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An Infographic Guide to Building Elite Apps for Leading Enterprises

Ensure your infrastructure decisions will enable your

critical enterprise applications to perform at peak

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Introduction

A friend of ours recently shared a story with us about his experience renting a vacation cottage. It was one of our hottest summers on record, and inside the traditional A-frame cabin the temperature was stifling. The owner of the cottage had left a small portable air conditioner to help cool down the interior, but when our friend plugged in the device, the circuits blew. The cottage's electrical design was based on an older 15-amp service and this appliance needed 30 amps to run.

The solution? Our friend dragged his lawn chair to the edge of the lake and spent most of the week sitting with his feet in the water. It wasn't elegant but it provided temporary relief during his time away. His story made us reflect on the rapid changes we have seen in our industry and especially in the evolution of enterprise applications. We are seeing advancements unparalleled in our history of technology innovation. But these advancements cannot thrive in our data centers of old. It's like trying to plug a 30-amp appliance into a 15-amp circuit. At some point, everything will simply blow up or shut down.

In many cases, our data centers were designed ten or more years ago before things like edge computing, modern workflows, IoT, deep machine learning, artificial intelligence and more became the business requirements for today's enterprise applications.

The data that our enterprise applications require lives everywhere, from in the cloud, the core data center, and at the edge. Hybrid, multi-cloud models that incorporate core, edge, and cloud have become the norm. Today's infrastructure teams need to plan where each one fits to support overall business goals.

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Scale granularly to **fit any workload**.

Orchestrate data from edge to core to cloud to **support modern data workflows**.

Assure performance of modern enterprise workloads with **advanced compute, storage, and fabric**.

Reduce data center costs through models that include hybrid cloud/ multi-cloud design and by incorporating industry-leading efficiencies.

Integrate **advanced** cloud services.

The modern data center architecture **needs to be able to**:

Deliver everything **securely**.

Support containers, Kubernetes, APIs, and other **modern application development methods**.

Confidently integrate new technologies as they are introduced, with **rapid validation**.

Power demanding artificial intelligence/ machine learning/deep learning applications with infrastructure **optimized for analytic workloads**.

Keep applications **"always-on"** with high-availability and disaster recovery capabilities built in.

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The technology team at Mercy Hospital has developed an application that uses data from both internal and external sources to dramatically reduce the incidents of sepsis – a leading cause of patient death in hospitals. Running such an intensive application requires a modern infrastructure – in this case, one with flash – to be able to deliver insight quickly so that medical professionals can act.

The innovation at Mercy Hospital is simply one instance of an organization that is making massive changes through the adoption of better enterprise applications that can harness data from multiple sources.

Any organization, whether it is commercial, non-profit, or public sector, has applications that are mission-critical to its operations and survival. In all cases, it is the infrastructure that supports those applications, and it is difficult to retrofit new enterprise applications onto an aging infrastructure that has reached capacity.

Unlike our friend at the cottage who reverted to doing things the old-fashioned way to escape the heat, an inelegant data center architecture will not support your enterprise applications for the long-term.

This infographic eBook is a compilation of research and statistics to help support some of your decision-making as you ready your data center for modern enterprise applications. We conclude with a set of questions you can ask yourself, as well as an overview of how a flexible and well-designed infrastructure can incorporate the many elements you need to support your enterprise apps into the future.

We hope you enjoy the read.

Steve Cooke,
Product Marketing, Cisco

Bruno Messina,
Product Marketing, NetApp

Why Your Data Center Needs a New Look

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The role of IT used to be simple. IT used to be measured on sourcing the best and cheapest infrastructure and then delivering to an infrastructure and application SLA. This role has now become much more complex in several dimensions.

1 As most companies become app companies, IT has transitioned from being asked to stand up shrink-wrapped software to really creating and maintaining development environments. This led to the rise of DevOps. As we become a more data and analytics-driven world, the critical constituency for IT becomes not just developers, but also data scientists and lines of business.

2 Applications are rapidly dissolving into interconnected webs of functions and data, distributed across on-premises and public cloud landscapes.

3 With the rise of IoT, new devices and connections are growing exponentially at the network edge. Data gravity makes transporting the data less efficient than processing it at the edge. At the same time, latency and data reduction needs suggest an increasing demand for analytic horsepower and capacity at the edge.

4 The ability to run more detailed models and to integrate insights across edges is increasing the demand for analytics in the core. IT is being asked to deliver a holistic approach that doesn't create silos and mitigates integration, management, and connectivity problems across both edge and core.

5 Because we are in the era of the cloud, a key metric for today's IT organization is their ability to deliver agility—not simply cost reduction and uptime.[1]

The State of Cloud Today

Enterprise Cloud Strategy Worldwide from 2017 to 2019[3]

Hybrid Cloud

58%	(2017)
51%	(2018)
58%	(2019)

● 2017   ● 2018   ● 2019

Multiple Public

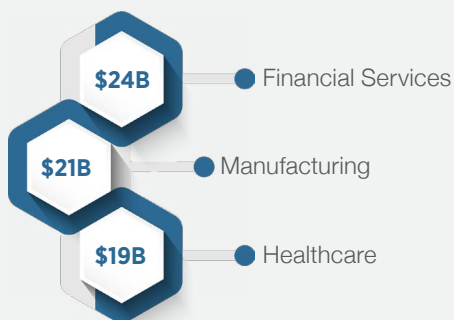|	
17%	(2017)
21%	(2018)
20%	(2019)

Enterprises are investing in multiple cloud platforms, including both private and public clouds.[2]

As of 2019, 58% of enterprises had deployed hybrid clouds in their organization (an increase of 7% from the previous year). Where enterprises had deployed multiple clouds, 84% were using more than four platforms.

Multiple Private

9%	(2017)
10%	(2018)
7%	(2019)

By 2021 the hybrid cloud market is expected to reach $91 billion.[4]

Enterprise Application Market to Hit $208 billion by 2020[19]

Top Three Verticals

$24B — ● Financial Services

$21B — ● Manufacturing

$19B — ● Healthcare

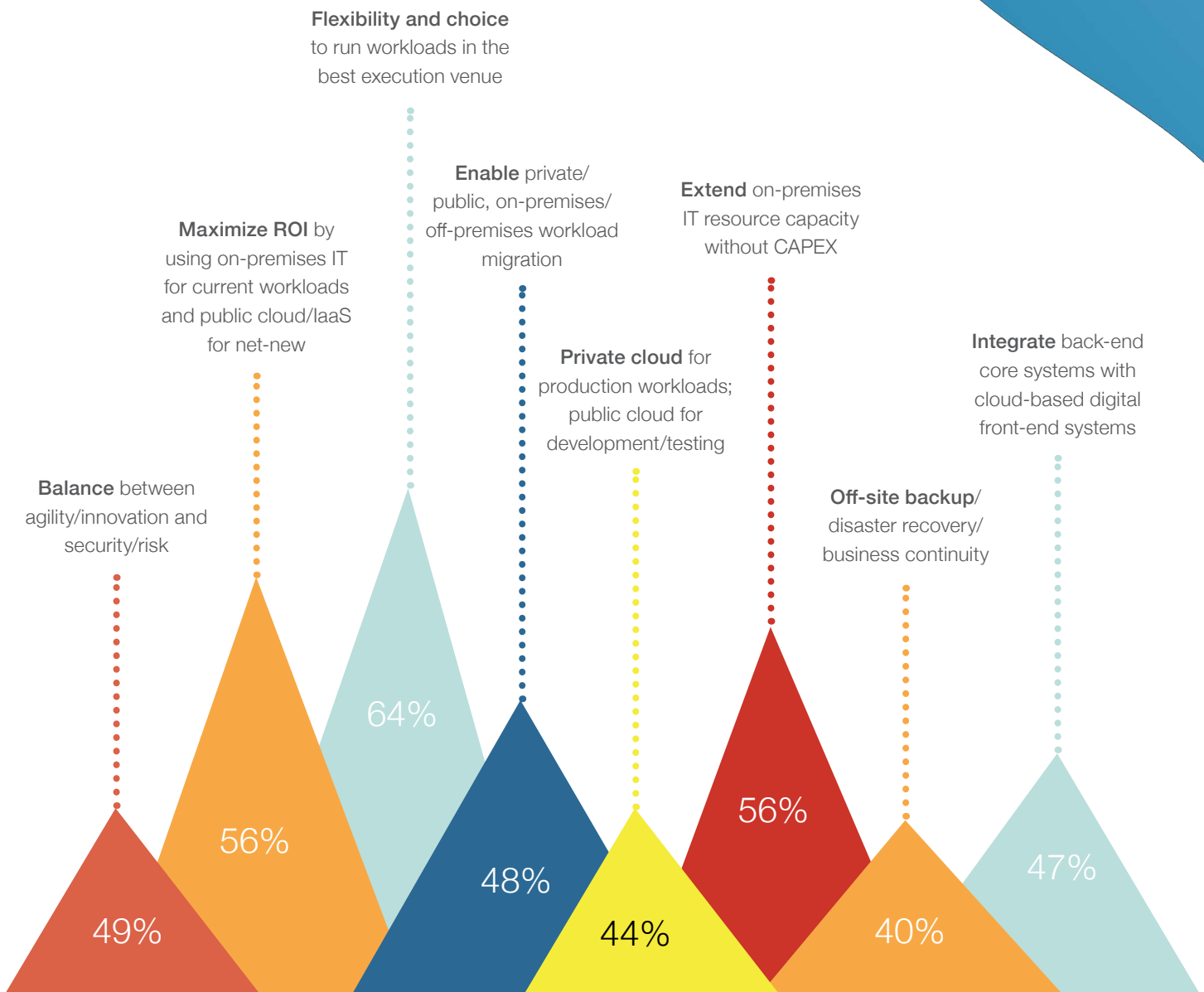**Healthcare Insights for 2020**

Global healthcare data is projected to increase dramatically with as much as 2,314 exabytes of new data generated in 2020.[20]

By 2020 the digital health market is expected to reach over $200B[21] with investments in:[22]
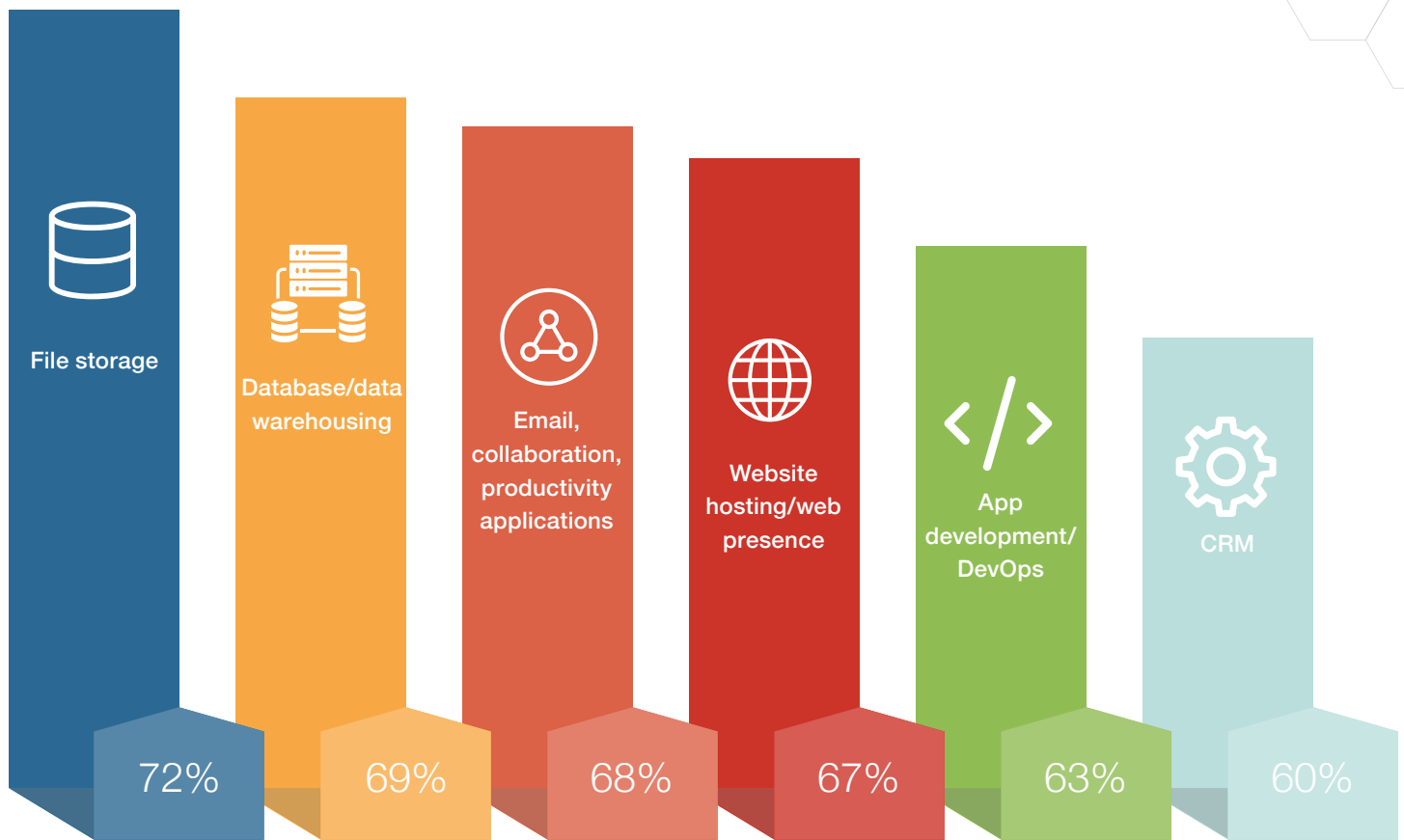
1. Digital health systems
2. Health analytics
3. mHealth
4. Telehealthcare

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Driving Factors for Adoption of Hybrid Environments[5]

Flexibility and choice to run workloads in the best execution venue

Enable private/ public, on-premises/ off-premises workload migration

Maximize ROI by using on-premises IT for current workloads and public cloud/IaaS for net-new

Extend on-premises IT resource capacity without CAPEX

Private cloud for production workloads; public cloud for development/testing

Integrate back-end core systems with cloud-based digital front-end systems

Balance between agility/innovation and security/risk

Off-site backup/ disaster recovery/ business continuity

64%

56%

56%

49%

48%

44%

47%

40%

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Top Workloads Enterprises Run in a Hybrid Environment[6]

File storage — 72%

Database/data warehousing — 69%

Email, collaboration, productivity applications — 68%

Website hosting/web presence — 67%

App development/DevOps — 63%

CRM — 60%

Top 3 Factors Leading to IT Budget Increases

As enterprises continue to innovate and grow, IT spending priorities are aligned to business growth. The top three drivers for IT spending increases include:[7]

01 — 64% — Need to upgrade outdated IT infrastructure

02 — 56% — Increased priority on IT projects

03 — 56% — Increased security concerns

5 Key Trends Impacting the Data Center[8]

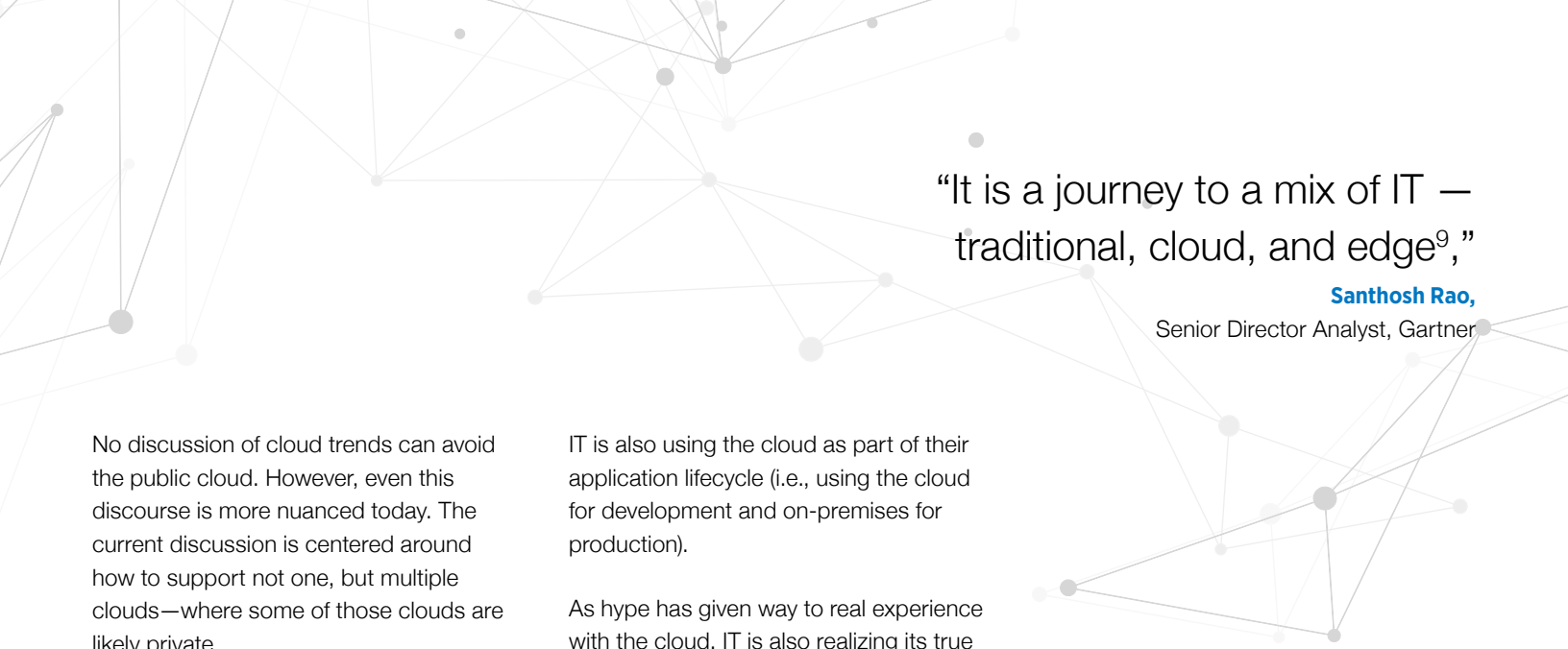**There has been a shift in the way enterprises think about building and maintaining their core IT infrastructure.**

There are **five key trends** influencing the data center:

01 — IT needs to **operate with a vastly different and more demanding set of user expectations** (apps are the key interface with customers, technology partners, supply chain, key vendors)

02 — **Significant fragmentation of ingredient technologies** – including converged infrastructure, hyperconverged infrastructure, cloud, multi/hybrid cloud, traditional siloed, hypervisors, file systems, management stacks, lifecycle automation, workflow automation, security, ticketing systems, IT operations management

03 — **Rate of change of these technologies is exponential**

04 — Workloads continue to be more **distributed from the data center** (remote-branch offices and at the edge)

05 — Current discussion is around how to support not one, but multiple clouds – how applications can **stretch across multiple clouds**

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Cloud Vs. On-Premises –
The Need for a Hybrid Model

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> "It is a journey to a mix of IT — traditional, cloud, and edge[9],"

Santhosh Rao,
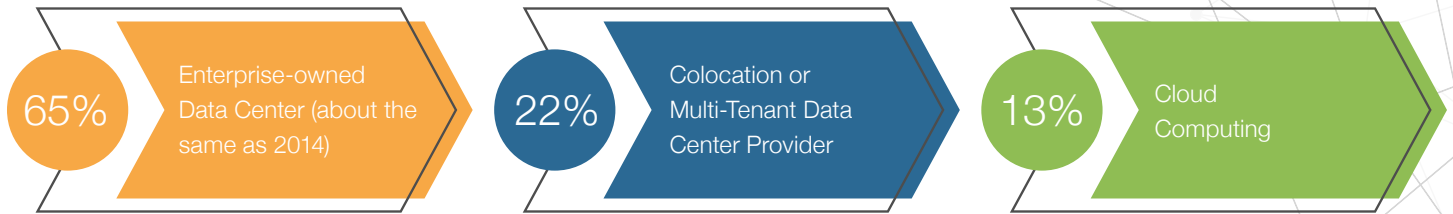Senior Director Analyst, Gartner

No discussion of cloud trends can avoid the public cloud. However, even this discourse is more nuanced today. The current discussion is centered around how to support not one, but multiple clouds—where some of those clouds are likely private.

The way IT is using clouds is also much more sophisticated. It is no longer about which applications should be moved to the cloud, but much more about how these applications can stretch across multiple clouds. For example, perhaps the web tier resides on the cloud and the databases are on-premises.

IT is also using the cloud as part of their application lifecycle (i.e., using the cloud for development and on-premises for production).

As hype has given way to real experience with the cloud, IT is also realizing its true costs. For many use cases the cloud can be more efficient. For others it can be powerful in terms of PaaS frameworks. However, there are other cases where it can also be more expensive than the traditional ownership economics… in the cloud "sometimes the lights are on but nobody's home."[10]

Uptime Institute Survey Finds 65% of Enterprise Workloads are Still On-Premises[11]

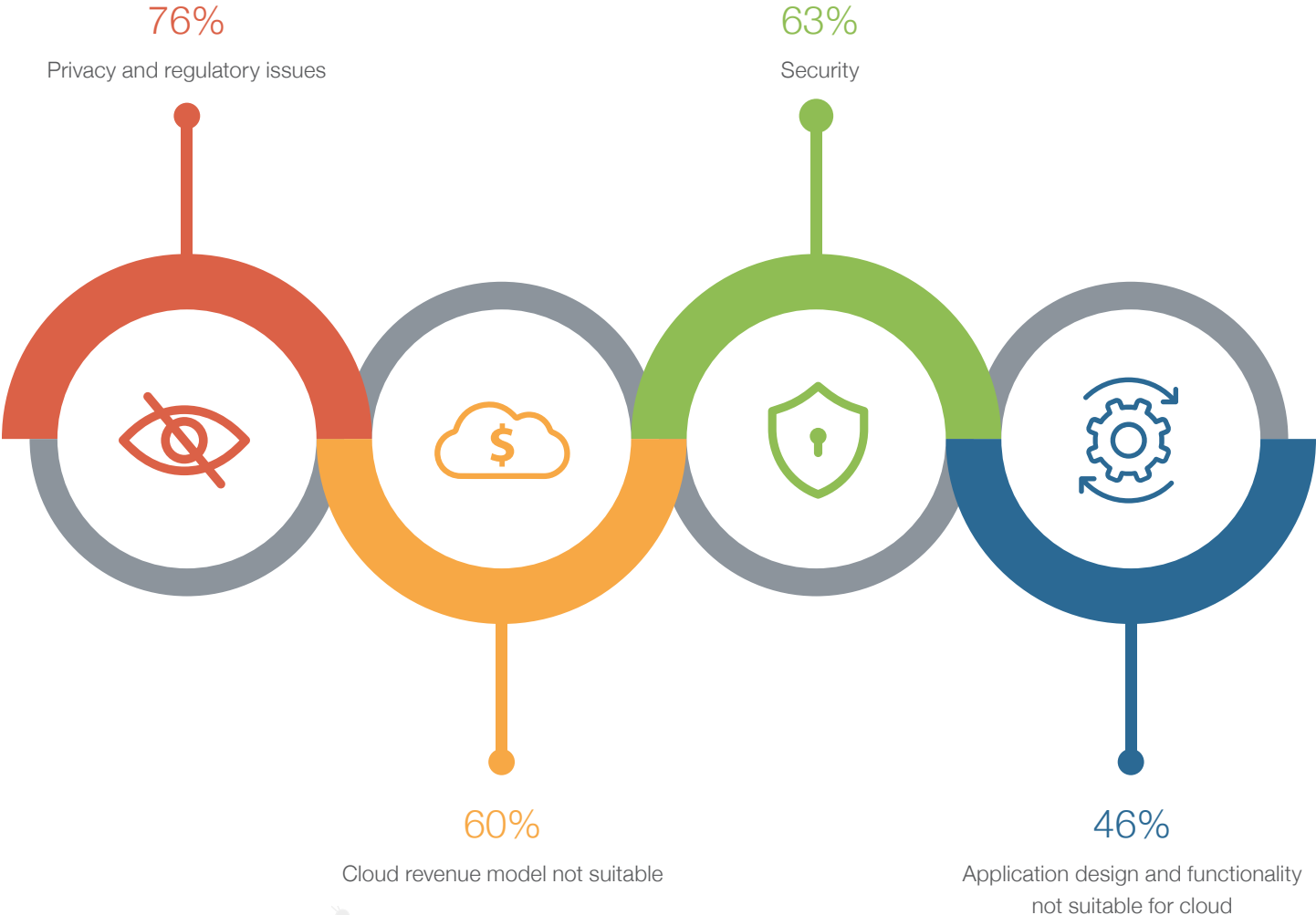| 65% | Enterprise-owned Data Center (about the same as 2014) |
| 22% | Colocation or Multi-Tenant Data Center Provider |
| 13% | Cloud Computing |

Out of 1,600 companies surveyed, most have a hybrid strategy with IT workloads spread across a range of services and data centers.

The study found the hybrid deployment percentages holding steady, with the percentage of IT assets deployed to be:

65% Enterprise-owned Data Center (about the same as 2014)

22% Colocation or Multi-Tenant Data Center Provider

13% Cloud Computing

The study also found:
One-third of all workloads are expected to be contracted to cloud, colocation, hosting and Software as a Service (SaaS) suppliers by 2021.[12]

Confidence in costing best-execution venues is growing. Sixty percent (60%) of respondents said they are confident in their organization's ability to compare the costs of provisioning workloads in the cloud or at their owned and leased colocation sites.[14]

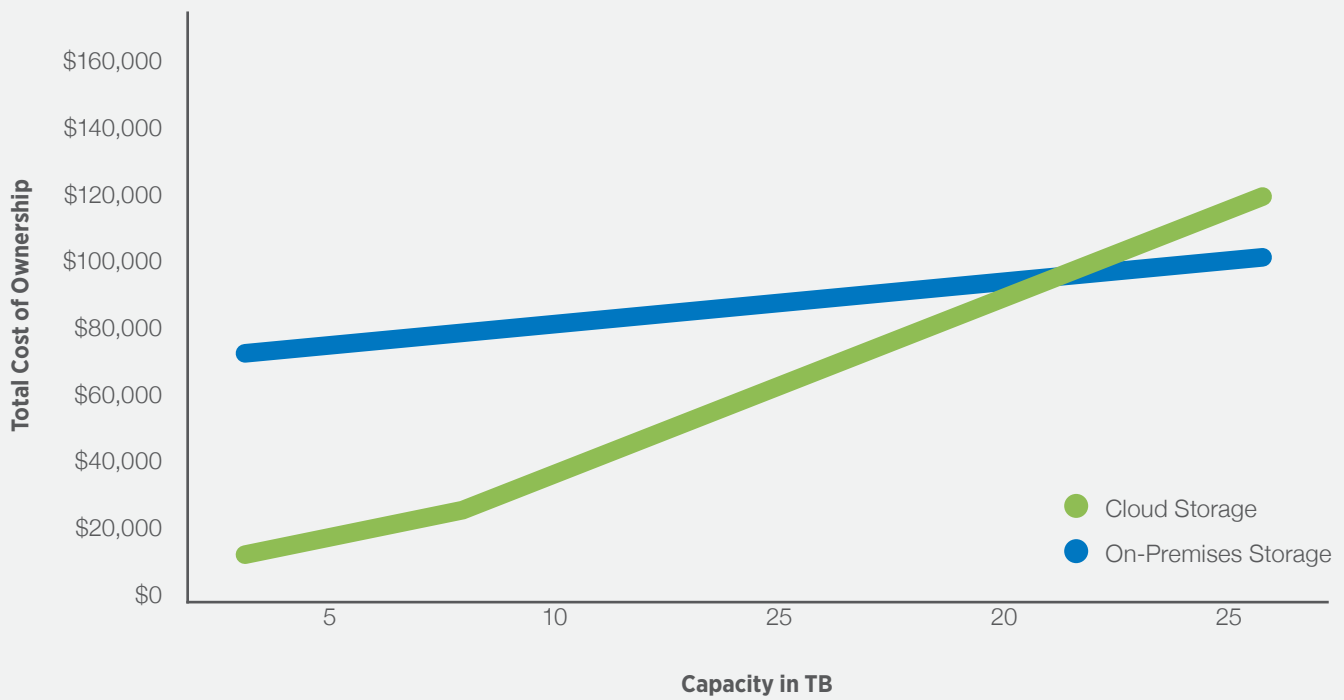**55% of IT managers** are planning server consolidation[13] as a priority over move to cloud, according to Uptime survey

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Barriers to Delivering Business Apps via Cloud-based Platforms[15]

76%
Privacy and regulatory issues

63%
Security

60%
Cloud revenue model not suitable

46%
Application design and functionality not suitable for cloud

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The Cost of Cloud vs. On-Premises[16]

While cloud storage can be less expensive than on-premises at lower data levels, as the total amount of storage increases, so does the total cost.

3 Year TCO: Growing Capacity, Primary Storage

Legend:
- Cloud Storage
- On-Premises Storage

Y-axis: Total Cost of Ownership ($0, $20,000, $40,000, $60,000, $80,000, $100,000, $120,000, $140,000, $160,000)

X-axis: Capacity in TB (5, 10, 25, 20, 25)

Questions to Ask When Determining Your Application Needs

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1

Is your current infrastructure **approaching the end** of its useful life?

2

Is your infrastructure **outdated, underpowered, or undercooled?**

3

Are you updating your software or **need to update** your hardware?

4

Are you running **mission-critical** enterprise applications, such as SAP, Oracle, SQL, VSphere, or HyperV ?

5

What other **traditional applications** are you running?

6

Do you need to **support containers** or cloud APIs?

7

Do you have **compliance or security issues** that require you to keep data on-premises?

8

Do you need converged infrastructure that is **thoroughly tested** from the ground up around all major IT applications?

9

What attributes of your architecture do you **need to control** and which ones can you let go of?

10

Is your organization today different from even 3-5 years ago? How have your technologies, imperatives, and operational models changed?[17]

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Wrap-Up - What's Next?

We hope the information that we've provided you in this eBook has been helpful.

So, what's next, you ask? Well, it's no secret that Bruno and I are big fans of a joint solution that Cisco and NetApp have developed together called FlexPod.

We want to tell you about it because not only is it the world's leading converged infrastructure solution[18], we think it is one of the best foundational decisions you can make for a modern data center architecture.

FlexPod has been around for over nine years, but it is even more relevant for your enterprise applications now than it was when we first introduced it.

When you think about how applications are built today, some aspects haven't changed fundamentally. You have a compute layer that talks through a network to a storage system. You want to make sure that you're getting the most out of your compute layer through your network layer to ultimately retrieve or store your data.

FlexPod has been purpose-built to take those fundamental components and reduce risk, increase security and availability, and ensure that your applications work well, with less time spent on the infrastructure itself.

FlexPod relies on Cisco's CVD (Cisco Validated Design) framework and NVA (NetApp Validated Architecture), which simply means that a combined team of Cisco and NetApp engineers test and validate real applications on FlexPod to ensure your applications get the performance and reliability needed for storage, communications, and compute. CVDs help mitigate your risk and maximize your resources.

Cisco and NetApp engineers test and validate real applications on FlexPod to ensure your applications get the performance and reliability needed for storage, communications, and compute.

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We take it a step further. Applications such as NetApp's converged system adviser (CSA) allows you to look across the entire stack and ensure that things are configured following best practices as you grow. We include automation with Cisco's UCS Director to pre-provision portions of your applications against networking, storage, CPU, memory, and even to pick templates out of your hypervisor to allow for self-service or ensure applications deploy consistently every time.

There is also cloud-based monitoring with elements such as Active IQ from NetApp or Cisco's Intersight, to allow for monitoring of those components and get telemetry on how they're performing in your environment.

With FlexPod we have use case models for leveraging:

- the cloud,
- edge IoT,
- AI/Deep Machine Learning,
- High-performance workloads such as SAP, Oracle, SQL Server, vSphere, HyperV, and more.

FlexPod is designed to deliver a complete combination of what you need to run a true set of enterprise applications: availability, integrity, reduced risk, flexibility, and end-to-end security, from the edge out to the cloud and back to your main data center.

You can learn more about FlexPod by visiting our website: **https://flexpod.com/.**

And if you would like to speak to a real person, then get in touch with one of us. We can schedule a demo or connect you with a FlexPod partner who can help you with an assessment.

Let's Connect:

Steve Cooke,
stecooke@cisco.com

Bruno Messina,
Bruno.Messina@netapp.com

Resources

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