I&O and Cloud 2025: A Gartner Trend Insight Report

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By Analysts Raj Bala, Arun Chandrasekaran, Philip Dawson, Jeffrey Hewitt, Mark Margevicius, David Smith, David Wright

Initiatives: Cloud and Edge Infrastructure

Infrastructure is adapting to become more pragmatically architected and delivered in order to realize increased business objectives. I&O organizations should also be pragmatic about the shifts in technology to support skills development, relief from technical debt and overcome sourcing challenges.

Additional Perspectives

- Summary Translation + Localization: I&O and Cloud 2025: A Gartner Trend Insight Report (27 January 2021)

Overview

Opportunities and Challenges

- **A cultural challenge:** Infrastructure and operations (I&O) must develop a culture, organizational structure and operating model that support digital business and modern initiatives such as public cloud. Agile methods such as continuous deployment require structural and mindset shifts that determine whether I&O will be strategic or marginalized to a caretaker of legacy systems.
- **A competitive sourcing challenge:** Cloud infrastructure and platform service offerings from hyperscale cloud providers offer unprecedented agility and a path to digital transformation. However, the consolidation of worldwide cloud infrastructure and platform services (CIPS) providers to a small number of large providers will create challenges related to competitive sourcing and cost.
- **A technical debt challenge:** Modern workload platforms, such as Kubernetes, and packaged distributions, such as Google's Anthos, Red Hat's OpenShift and VMware's Tanzu, provide a pathway to relieving technical debt, but require a substantial investment of time and money to take advantage of these advances and meaningfully draw down debt that has accumulated over many years.
- **A skills challenge:** Organizations can address the skills gap with modern learning channels, nontraditional career paths and matrixed teams with versatile bench strength. Ultimately, I&O can lead organizations to realize more agility and quality, but the prioritization of tools over skills and processes limits I&O leaders' ability to deliver on goals.

What You Need to Know

- I&O must develop a culture, organizational structure and operating model that support modern initiatives such as public cloud. Agile methods such as continuous deployment require structural and mindset shifts to be successful.
- The pervasive nature of CIPS providers within enterprises presents the opportunity for I&O leaders to resolve technical debt, but this requires aligning with a cloud provider's unique offerings and APIs. I&O leaders must invest in these paradigms as a replacement for their existing applications and infrastructure.
- A dispersion of technical talent from large innovation hub cities to smaller cities as a result of a COVID-19-influenced migration may offer enterprises the chance to recruit talent that would have otherwise been challenging.
- The hyperscale cloud providers are, in some cases, lowering committed spend-based discounting as the market matures. Splitting cloud across multiple CIPS providers further dilutes the discounting potential and compounds the problem. I&O leaders should work closely with sourcing, procurement and vendor management (SPVM) leaders to source and negotiate to maximize cost advantages.

Insight From the Experts

A Pragmatic I&O Organization Is Required to Thrive in 2025

 Raj Bala, Senior Director Analyst

 Arun Chandrasekaran, Distinguished VP Analyst

 Philip Dawson, VP Analyst

 Jeffrey Hewitt, Research VP

 Mark Margevicius, VP Analyst

 David Smith, Distinguished VP Analyst


David Wright, Senior Director Analyst

Looking forward to 2025, I&O organizations need to be pragmatic about the tectonic shifts around us in order to address the new land masses and chasms that form as a result. The pressures put on I&O as a result of the shifts require leadership, agility and a culture of continuous delivery to improve quality, develop organizational skills and lower the costs of delivering IT.

Infrastructure is becoming programmable and the operation of programmable infrastructure is becoming automated. Modern IT infrastructure, whether deployed in the data center or consumed in the public cloud, is more hands-free than its legacy equivalents. Such systems are easier to manage, because routine tasks are now the responsibility of a cloud service provider (CSP) or more automation. These systems require less manual intervention and routine administration, because automation has ushered in a new wave of I&O efficiency.

The chasms that form can be daunting, but that's the reality when the atomic unit of compute is changing. Servers have been the atomic unit of compute for decades. When we needed a new application, we asked about the size of the server: How many CPUs of what type, how much memory and how much storage does the application require? How many servers of each size do we need?

Whether the server was physical or virtual, servers were the unit of scale. However, that's changing. Applications are being broken up into smaller portions to make them more modular. The modularity makes it easier to scale and operate the portions independent of each other. No longer are the size and shape of the server the foundation for how IT needs to think about deploying a new application. Now we need to think about scaling services and their underlying containers and functions, which in turn introduce their own unique scaling properties.

Ultimately, not being pragmatic about these tectonic shifts manifests in skills shortages, the potential for increased technical debt and costs, and a lowering quality of IT services delivered.

Kind regards,

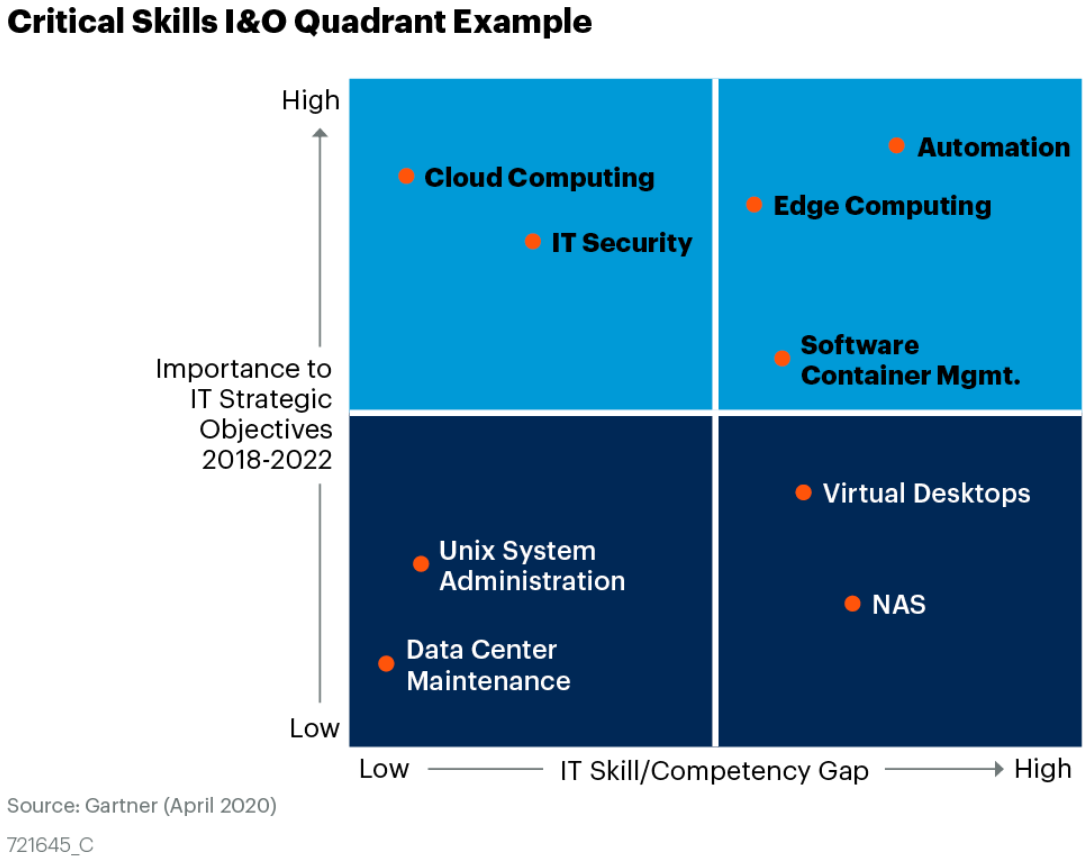
Raj Bala, Arun Chandrasekaran, Philip Dawson, Jeffrey Hewitt, Mark Margevicius, David Smith and David Wright

Executive Overview

Definition

This special report is a collection of research that helps I&O leaders understand the long-term changes in markets related to I&O. The research noted in this report focuses on the key changes expected by 2025 across different areas. This special report comprises the following research focused on the 2025 time frame: the evolution of cloud IaaS to CIPS, which represents IaaS integrated with PaaS; "distributed cloud," which refers to the distribution of public cloud services to different physical locations; the challenges of managing Kubernetes from an I&O perspective; how cloud and data center infrastructure is evolving to become more intelligent; and the I&O organizational structure and skills challenges, and how to prioritize as depicted in the I&O skills quadrant in Figure 1.

Figure 1: Critical Skills I&O Quadrant Example



Source: Gartner (April 2020)

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Research Highlights

The Evolution of Cloud IaaS to CIPS

Demand for integrated cloud infrastructure (infrastructure as a service [IaaS]) and platform (platform as a service [PaaS]) offerings — in other words, CIPS — is driving the next wave of cloud adoption as enterprises seek to modernize applications and close down traditional data centers. IaaS- or PaaS-only cloud providers will continue to exist, but only as secondary cloud providers compared to CIPS providers such as Alibaba Cloud, Amazon Web Services (AWS), Google and Microsoft.

The market for CIPS is consolidating, with nearly 80% of the worldwide market concentrated in just four cloud providers. AWS and Microsoft have 45% and 17.9% of the IaaS market, respectively, while Alibaba and Google, the next-closest competitors, have 9.1% and 5.3%, respectively.

This consolidation shows no sign of slowing. AWS and Microsoft continue to dominate in much of North America and Europe, where overall cloud growth rates remain strong. Alibaba is a dominant force in China and a formidable competitor in surrounding countries such as Indonesia and Malaysia, which have two of the highest worldwide growth rates in this market.

This consolidation of cloud providers presents unique challenges to enterprises over the next five years. In some cases, Gartner is observing a tightening of committed-spend-related discounts as the market matures. And the prevalence of enterprises using multiple cloud providers will further suppress discounting as a result of splitting cloud spend across those providers. This highlights the need for I&O and application leaders to work closely with sourcing leaders in the process of cloud provider selection and negotiations.

Related Research

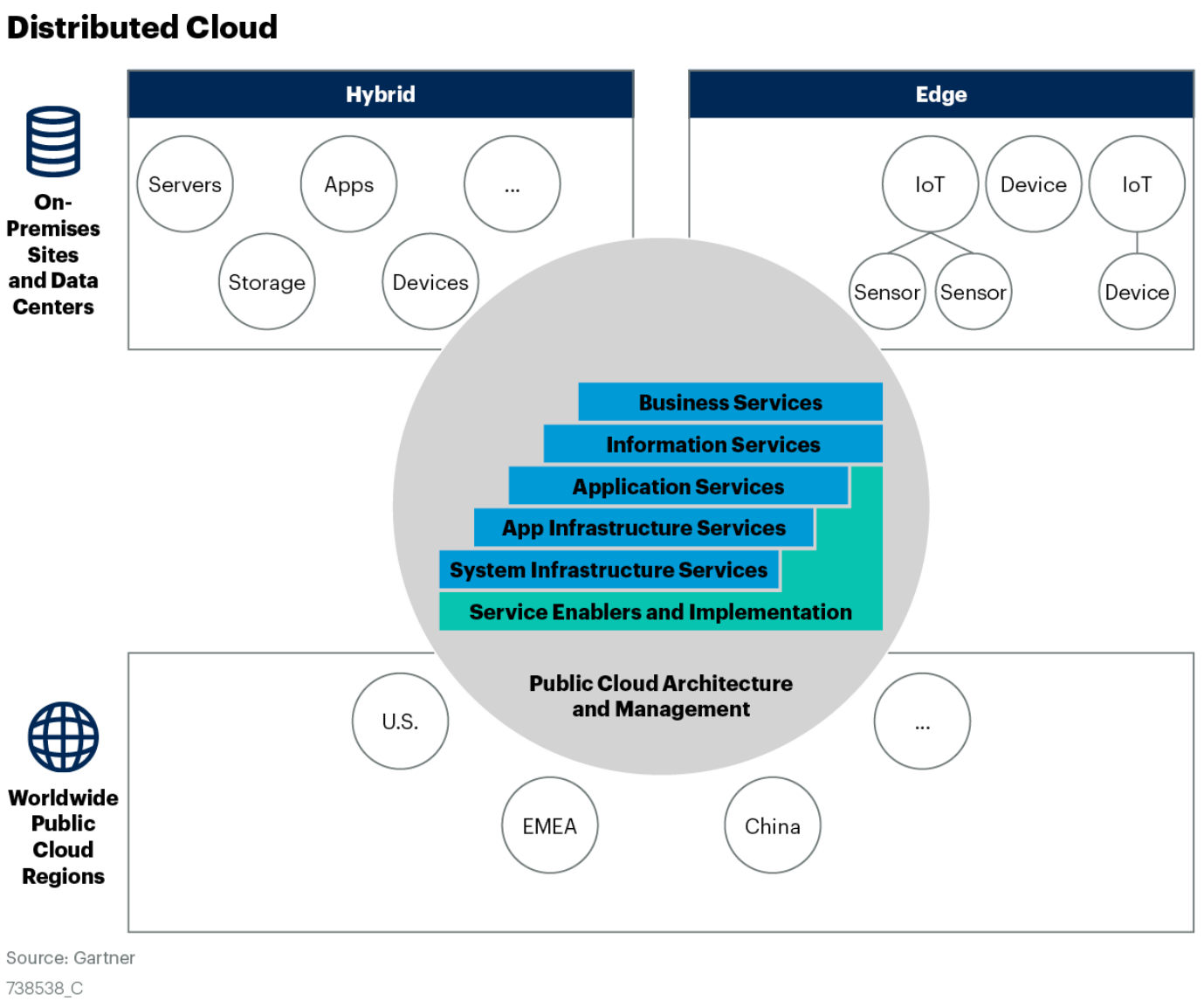
The capability gap between hyperscale cloud providers has begun to narrow; however, fierce competition for enterprise workloads extends to secondary markets worldwide. The Magic Quadrant for Cloud Infrastructure and Platform Services details how I&O leaders should evaluate cloud providers with a broad range of use cases and a wide market presence.

Large CIPS providers are rapidly innovating and crowding smaller providers out of the market. I&O leaders should shift their strategy for meeting business needs and limiting risk as is described in The Evolution of Cloud Infrastructure as a Service to CIPS.

Distributed Cloud

Distributed cloud's distribution of public cloud services to different physical locations represents a significant shift from the virtually centralized model of most public cloud services and the model associated with the general cloud concept. It will lead to a new era in cloud computing (see Figure 2).

Figure 2: Distributed Cloud



Distributed cloud is the answer to the question, “What is the future of cloud computing?” It refers to the distribution of public cloud services to different physical locations while the operation, governance and evolution of the services remain the responsibility of the public cloud provider. As with anything that describes the future, distributed cloud is based on origins visible today. The distributed cloud brings aspects of worldwide public cloud regions, hybrid cloud and edge computing to the original world of cloud computing.

Distributed cloud platforms such as Google’s Anthos provide services such as continuous integration/continuous delivery (CI/CD) to facilitate streamlined application development processes, which can serve to reduce technical debt. But technical debt is a multifaceted problem, often with a complex web of interdependencies and a hornet’s nest at the center. As such, there are no panaceas to relieving technical debt and distributed cloud is but one of many possible steps.

Related Research

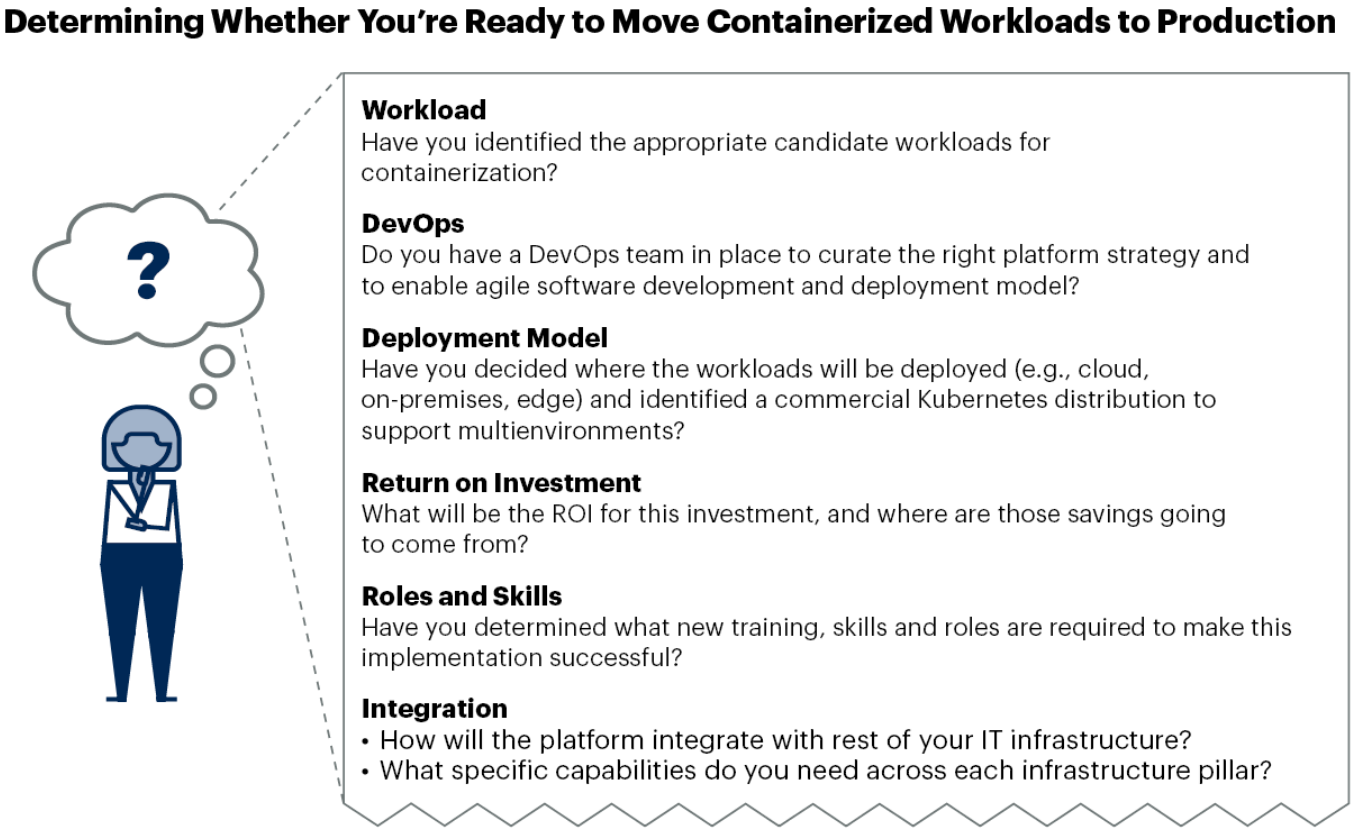
Hyperscale cloud providers now offer ways to install and run their services directly in customer data centers. Is this a good idea? I&O leaders should avoid pitfalls by embracing Gartner's keys to success as documented in How to Bring the Public Cloud On-Premises With AWS Outposts, Azure Stack and Google Anthos.

By 2025, cloud computing will be pervasive. Cloud will drive not only technological innovation, but will also serve as the foundation for business innovation. The Future of Cloud in 2025: From Technology to Innovation enables IT leaders to develop cloud strategies and present its future evolution to executive leaders, peers and teams.

I&O and Kubernetes

Gartner research indicates that 20% of global companies are now running containers in production, and we expect this number to grow significantly over the next few years. Kubernetes is a vendor-agnostic cluster and container orchestration tool that provides a platform for automated deploying, scaling and operating application containers across clusters of hosts to operate containers at scale in production environments; interest in it is rising accordingly (see Figure 3).

Figure 3: Kubernetes and I&O



Source: Gartner (2020)
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But Kubernetes is difficult to install and operate, and most I&O organizations are unfamiliar with much of the related approaches and technology. Success with Kubernetes requires input from multiple enterprise teams and use of planning and management best practices. This research provides the foundational components for required investments and guidance for I&O leaders planning to introduce Kubernetes into their environments.

Related Research

Interest in production Kubernetes deployments is growing, but IT organizations are largely unfamiliar with the technology and how to structure teams. I&O leaders must prepare their organizations to provide operational support for forthcoming Kubernetes initiatives, as informed by How I&O Can Properly Deliver Kubernetes Support.

The container ecosystem is immature and lacks operational best practices; however, the adoption of containers and Kubernetes is increasing for legacy modernization and cloud-native applications. I&O leaders must accelerate container deployment in production environments using Best Practices for Running Containers and Kubernetes in Production.

The Road to Intelligent Infrastructure and Beyond

Intelligent infrastructure takes simple, repeatable building blocks and technology components, available from multiple sources, and integrates or manages them in a standardized, automated manner. It optimizes infrastructure resources for application consumption through the use of infrastructure machine learning and applying tuning as software overlays.

For years, server technologies have developed around hardware phases. Frames and towers lead to racks, which lead to blades, driving modularity around density, power and cooling with physically abstracted input/output (I/O) for network and storage. Integrated systems took this evolution radically further by incorporating reference architectures and preintegrating hardware and software into a single system.

Additionally, hyperconverged systems replaced multiple physical components with software-defined infrastructure (SDI)-based components, driving further consolidation. This SDI software included management tools, operating systems and hypervisors, in the case of integrated infrastructure. In the case of integrated stack systems, it included applications and databases.

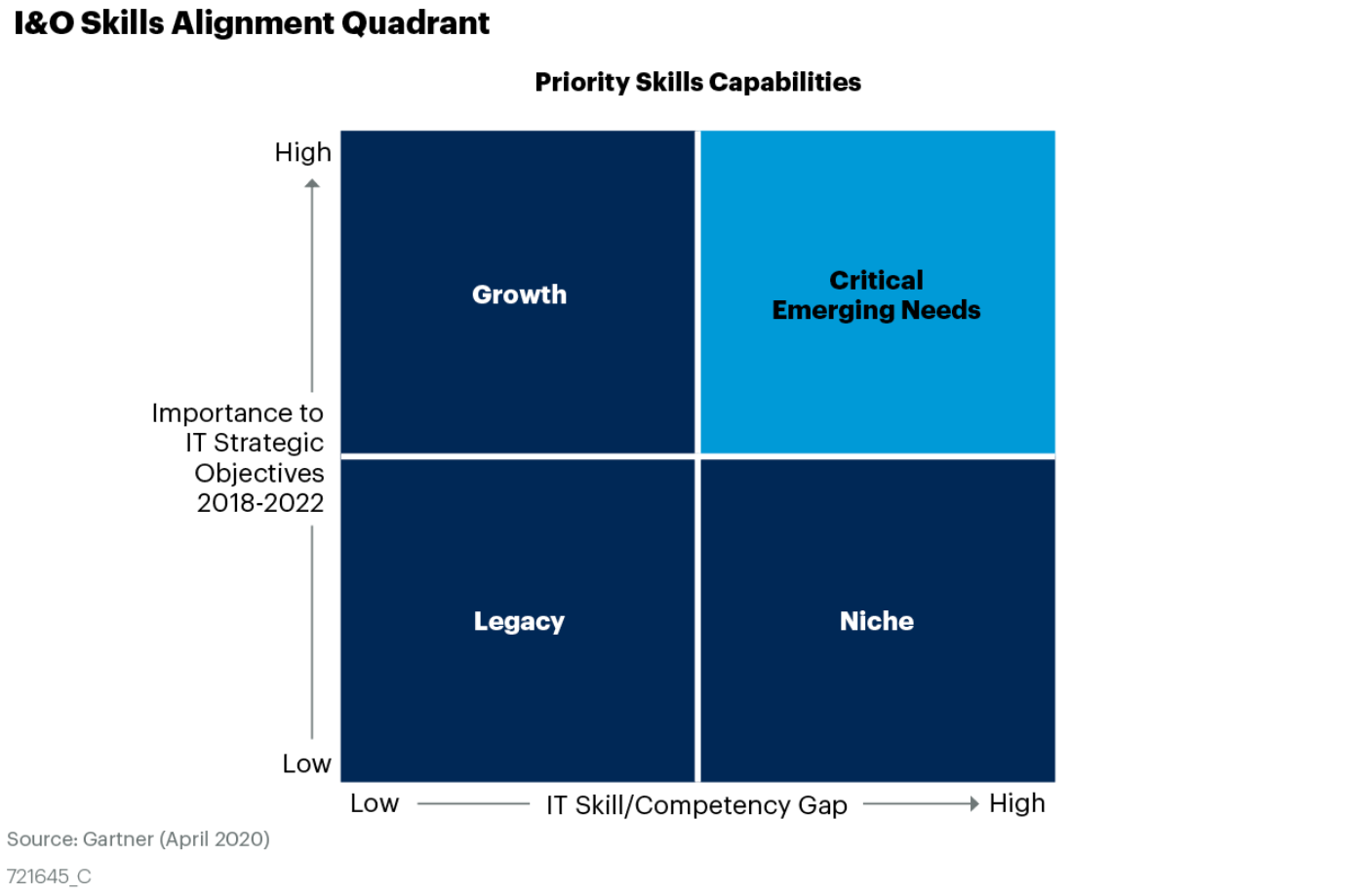
Related Research

Achieving infrastructure modernization by leveraging integrated systems has been a series of phased hardware- and software-based innovations. I&O leaders must look beyond tactical implementation and plan for future disruption if they are to optimize investment, as described in The Road to Intelligent Infrastructure and Beyond.

I&O Skills and Organizational Structure

A major contributor to the future success of I&O will be how quickly I&O leaders can acquire the talent required for servicing customer needs. Demands for talent may ebb and flow as economic and social conditions change. Implementing effective changes to talent requirement plans can help I&O leaders adapt to current situations and prepare their organizations by having the right skills and competencies at the right time. To achieve the latter, I&O leaders should take a leading role in future-proofing talent recruitment. The use of an I&O skills alignment quadrant, with some supportive tactics, can optimize the I&O recruitment process and focus hiring on the most important skills required for success (see Figure 4).

Figure 4: I&O Skills Alignment Quadrant



Most I&O organizations use a traditional and hierarchical organizational structure based on technical disciplines. While this traditional approach is often effective for managing on-premises infrastructure services, most I&O leaders find it is insufficient for supporting new and emerging digital business requirements. In response, many I&O leaders attempt to address the shortcomings by restructuring their organization.

However, these efforts often fail to deliver increased agility, higher productivity, improved SLAs and innovation. To fulfill both traditional and emerging digital business requirements, I&O leaders must

change their organizational structure in alignment with a new operating model (see Embrace an I&O Operating Model to Support Digital Transformation).

Many I&O leaders are asking how they can best structure their organization to support digital transformation. To accomplish this goal, they must start by assessing how their existing organizational structure aligns with other components of the I&O operating model. After defining all components of the I&O operating model and performing this gap analysis, I&O leaders should then identify which organizational structure models are suitable for their organization.

Related Research

Organizations that adopt the cloud often quickly realize that the skills required to succeed differ from what had once worked well enough. I&O leaders need to address their cloud skills gaps, as informed by The Cloud Infrastructure and Platform Services Skills I&O Teams Require for the Future.

Adopt New I&O Organizational Structures to Drive Digital Transformation in order to meet evolving digital business needs driven by adoption of cloud, DevOps and product delivery. I&O leaders should evaluate the organizational structure models and implement the optimal combination of structures based on their operating model.

I&O leaders should drive organizational transformation, as economic and social conditions change via rapid, more effective talent acquisition. To achieve this, I&O Leaders Should Future-Proof Team Skills and Competencies With a Skills Alignment Quadrant.

There are multiple ways to deliver cloud operations. When I&O leaders intend to either deliver cloud operations internally or contract with an MSP, they must choose a pattern most suited to the desired end state for each workload, as described in Choose the Best Cloud Operations Delivery Model for Your Organization's Needs.

Gartner Associates Supporting This Trend

 David Wright

 Dennis Smith

 David Smith

 Mark Margevicius

 Philip Dawson

 Arun Chandrasekaran

 Jeffrey Hewitt