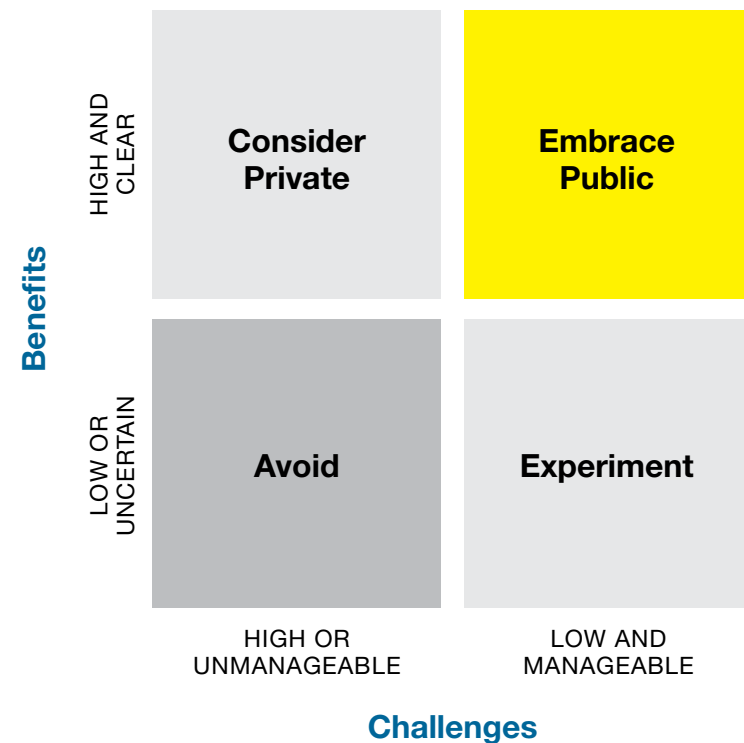
Think bimodal

Now that you have a better idea of what options the cloud spectrum offers, it's time to apply this view as you create a cloud strategy, says Cearley. Start by thinking about the different modes, or IT approaches, of your business. In bimodal IT, one approach (Mode 1) focuses on keeping the business running reliably. The other approach (Mode 2) focuses more on agility, speed and innovation. What is your business's strategy? Is it focused on stability or innovation? A cloud strategy must address both modes based on the overall business strategy and the degree to which the business is focused on driving innovation and aggressively pursuing digital business.

Create a decision framework

A key part of a cloud strategy is a systematic decision framework that is used to evaluate the benefits and challenges of a cloud approach for specific application scenarios. Plot a matrix (see Figure 2) that has "Challenges" along its horizontal axis ("high or unmanageable" on the left to "low and manageable" on the right), and "Benefits" along its vertical axis ("low or uncertain" at the bottom to "high and clear" at the top).

FIGURE 2: Categorizing Cloud Service Options Based on Benefits and Challenges

Benefits		
HIGH AND CLEAR	**Consider Private**	**Embrace Public**
LOW OR UNCERTAIN	**Avoid**	**Experiment**
	HIGH OR UNMANAGEABLE	LOW AND MANAGEABLE

Challenges

Then for each cloud application or use-case scenario you're considering, evaluate and mark the framework with:

Potential benefits: How high-priority are the benefits or rewards that cloud could offer? If the business has requested a customer-facing microsite for a seasonal promotion, cloud benefits might be rapid time to solution and access to innovation. Benefits under other scenarios might be cost savings, solutions to capacity problems, or better handling of workload imbalances or volatility.

Potential risks and challenges: What are the potential downsides or dangers to using cloud services? For an insurance company considering moving its claims adjustment application into the public cloud, security and regulatory challenges might be issues. In other use cases, risks and challenges might be potential lock-in, integration difficulties or market immaturity.

Applications in the upper-right quadrant are the immediate prime candidates for public cloud. Applications in the lower right are candidates for public cloud when a company is pursuing a "cloud first" approach, but more cautious companies or those early on their journey to using cloud may want to wait for these applications.

This technique will offer a rough outline of where and how to provision via the cloud; however, further analysis should follow. This may shift some of the parameters and move the dots on the matrix.

For example, the availability of risk mitigation options (using encryption or tokenization to address security concerns) could reduce the risk and have an impact on your overall assessment. Likewise, your organization's experience with cloud computing and having best practices to secure, manage, and govern access and usage of cloud services can help offset risks as your understanding and management of cloud matures.

Applications that land in the upper-left quadrant, where cloud service benefits are high and clear but the risks or challenges are also high, may be good candidates for a private cloud approach including either a managed private cloud hosted by a third party or virtual private cloud services delivered by public cloud providers. For example, companies that work in markets with government compliance requirements, such as medical or government contracting, might prefer to build in-house cloud services.

Define guiding principles for cloud adoption

IT leaders must define a set of high-level guiding principles for the ideal way for cloud adoption to occur and expectations for associates to consider, adopt and use cloud services. These principles will be unique to each organization, but there are common principles for guidance. Specifically, companies should consider what different adoption scenarios would look like.
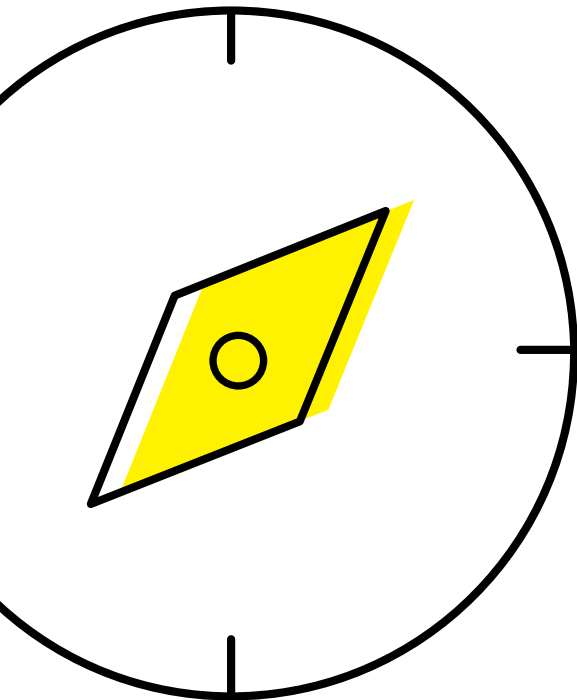
Decentralized/independent service acquisition

In this scenario, the business units pay the service provider directly — the most frequent mode of cloud acquisition. Disadvantages of this setup include minimal visibility across business units and limited synergies in contract management and service efficiency. However, this does lend itself to more satisfied business units and a distributed budget. This approach aligns with Mode 2 in bimodal terms.

SCENARIO 2:

Central review, distributed cloud service acquisition

In this scenario, business units submit a proposal or statement of intent to a central team. This slows the process and reduces agility, but it prevents proliferation of similar applications (thus avoiding integration problems) and offers more visibility into a business unit's interests and need. Keep the business unit's needs in mind when preparing help desk operational support.

SCENARIO 3:

Centralized cloud service acquisition

In this scenario, which is often the approach taken by IT departments, there is a central cloud service procurement function. This offers unified cloud efforts, but can lead to unsatisfied business units, and items that are purchased but not used. IT should start small, monitor use and expand the service as needed. This approach tends to work better for Mode 1 (in bimodal terms).

Top 10 Cloud Myths

The cloud, it turns out, is uniquely susceptible to the perils of myth. Unfortunately, according to David Mitchell Smith, vice president and Gartner Fellow, myths slow us down, impede innovation and scare us, thus distracting us from real progress, innovation and outcomes. The most prevalent myth about the cloud is that it always saves money.

There is no shortage of candidates for the top 10 cloud myths. The list below highlights some of the most dangerous and misleading ones.

1 Cloud Is Always About Money

Gartner surveys show that cost savings account for the reason a small number of organizations use the public cloud. Saving money may end up one of the benefits, but it should not be taken for granted.

▶ **Advice:** Utilize total cost of ownership and other models on a case-by-case basis and assess the implications of moving from capital expenditure (capex) to operating expenditure (opex).

2 You Have to Be Cloud to Be Good

Are you "cloud washing" (referring to the tendency to call things cloud that are not)? As a result, people are falling into the trap of believing that if something is good it has to be cloud or that if it is not cloud-based it cannot be good.

▶ **Advice:** Call things what they are. Many other capabilities (e.g., automation, virtualization) and characteristics can be good and do not need to be cloud-washed.

3 Cloud Should Be Used for Everything

Cloud is a good fit in organizations where value is placed on flexibility and the business has the ability to consume and pay for only what is needed when needed. Unless there are cost savings, moving a legacy application that doesn't change is not a good candidate for cloud.

▶ **Advice:** The cloud may not benefit all workloads equally. Don't be afraid to propose noncloud solutions when appropriate.

4 "The CEO Says So" Is a Cloud Strategy

When asked about what their cloud strategy is, many companies don't have one, and the default is often (stated or not) that they are just doing what their CEO wants.

▶ **Advice:** A cloud strategy begins by identifying business goals and mapping potential benefits of the cloud to them, while mitigating the potential drawbacks.

5 We Need One Cloud Strategy or Vendor

The nature of cloud services and existing interoperability standards can make the issue of limiting options less important, as those details are often hidden from the consumer.

▶ **Advice:** A cloud strategy should be based on aligning business goals with potential benefits. A single cloud strategy makes sense if it makes use of a decision framework that allows for and expects multiple answers.

6 Cloud Is Less Secure Than On-Premises Capabilities

Cloud computing is perceived as less secure. To date, there have been very few security breaches in the public cloud — most breaches continue to involve on-premises data center environments.

▶ **Advice:** Don't assume that cloud providers are not secure, but also don't assume they are. Cloud providers should have to demonstrate their capabilities, but once they have done so, there is no reason to believe their offerings cannot be secure.

7 Cloud Is Not for Mission-Critical Use

Cloud computing is not all or nothing. It is being adopted (and should be adopted) in steps and in specific cases.

▶ **Advice:** Mission-critical can mean different things. If it means complex systems, approaches such as taking a phased approach can ease the movement to the cloud. Hybrid solutions can also play a key role.

8 Cloud = Data Center

Most cloud decisions are not (and should not be) about completely shutting down data centers and moving everything to the cloud.

▶ **Advice:** Look at cloud decisions on a workload-by-workload basis, rather than taking an "all or nothing" approach.

## 9 Migrating to the Cloud Means You Automatically Get All Cloud Characteristics

Many migrations to the cloud are "lift and shift" rehosting, or other movements that do not exhibit cloud characteristics at higher levels, while other types of cloud migration (refactoring and rewriting, for example) typically do offer more of these characteristics. The most common use case for the cloud, however, is new applications.

▶ **Advice:** Distinguish between applications hosted in the cloud from cloud services. There are "half steps" to the cloud that have some benefits (there is no need to buy hardware, for example) and these can be valuable. However, they do not provide the same outcomes.

10 Virtualization = Private Cloud

Virtualization is a commonly used enabling technology for cloud computing. However, it is not the only way to implement cloud computing. Not only is it not necessary, it is not sufficient.

▶ **Advice:** Use the correct term to describe what you are building. You don't have to be cloud to be good. Avoid setting inaccurate expectations and adding to cloud confusion.
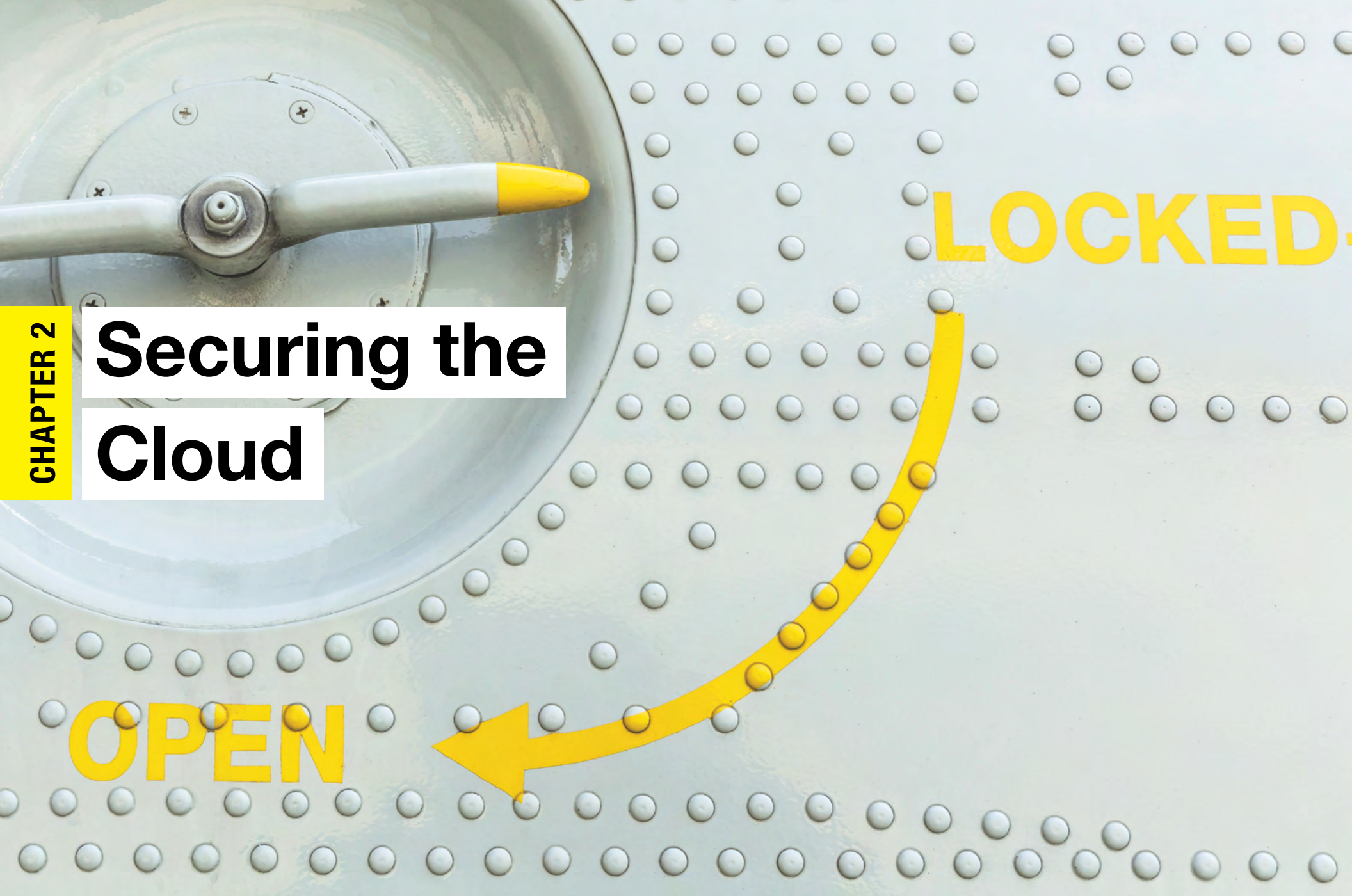
CHAPTER 2

Securing the Cloud

After moving some parts of the business to the cloud, the CISO of a large, international retail store discovered a data breach that exposed the names and credit card information of nearly 50 million people. This led to a complete investigation of security practices, eventually revealing major holes in security protocol and repeated notifications of minor breaches.

In a world where security breaches at large corporations dominate the headlines, the ambiguity that surrounds cloud computing can make securing the enterprise seem daunting for CIOs, CISOs and their colleagues. The challenge exists not in the security of the cloud itself, but in policies and technologies for security and control of the technology. Although most enterprises are familiar with cloud, or at least the idea of cloud, pervasive misconceptions and misunderstandings about what the technology can offer still remain.

"Cloud computing remains hyped and widely misunderstood," says Jay Heiser, research vice president. "Ambiguity about what cloud computing actually delivers to an organization is compounded by a variety of real and imagined concerns about the security and control implications of different cloud models."

> ## "Cloud computing remains hyped and widely misunderstood."
>
> Jay Heiser, Gartner Research Vice President

Cloud predictions

It can be difficult to see the future of any technology. The following Gartner predictions provide context for the future of cloud security.

> Through 2020, public cloud infrastructure as a service (IaaS) workloads will suffer at least 60% fewer security incidents than those in traditional data centers.

Gartner concluded that the security posture of major cloud providers is as good as or better than most enterprise data centers and security should no longer be considered a primary inhibitor to the adoption of public cloud services. However, it is not as simple as moving on-premises workloads to the cloud. Security teams should look to leverage the programmatic infrastructure of public cloud IaaS. Automating as much of the process as possible will remove the potential for human error — generally responsible for successful security attacks. Enterprise data centers could also be automated, but usually don't offer the programmatic infrastructure required.

> By 2018, the 60% of enterprises that implement appropriate cloud visibility and control tools will experience one-third fewer security failures.

Placing workloads in the cloud does not require a security trade-off. In fact, IaaS cloud providers offer features to ensure users have access only to the information they need, and also track all the "who, what, when, where" details. Enterprises actually benefit from the security built into the cloud.

Cloud computing does reduce the overall security scope, and it does require customers to manage some of the computing stack in a shared-responsibility model. This is a good opportunity for new types of approaches and new method adoption to protect information. The cloud will require a different approach to security — on-premises security habits and designs won't work well for information stored in the cloud.

Is the cloud more secure?

Security and risk-management leaders need to advise and educate their teams and the infrastructure and operations (I&O) teams about native visibility and control features offered by cloud providers. Look into cloud-aware tools to improve visibility so day-to-day security rests with the security and I&O teams, rather than the developers.

"Concerns about cloud service provider security have become counterproductive, and are distracting CIOs and CISOs from establishing the organizational, security and governance processes that prevent cloud security and compliance mistakes," says Heiser. "In fact, Gartner predicts that, through 2020, 95% of cloud security failures will be the customer's fault."

The naive belief that cloud providers are entirely responsible for their customers' security means that many enterprises are failing to address how their employees use external applications, leaving them free to share huge amounts of often-inappropriate data with other employees, external parties and sometimes the entire internet.

Virtually all public cloud use is within services that are highly resistant to attack and, in the majority of circumstances, represent a more secure
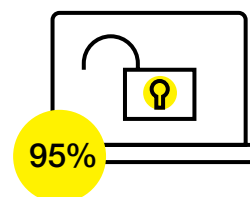
Gartner predicts that, through 2020, 95% of cloud security failures will be the customer's fault.

95%

starting point than traditional in-house implementations. Only a very small percentage of security incidents that have affected enterprises using the cloud have been due to vulnerabilities on the part of the provider.

"The cloud business model provides huge market incentives for cloud service providers to place a higher priority on security than is typical for end-user organizations," says Heiser. "Cloud service providers can afford to hire experienced system and vulnerability managers, and their economies of scale make it practical to provide around-the-clock security monitoring and response."

Organizations should not, however, assume that using a cloud service means that whatever they do within that cloud will be secure. The characteristics of the parts of the cloud stack under customer control can make it easy for inexperienced users to adopt poor cloud practices, which can lead to widespread security or compliance failures.

Ultimately the responsibility lies with the organization to exert control over cloud. Secure and regulatory-compliant use of public clouds requires that enterprises implement and enforce clear policies on usage responsibility and cloud risk acceptance processes.

Organizations that don't take a strategic approach to the secure use of cloud computing could find themselves in an unsecure, inflexible or uncompetitive situation.

Developing Cloud Talent

IT professionals identified cloud as having the single biggest technology impact on their career in 2016, according to Gartner's 2016 IT Professional Survey.

A midsize telecommunications company realized it wasn't able to keep up with hiring and talent needs across the quickly growing international organization. The decision was made to move to a cloud-based recruitment program to alleviate some of the pressure on the HR department, which had hired 300 associates in six months. While the cloud capabilities would solve some recruiting issues, it created a larger question: Who had the skills to implement and manage cloud capabilities? The CIO began an external search for a new hire, but during a one-on-one discussion with a current employee found that the employee had been working on an outside project involving a similar technology. When the employee expressed an interest in bringing his cloud skills to the telecom enterprise, the CIO ended up moving the employee to the new cloud position.

==Although cloud can offer speed and flexibility, it requires additional talent and special skill sets that can be difficult to locate.== The current skill sets and type of cloud will dictate whether it's time to retrain or hire on. One company that decides to go with Amazon Web Services might realize that the IT staff has a particular interest or talent in working with the technology, while a smaller startup might realize this is a good time to acquire new people who could expand their team's skills.

IT professionals identified cloud as having the single biggest technology impact on their career in 2016, according to Gartner's 2016 IT Professional Survey. With 22% of respondents selecting this technology, cloud was identified at twice the rate of the next technology influencer — data and analytics. Broken down by IT role, IT architects were even more likely to select cloud as the biggest technology impact. Cloud technology touches many different parts of the business, and IT professionals need to acquire the skills to be able to deal with it in different scenarios, such as:

→ Cloud's impact on data and analytics

→ Cloud and how security is architected and implemented

→ Cloud's overwhelming presence in IoT deployments

→ What cloud means for infrastructure and operations teams

→ Cloud as an execution platform for any service

→ Packaged SaaS products to address specific business needs

Select a cloud architect

The adoption of cloud computing is a multidimensional, multiyear program that needs at least one cloud architect to lead the organization through the transformation that a cloud program warrants.

Cloud architects have three main responsibilities:

1. Lead cultural change for cloud adoption

2. Develop and coordinate cloud architecture

3. Develop a cloud strategy and coordinate adoption

"The responsibilities of the cloud architect will be very fluid day to day and over time, and will vary from organization to organization. As the cloud computing market matures and your organization improves its cloud adoption, the cloud architect will also need to evolve to support the tasks and projects in front of him or her," says Kyle Hilgendorf, research vice president and distinguished analyst.

Organizations that put off selecting or hiring a cloud architect end up adopting cloud services through ad hoc processes that lead to issues, frustrations, duplicate work cycles, general inefficiencies or inappropriate risk-filled use of cloud services. As cloud computing increases in complexity and popularity, appointing one responsible party will help smooth the process.

This person can be appointed or hired, but should have a variety of technical and nontechnical skills, and must be a great collaborator, as he or she will be responsible for changing the culture of the workplace. For example, the cloud architect might work with developers to instrument consumption of cloud services only when necessary rather than keeping services running 24/7.

"As the cloud computing market matures and your organization improves its cloud adoption, the cloud architect will also need to evolve to support the tasks and projects in front of him or her."

Kyle Hilgendorf, Gartner Research Vice President and Distinguished Analyst

Acquire procurement skills

Cloud is becoming more prevalent in all enterprises, but technology procurement teams often lack the skills and experience to effectively obtain these technologies for business leaders. This stems from a combination of procurement professionals focusing on acquiring specific IT categories versus dealing with cloud computing's outsourced nature, and cloud services that are marketed directly to business leaders, bypassing IT altogether.

"Many technology procurement teams are not equipped with the tools and knowledge necessary to help business leaders make informed cloud investment decisions, leading to unsatisfied business objectives, unrealized financial savings and increased operational risk," says Luke Ellery, research director. "Technology procurement teams need to be empowered to help the business through the cloud procurement process if they are to be the trusted advisors for the business leaders in their organizations."

IT leaders must equip their teams with the ability to efficiently and effectively procure cloud computing technology. Unlike traditional procurement teams, often divided into categories such as software, hardware, services, etc., cloud procurement teams must have a holistic understanding of categories including outsourcing, remote hosting, commercial implications, contracts, and legal and regulatory requirements.
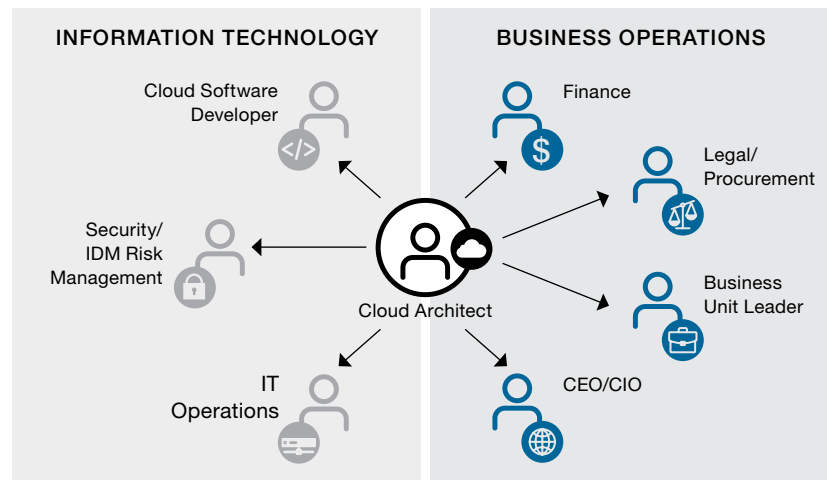
"Technology procurement teams need to be empowered to help the business through the cloud procurement process."

Luke Ellery, Gartner Research Director

To counter cloud vendors circumventing technology procurement and selling directly to the business, ensure that the procurement team engages key stakeholders throughout the process (see Figure 3). This will help avoid risk and unnecessary costs, and allow IT and the business to work together for the best solutions. Key stakeholders might include the CIO, security, enterprise architecture, legal, the CFO and others, depending on the organization.

Finally, ensure the procurement team has specific themes to address when looking to procure cloud services and use them as the foundation for the selection process. This framework should clearly indicate themes such as approved/prohibited lists that include any cloud services that are banned and an approved list with alternative options to the banned list. Other themes include a business case to outline business values, security, regulation and legal compliance, business continuity and disaster recovery, and enterprise architecture. Don't forget to have an exit strategy theme to recover data and factor in the cost and time frame for switching to another provider.

FIGURE 3

INFORMATION TECHNOLOGY

Cloud Software Developer

Security/ IDM Risk Management

IT Operations

Cloud Architect

BUSINESS OPERATIONS

Finance

Legal/ Procurement

Business Unit Leader

CEO/CIO

Assess Cloud Options

For a large accounting firm, the challenge was not an aging infrastructure, but rather how to deal with waves of intense usage followed by lulls. Once a year during tax season, the company's products are highly utilized, but most of the year, the company doesn't require the same level of intense computing power. The company looked to a cloud service to bring together all the aspects of the required infrastructure, such as security and storage, but only for the short period of need. Large computing abilities were added when necessary, but the company didn't have to pay for the abilities for the rest of the year.

Cloud computing was originally a place to experiment, and has come a long way as a critical part of today's IT. After 10 years, companies should look for even wider-scale investments.

==In its first decade, cloud computing was disruptive to IT, but looking into the second decade, it is becoming mature and an expected part of most disruptions.== For the past 10 years, cloud computing changed the expectations and capabilities of the IT department, but now it is a necessary catalyst for innovation across the company.

It's not too late to begin planning a roadmap to an all-in cloud future. Smith provides a few predictions about what that future will look like.

An all-cloud strategy

> By 2020, anything other than a cloud-only strategy for new IT initiatives will require justification at more than 30% of large-enterprise organizations.

During the past decade, cloud computing matured on several fronts. Today, most security analysis suggests that mainstream cloud computing is more secure than on-premises IT. Cloud services are more often functionally complete, and vendors now offer migration options.

Importantly, innovation is rapidly shifting to the cloud, with many vendors employing a cloud-first approach to product design and some technology and business innovations available only as cloud services. This includes innovations in the Internet of Things and artificial intelligence.

As the pressure to move to cloud services increases, more organizations are creating roadmaps that reflect the need to shift strategy. At these organizations, projects that propose on-site resources are considered conservative, as the reduced agility and innovation options decrease competitive agility. Enterprises will begin to pressure IT departments to embrace cloud computing.

Keep in mind that not all projects can utilize cloud services due to regulatory or security concerns or even the money that has been invested in the projects. Also, some enterprises may lack the correct skill sets and talent.

By 2021, more than half of global enterprises already using cloud today will adopt an all-in cloud strategy.

The key to an all-in cloud strategy is not to "lift and shift" data center content. Instead, enterprises should evaluate what applications within the data center can be replaced with SaaS, refactored or rebuilt. However, an all-in strategy will have more impact on IT than will a cloud-first or cloud-only strategy.

By and large, companies that have shifted to all-cloud have not returned to traditional on-premises data centers, with even large companies embracing third-party cloud infrastructure.

Enterprises should begin to plan a roadmap for their cloud strategy, and ensure that lift-and-shift is only being done when necessary, such as part of data center consolidation efforts.

Public, private or hybrid?

Enterprises are slowly migrating from on-premises data centers to the public cloud. Through 2020, an increasing percentage of annual IT spending will be directly or indirectly impacted by a cloud shift, making cloud computing one of the most disruptive forces in IT markets since the early days of the digital age. Digital business requires speed and agility that cloud computing provides through the use of cloud services.

A key benefit of public cloud infrastructure as a service (IaaS) and PaaS is to place applications closer to customers to enable a better user experience. Private cloud computing is also being exploited, especially where intellectual property, control, regulatory or compliance concerns, security, performance and cost of service delivery are differentiated. In such cases, private clouds run on-premises, in colocation facilities or at provider facilities, and they can offer similar benefits to public cloud computing.

By 2019, "cloud" will be a ubiquitous term, like "network," as business solutions assume use of public cloud as a common asset.

Hybrid cloud computing implies significant integration between the internal and external (or two or more external) environments at the data, process, management or security layers.

As they expand cloud usage, many organizations will use managed service providers/cloud service brokers that will help them to aggregate, integrate and customize cloud services, and serve as an intermediary between cloud providers. For example, a large research company might choose to migrate some information to the cloud and keep the more secure information on a local server.

Using a hybrid approach should be considered as a way to take advantage of public cloud while protecting sensitive data on private cloud or traditional infrastructure. A company may store data at rest at a hosting provider with more control of the underlying infrastructure and access than data across high-speed connections from a public cloud service being used for high-performance computing analytics.

Cloud services exist at multiple levels. Software as a service (SaaS) offerings are services at the application level. PaaS offerings are at the middleware level, while infrastructure as a service (IaaS) offerings are at the hardware infrastructure level. Each has appropriate use cases.

Enterprises should consider all options when deciding on which cloud strategy best fits the company needs.

Software as a service

The ease of adoption of cloud SaaS is increasingly leading business-unit managers to make cloud buying decisions independently of one another and of any central authority.

According to Janelle Hill, research vice president and distinguished analyst, this approach reflects greater freedom of choice over the specific solution and solution provider for business-unit needs and may improve time to market for desired new capabilities. However, it can seriously hamper the combined value to the enterprise.

55%
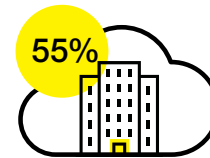
**By 2025, 55% of large enterprises will successfully implement an all-in cloud SaaS strategy.**

"Independent and uncoordinated journeys into cloud SaaS mean the goals, selection approach, initiation and ongoing implementation of services will be fragmented at best and siloed at worst," says Hill. "A coordinated, value-optimized approach has the advantage of enabling multiple business units to benefit from joint decisions and shared end-user support for all of the various SaaS solutions."

This is a transformation to a very different world for the CIO and the IT organization. In this scenario, the focus of the CIO's office flips from the issues associated with owning and providing technology-based solutions to providing value-add services to complement the usage of SaaS.

"A coordinated, value-optimized approach has the advantage of enabling multiple business units to benefit from joint decisions and shared end-user support for all of the various SaaS solutions."

Janelle Hill, Gartner Research Vice President and Distinguished Analyst

Assess Cloud Options
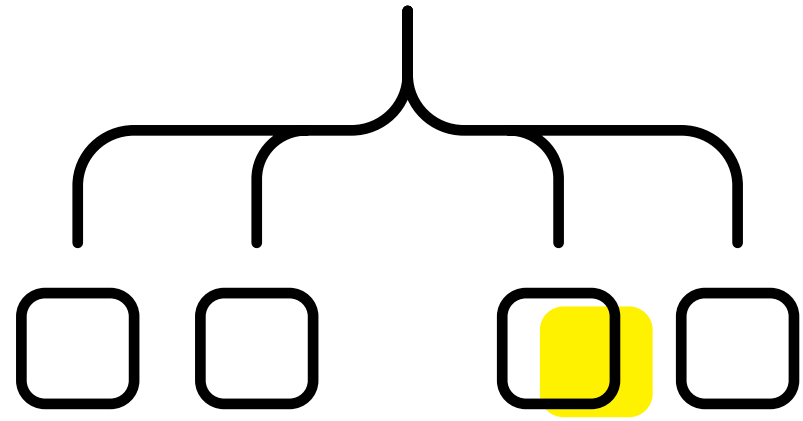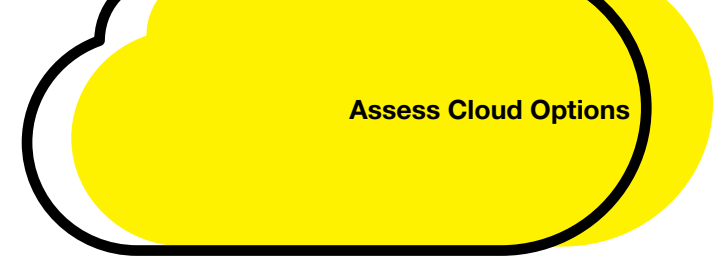
The office of the CIO should focus on becoming a cloud brokerage, offering value-added capabilities, including help desk triage and end-user support for cloud SaaS solutions, integration skills, and procurement and contract management skills for cloud SaaS usage.

These areas, in particular, are opportunities for the CIO to better partner with the business unit, as it's not always obvious if an issue is technical or functional.

This amounts to a shift from being a cost center into a value center relationship with the business. This shift will expand CIOs' engagement with business leaders, enabling earlier participation in planning for strategic innovation and growth initiatives.

CIOs should focus on the services that will make an immediate difference to business consumers adopting SaaS.

> "The PaaS market remains short on standardization, established best practices and sustained leadership."
>
> Yefim Natis, Vice President and Gartner Fellow

Platform as a service

Between the SaaS and IaaS levels is the PaaS layer, a broad collection of application infrastructure services. Companies are increasingly adopting PaaS, and vendors are continuing to innovate as a result.

"Enterprise customers are adopting PaaS for increasingly strategic initiatives, and more customers believe that PaaS will be the primary form of platform delivery going forward," said Yefim Natis, vice president and Gartner Fellow. "The PaaS market remains short on standardization, established best practices and sustained leadership, thus slowing adoption by more risk-averse organizations."

Although this technology originated as a platform, it has since expanded and evolved to represent a variety of technology types. This means distinct offerings target specific users and roles. In some scenarios IaaS and SaaS also offer a platform role. As companies continue to move to the PaaS option for strategic and challenging innovation projects, the industry continues to evolve and mature.

Infrastructure as a service

Organizations are increasingly turning to IaaS. This includes anything from migrating existing applications to entire data centers to cloud IaaS. Gartner estimates through 2017, more than 80% of CIOs will be pressured by business management to evaluate migrating their data centers to cloud IaaS.

IaaS is most frequently used for new workloads in Mode 2 agile IT, but an increasing number of organizations are also using cloud IaaS for Mode 1 reliable IT workloads due to its ability to reduce costs and increase efficiency.

When considering migrating data centers to IaaS, organizations must select one of three options. The choice will depend on the end goal of the migration, as well as individual organization needs.

1. Lift-and-shift

Lift-and-shift means that workloads are migrated to cloud IaaS in as unchanged a manner as possible and happens only when absolutely necessary. IT operations management tools from the existing data center are deployed into the cloud environment as much as possible. Little or no use is made of cloud-native features.

2. Cloud-enabled virtual automation

IT processes are modified in this approach to take advantage of automation and some cloud-native capabilities. The migration process is used to make adjustments to drive greater standardization, automation and a cleanup of existing operations.

3. A DevOps transformation

IT and some business processes are transformed, and a cloud-native agile approach is used as much as possible during the migration. Cloud-native, DevOps-oriented tools are used throughout the entire application life cycle, with a strong emphasis on automation and "infrastructure as code." This approach will renovate the technology core of the company to support Mode 2 and Mode 1 needs.

"Cloud computing is increasingly becoming a vehicle for next-generation digital business as well as for agile, scalable and elastic solutions."

David Mitchell Smith, Vice President and Gartner Fellow

As the technology matures, objections to cloud computing are lessening, although myths and confusing technology terms continue to plague the space.

"As it enters its second decade, cloud computing is increasingly becoming a vehicle for next-generation digital business, as well as for agile, scalable and elastic solutions," says David Mitchell Smith, vice president and Gartner Fellow. "CIOs and other IT leaders need to constantly adapt their strategies to leverage cloud capabilities."

Additional Research

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