SIMPLICITY SCALABILITY EFFICIENCY

THE HYPER-CONVERGED INFRASTRUCTURE

vmware®

carahsoft.

INTRODUCTION

The past decade has brought a new era to government — and more importantly, to government information technology. Organizations, in the face of fewer resources and more budget cuts, have looked to transform their IT departments into efficient, flexible enterprises that can respond faster to the needs of policymakers, organizations and constituents while reducing IT infrastructure and operating costs. Caught between shrinking funding and a growing need for services, government IT departments need to deploy a new model for computing.

One step that many organizations and departments have already taken to achieve this is virtualization. Virtualization is the creation of a virtual — as opposed to actual — version of something, such as an operating system, a server, a storage device or network resources. This process provides government organizations with an evolutionary path that preserves existing IT investments, security and control.

And now, an even more efficient and scalable solution is on the scene that many government organizations may not yet know about: hyper-converged infrastructure. A hyper-converged infrastructure tightly integrates storage, compute, and networking virtualization resources in the same appliance.

Hyper-converged systems take traditional convergence to the next level. Generally, converged systems are made of separate components built to work well together, while hyper-converged ones are modular systems designed to scale out by adding modules. In a converged infrastructure, each of the components in the building block is discrete and can be used for a specific, intended purpose. In a hyper-converged infrastructure, the technology is software defined, so that the technology is, in essence, all integrated and cannot be broken out separately.

There are many benefits of a hyper-converged system and the software-defined enterprise. One team, instead of a variety of separate teams, can manage the stack, freeing up other employees to work on pressing IT issues and innovation. The architecture is simplified. And it's very scalable.

Deploying a software-defined enterprise uses the power of software to keep redefining itself, rather than being locked into operating in a specific way. This reconfigures processes such that it can quickly morph operations to adapt to your emerging business opportunities and challenges.

However, despite its obvious benefits and its ability to help organizations achieve a software-defined enterprise, the hyper-converged infrastructure is still relatively new to the public sector. To delve deeper into this technology, GovLoop, in partnership with VMware, surveyed more than 600 government and IT professionals to create this research brief.

Despite the many advantages of a hyper-converged infrastructure, 70 percent of the people GovLoop surveyed had not heard of a hyper-converged solution.

So why is this IT solution not yet on the horizon for government agencies? What challenges might organizations be facing in knowledge, skill and implementations?

This research brief will look at:

» The basics of a hyper-converged infrastructure and how it differs from current infrastructure solutions.

» The software-defined enterprise as the next wave of IT and how hyper-convergence can get you there.

» The benefits of a hyper-converged infrastructure for the public sector.

» Hurdles that public sector organizations may face on the path toward modernization.

As government strives to continue being effective and efficient, organizations need to be more innovative and proactive about a variety of infrastructure solutions that can help keep their citizens' and users' information safe. Hyper-converged infrastructure is one such solution.

Figure 1.

HAVE YOU HEARD OF HYPER-CONVERGED INFRASTRUCTURE?

30% Yes
70% No
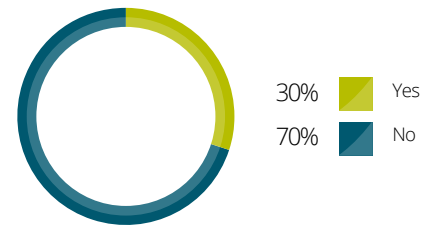
*Based on 600 total responses

Figure 2.

IS HYPER-CONVERGED INFRASTRUCTURE SOMETHING YOUR AGENCY IS LOOKING INTO?

11% Yes
18% No
71% Unsure
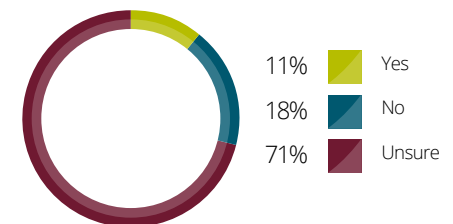
Figure 3.

WHAT DO YOU UNDERSTAND AS THE BENEFITS OF A HYPER-CONVERGED INFRASTRUCTURE?
(CHECK ALL THAT APPLY)

Simplifies deployment & management	54%
No application downtime during planned maintenance	18%
Automates manual processes, patches and upgrades	28%
Reduced operational expenses	40%
Scales out automatically as data grows	23%
Frees staff to work on more innovative projects	19%
Have not adapted a hyper-converged infrastructure	33%
Other	9%
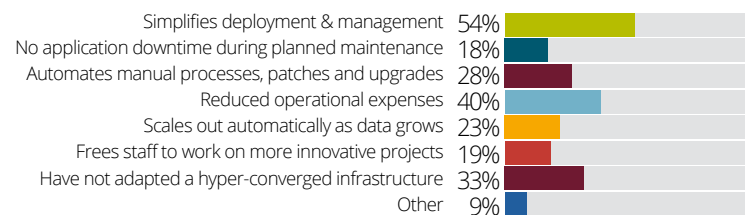
WHAT IS A HYPER-CONVERGED INFRASTRUCTURE?

In the recent GovLoop survey, a large majority said they were not yet aware of what exactly "hyper-converged infrastructure" means. In fact, almost 70 percent of respondents said they had never heard of it.

Of the 168 other survey respondents who had heard of a hyper-converged infrastructure, 27 percent knew what it was with certainty; 37 percent had heard the term; and 36 percent thought they had heard the term but were not clear about what it meant.

As we continue through this brief, our survey results and percentages will reflect the perceptions and answers only of the 168 survey respondents who either knew what a hyper-converged infrastructure was or who had heard the term.

For clarity, we turned to Grant Challenger, Software Defined Storage Specialist at VMware.

"Today there are a variety of terms around hyper-convergence," Challenger said. "But to be as simple as possible, what a hyper-converged infrastructure really means is having the features and capabilities of various proprietary devices, hardware and software devices, and their functionality, abstracted into the hypervisor."

Challenger went on to explain that a hypervisor is the closest thing to the application's performance requirement, meaning the hypervisor sits on bare metal on the storage and memory of the server — be it a blade or a rack-bound server — and it knows what application requirements are faster and better than any other software layer.

"A hypervisor converged is the functionality in all kinds of devices, commodity and specialized equipment [combined] into the hypervisor," Challenger said. "And from there we take it into being able to manage and apply policy with the software layer, and are no longer bound to proprietary hardware or software models."

How does a hyper-converged infrastructure differ from current traditional converged infrastructures? In a converged infrastructure, each component is discrete and can be used for its intended purpose — the server can be separated and used as a server, just like the storage can be separated and used as functional storage. However, in a hyper-converged infrastructure, the technology is software-defined and essentially integrated, unable to be broken into separate components.

"Today's traditional infrastructure is a set of technologies that are built to be integrated with one another but are highly proprietary," Challenger said. "To build on it, you need specialized resources in your data center, in your IT organization to integrate all of those different components."

"In most scenarios, you need networking specialists to build the network; you have to have storage specialists to integrate into that and to build on the storage; you have to have compute folks to build operating systems; and you have to have virtualization specialists and architects who know how to put all that together," Challenger added.

"That's just an intolerable amount of resources without being able to deliver on the [service-level agreements] to end users," he said. "So, the efficiencies that we need today, and in the next 10 years, and the expectations of what users require are not being met by this current modern technical architecture."

Figure 4.

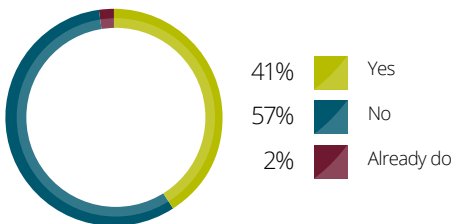**ARE YOU LIKELY TO CONSIDER A HYPER-CONVERGED INFRASTRUCTURE IMPLEMENTATION?**

41% Yes
57% No
2% Already do

Figure 4-B.

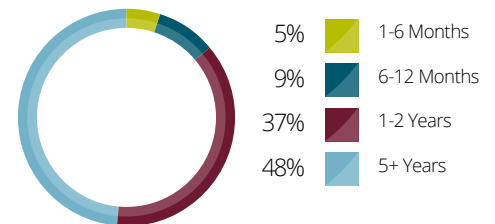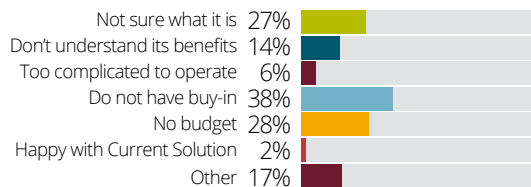**IF CONSIDERING A HYPER-CONVERGED INFRASTRUCTURE SOLUTION, WHAT IS YOUR TIMEFRAME FOR IMPLEMENTATION?**

5% 1-6 Months
9% 6-12 Months
37% 1-2 Years
48% 5+ Years

Figure 4-A.

WHY ARE YOU NOT CONSIDERING HYPER-CONVERGED INFRASTRUCTURE?
(CHECK ALL THAT APPLY)

Not sure what it is	27%
Don't understand its benefits	14%
Too complicated to operate	6%
Do not have buy-in	38%
No budget	28%
Happy with Current Solution	2%
Other	17%

ARE ORGANIZATIONS CONSIDERING HYPER-CONVERGED INFRASTRUCTURE?

Of the 168 GovLoop survey respondents who said they had heard of hyper-converged infrastructure, only 11 percent said their organization was looking into it as an IT solution. Eighteen percent said their organization was not looking at implementing a hyper-converged infrastructure, and a whopping 71 percent were simply unsure if their organization was considering this solution. (See Figure 2.)

That is not unexpected, and our survey reveals that hyper-converged infrastructure faces a couple implementation challenges: lack of awareness about what it is and an uncertainty about the concrete benefits that it can provide.

Survey respondents who answered that they were not looking at a hyper-converged infra-

structure or were unsure cited several reasons, including lack of clarity on its benefits to lack of leadership buy-in.

Twenty-seven percent of respondents said the biggest reason they were not considering a hyper-converged infrastructure was that they simply didn't know what it is, while 14 percent cited that they did not understand its benefits. Six percent said they thought a hyper-converged infrastructure would be too complicated to operate. (See Figure 4-A.)

However, buy-in (38 percent of respondents) and budget (28 percent of respondents) were also main reasons public sector employees were not looking at a hyper-converged infrastructure.

Respondents cited other concerns about adopting a hyper-converged infrastructure.

Thirty-one percent said they had concerns about compatibility and configurations, while 35 percent said they had concerns about personnel and operating costs. (See Figure 5.)

Challenger said these concerns were not uncommon, but they are unfounded. It's important that the public sector begin to understand the true value of a hyper-converged infrastructure, he added, because it is cost-efficient, simple to adopt and not complex. Public sector officials who want to consider a new infrastructure should look at a hyper-converged infrastructure and its many benefits.

THE PATH FORWARD FOR PUBLIC SECTOR IT

According to the GovLoop survey, department IT directors are the majority of the people who are driving the decisions around IT purchases, at 31 percent of survey respondents. Chief executives are also somewhat responsible for IT purchases and decisions, 24 percent of respondents said.

For those in the public sector who are considering hyper-converged infrastructure or who are responsible for IT decisions, Challenger had two major pieces of advice.

"Have you already tried to succeed at virtualization yourself?" Challenger asked. "Then I would try to consider partnering with vendors to achieve what you're looking for. In many organizations they've virtualized compute, they've tried different layers of storage, they've tried to innovate on their

own, and they've realized that the benefit is to have the vendors provide those efficiencies, so they don't have to do it themselves."

Second, Challenger said IT departments must test and experiment in different environments to find the right solution for them.

"If you've considered a new IT solution, first you must test in a couple of environments so then you'll have an idea of how well it works and how things will change for you and where to focus," Challenger said. "We see very specific workloads or use cases being tested with hyper-converged storage or software-defined storage. Those are things like virtual desktop infrastructure, like remote office, DMZ or edge computing and storage." Then organizations will do testing and

development on these situations, which is a necessary step, he added.

This sort of testing will allow IT managers to see the experience they're having, Challenger said, the difference in the environment and how it's set up, and how it performs. After that, organizations can expand hyper-convergence.

"I find that the experiential step the most important for the public sector," added Challenger.

In summary, hyper-convergence and the software-defined enterprise will become a reality sooner rather than later in the public sector. Adopting a software-enabled approach will allow you to bring new services to constituents more quickly and efficiently, as well as provide the innovation inspiration agencies need.

THE BENEFITS OF A HYPER-CONVERGED INFRASTRUCTURE

Challenger broke down the benefits of a hyper-converged infrastructure into three main areas: simplicity and ease of operation; reduced staff needs; and economic benefits.

SIMPLICITY AND EASE OF OPERATION

As explained earlier, hyper-converged infrastructures are modular systems intended to scale out by adding modules. Their simplicity comes from the fact that a user can leverage improvements at the storage controller software layer.

"The number one benefit behind a hyper-converged infrastructure is the simplicity of deployment and management of your IT environment," Challenger said. "It's all converged, it's all being consumed. Storage, network and compute are in one environment with one pane of glass, so you have an extremely high degree of simplicity for deployment and for the end user."

And as most of the public sector can agree, simplifying government operations is always a good thing.

REDUCED STAFF NEEDS

As Challenger explained, hyper-converged systems are managed via a single pane of glass. That means instead of having a set of applications and one team to manage your storage array, another team to manage virtualization, and another team to manage the server hardware, one team — or in some cases, one person — can manage the complete hyper-converged stack.

"To get to thousands of virtual machines," Challenger said, "you can literally plug in [VMware] EVO:RAIL or EVO:RACK without the need for storage personnel or without the need for networking folks and have a very large set of virtualization infrastructure, storage, network and compute. So overall, as I see this adoption towards hyper-convergence...growing, resources will either get leveled up or moved into different roles."

In this manner, dozens of employees who previously had to administer the system can now be deployed at the organization to work on other needs and innovative solutions.

ECONOMIC BENEFITS

To illustrate the cost savings of a hyper-converged infrastructure, Challenger offered a hypothetical scenario of an end user.

"Vendors are virtualizing networks, they're virtualizing storage, but they're doing this based on demand, and they're doing it on the availability of power," he said. "Meaning, there was a time when with an x86 server, even if you virtualized it, you weren't going be able to additionally handle other services and features. Now, we're extrapolating capabilities out of proprietary hardware and software, running on a storage array or a network switch, and we're putting them into the x86 servers. Those x86 servers now have the power to deliver on all those capabilities at the software layer in the hypervisor, where five years ago they did not."

This allows the end user to realistically take advantage of that power — and along with that power comes some incredible economic scale. That commodity hardware can run anything in the data center without someone augmenting it with proprietary hardware designs and software, thereby increasing cost savings.

VMware is changing the economic-aimed model because it doesn't charge for capacity, Challenger said.

"If you buy software-defined storage from us, if you build your servers with 1-terabyte drives today, and a year later you like the 10-terabyte drives because the performance is there and, you're comfortable with it, you can get 10 times the storage you originally purchased without spending additional funds," he said. "So the economic model is different at that layer, and it's also different at the commodity hardware layer. You don't have to buy the fibre channel, you don't have to buy a dedicated [storage-area network] switching environment for networking, you don't have to buy a proprietary array. You just buy the white box."

"We don't charge for capacity; we license the storage on a per CPU basis. With any other storage company out there, you will have to buy capacity," he added.

Figure 5.

WHAT CONCERNS, IF ANY, DO YOU HAVE ABOUT ADAPTING A HYPER-CONVERGED INFRASTRUCTURE?
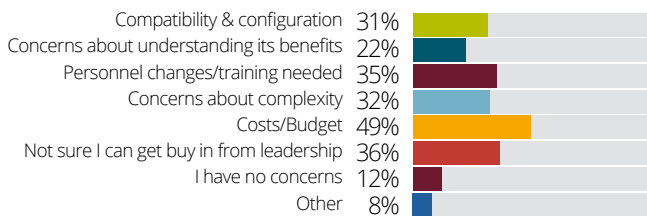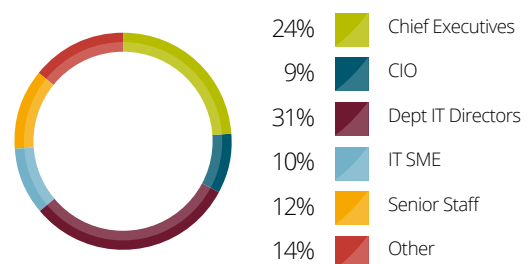*(CHECK ALL THAT APPLY)*

Compatibility & configuration	31%
Concerns about understanding its benefits	22%
Personnel changes/training needed	35%
Concerns about complexity	32%
Costs/Budget	49%
Not sure I can get buy in from leadership	36%
I have no concerns	12%
Other	8%

Figure 6.

WHO DRIVES DECISIONS AROUND THIS IT MODERNIZATION IN YOUR AGENCY OR DEPARTMENT?

24%	Chief Executives
9%	CIO
31%	Dept IT Directors
10%	IT SME
12%	Senior Staff
14%	Other

WHY VMWARE?

VMware EVO:RAIL™ is hyper-converged infra-structure that combines VMware compute, networking and storage resources into a hy-per-converged infrastructure appliance to create a simple, easy to deploy all-in-one solution offered by the company's partners. It is a scal-able software-defined data center building block that delivers compute, networking, storage and management to empower private/hybrid-cloud, end user computing, test/dev, remote and branch office environments, and small virtual private clouds.

Building on the proven technology of vSphere, vCenter Server and Virtual SAN, EVO:RAIL delivers the first hyper-converged infrastructure appliance 100 percent powered by VMware software.

"What VMware did for compute, we're now doing for storage and networking," Challenger said.

FURTHER READING

As this report explained, hyper-converged infra-structure is on the horizon, but there is still a lot of education that needs to take place. Here are some educational materials and resources.

» High-Value Outcomes for IT Organizations

» Oregon State University Solves Critical Storage Pain Points with VMware Virtual SAN Solution

» Virtual San

» Introducing the VMware EVO Hyper-Con-verged Infrastructure Solutions

ABOUT VMWARE

VMware is the industry-leading virtualization software company. Our technologies simplify IT complexity and streamline operations, helping businesses become more agile, efficient and profitable. By virtualizing infrastructure — from the data center to the cloud to mobile — VMware enables IT to deliver services from any device, anytime, anywhere. Learn more:
http://www.vmware.com/industry/government/overview

vmware®

carahsoft®

ABOUT GOVLOOP

GovLoop's mission is to "connect government to improve government." We aim to inspire public sector professionals by serving as the knowledge network for government. GovLoop connects more than 150,000 members, fostering cross-government collaboration, solving common problems and advancing government careers. GovLoop is headquartered in Washington, D.C. with a team of dedicated professionals who share a commitment to connect and improve government.

For more information about this report, please reach out to
Catherine Andrews, Director of Content at catherine@govloop.com.

1101 15th St NW, Suite 900
Washington, DC 20005

Phone: (202) 407-7421 | Fax: (202) 407-7501

www.govloop.com
@GovLoop