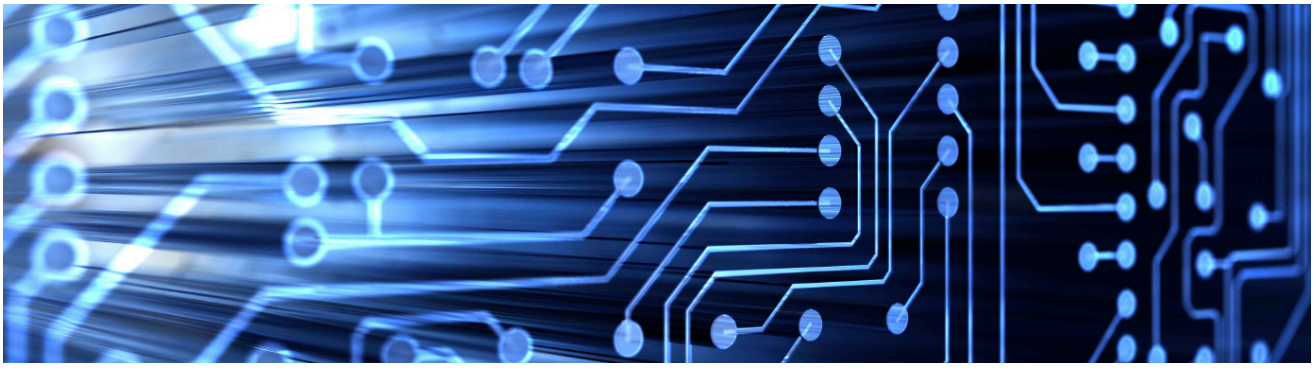
Business Technology Office



Next-generation IT infrastructure

IT infrastructure leaders are excited about the prospect of the next generation of IT infrastructure, but they are proceeding with caution.

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Based on recent discussions with a group of West Coast Information Technology infrastructure leaders, we found that these executives have much on their minds when it comes to next-generation IT infrastructure (NGI), and its various components, including:

- Open-source environments
- Software-defined networking and storage
- "As-a-Service" offerings, such as Software- and Platform-as-a -Service
- Cloud orchestration layers
- Application configuration management

Although these infrastructure leaders are focused on NGI, they are cautious about rushing in because of a number of concerns ranging from security to economics. One example of their security worries is their concern that public cloud providers are legally barred from informing a customer if that customer's data is subpoenaed by the government. Moreover, these leaders appear unconvinced by the economics of public cloud providers relative to internal hosting, and many are not yet taking advantage of "white box" servers to lower costs.

To understand these trends, we recently hosted our semi-annual Chief Infrastructure Technology Executive Roundtable (CITER) dinner on the West Coast. Reflecting the diversity of economic activity in the region, we assembled IT infrastructure leaders from sectors ranging from healthcare to technology and from banking to travel. We also conducted a short online survey of the invitees to get a deeper understanding of their perspectives. This article synthesizes the findings from our discussions with the CITER members as well as the results of the survey:

- The security of the public cloud remains a high concern
- Public cloud economics are often less attractive than internal hosting
- Companies are not yet taking full advantage of next-generation infrastructure (NGI) largely because of the difficulties of making this transition
- There is an increased need for "true program managers"

An overview of next-generation infrastructure

IT infrastructure leaders must not only meet the perpetual challenge of managing costs but also meet ever increasing demands to:

- Deliver higher service levels
- Deliver new IT-enabled capabilities to the business
- Enable faster application development

IT infrastructure professionals are reaching the point where the benefits of standard IT improvement levers, such as renegotiating vendor contracts, leaning out operations, and

establishing new technology-focused organizational silos, cannot fully relieve the mounting pressure to simultaneously meet cost targets and deliver against ambitious business requirements. Therefore these leaders have started to look for more transformative options, including next-generation IT infrastructure (NGI).

The key elements of NGI are the following:

- NGI involves a highly-automated platform for the delivery of IT infrastructure services, such as software-defined networking and central orchestration layers to scale infrastructure to meet peak workloads. This platform can be built on top of new and open technologies, such as cloud computing, "white box" servers, and/or modular datacenter designs.

- NGI entails leaner organizations operating at scale and relying more on cloud-provider-level hardware and software efficiencies, such as on-demand capacity scaling to support fluctuating capacity needs and resource pooling to drive increased resource utilization.

- The objective of NGI is to better support new business needs opened up by IT advances including Big Data analytics, digital customer outreach, Bring Your Own Device, and mobile applications.

The security of the public cloud remains a concern for IT infrastructure leaders

IT professionals have long voiced concerns about the security of running applications and allowing their organization's data to reside in the public cloud. In general, there is still reluctance to allow confidential or proprietary data to leave the enterprise's firewalls.

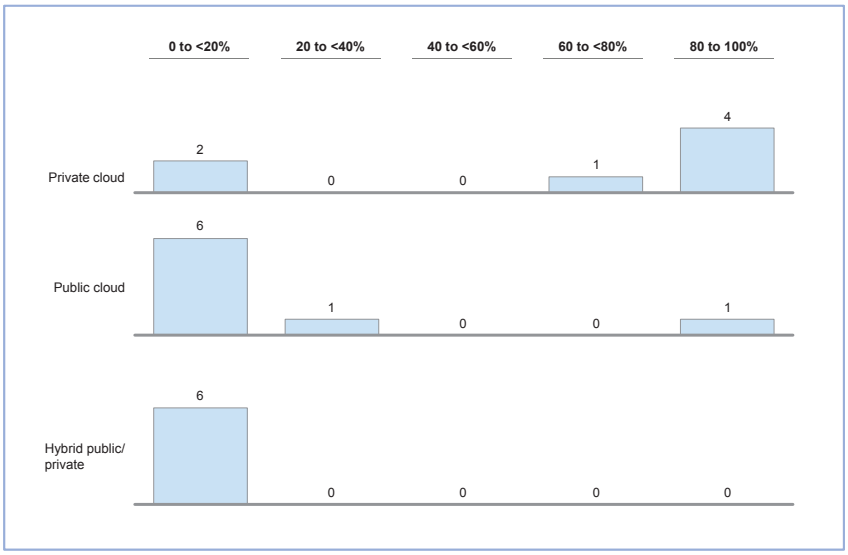
CITER members cited particular concerns about loss of control in the event of private litigation or inquiries from governmental agencies such as the National Security Agency. In such instances, public cloud providers can be subpoenaed to hand over the information of their customers, but may be legally barred from informing their customers of what has transpired. Moreover, there is no way to contract around these legal constraints. Members also cited concerns that, especially in highly regulated industries such as healthcare and banking, public cloud providers are not always well equipped to conform to the unique regulatory requirements of those industries.

As a result of the cloud security issue, CITER members still generally feel more comfortable keeping critical data within their own corporate firewalls so that, in the event of a governmental action, they at least know the action has occurred. These sentiments were also reflected in our survey of the membership's utilization of public cloud services: 75% of respondents indicated that 20% or less of their workloads are in the public cloud. In contrast, more than 60% of respondents indicated that more than 60% of their workloads are run in a private cloud where they can control the data. See Exhibit 1:

Exhibit 1

Percentage of current workloads running on the following

Number of responses per category



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Notwithstanding these concerns, CITER members recognize the potential security benefits of the scale and operational expertise that come with the use of public cloud providers. Given their focus and size, public cloud providers are more likely to have the expertise and experience to combat security threats and prevent surreptitious breaches. The public cloud may gain more acceptance as cyber security threats outpace the ability of smaller IT departments to combat them.

Public cloud economics are often less attractive than internal hosting

Public cloud providers often emphasize that because of their scale and higher utilization across shared assets, the public cloud is more cost effective than internal hosting. However, several of our CITER members challenged this assertion.

Some CITER members have run analyses to compare the economics of internal hosting against public cloud offerings. For example, several members have compared the cost of running e-mail in the cloud to their own internal costs with the results tipping in favor of the cost advantage of self-hosting, notwithstanding the scale advantage of public cloud providers.

Companies are not yet taking full advantage of next-generation infrastructure largely because of the difficulties of making this transition

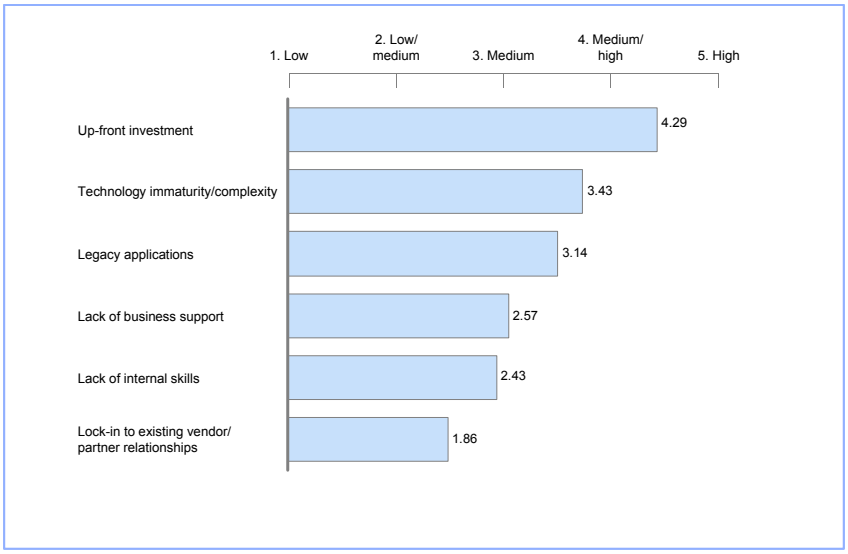
Most CITER members have not yet fully taken advantage of the promises of NGI. Our survey indicated that the "sticker shock" of the up-front investment for NGI is one of the biggest impediments to adopting next-generation IT infrastructure. The survey also indicated the immaturity and complexity of the technology may also play a significant role in slowing the rate of adoption.

As one example, few attendees have yet considered sourcing "white box" alternatives direct from ODMs for compute, storage, and/or networking. Attendees generally felt that they lacked sufficient scale to source white box alternatives at a more cost effective price point than what is currently being offered by OEMs. Many of the CITER members are also dealing with legacy applications and therefore were wary of the up-front costs of migrating to NGI. See Exhibit 2:

Exhibit 2

Biggest hurdles to upgrading your IT infrastructure

Scale of 1 to 5, with 5 being highest

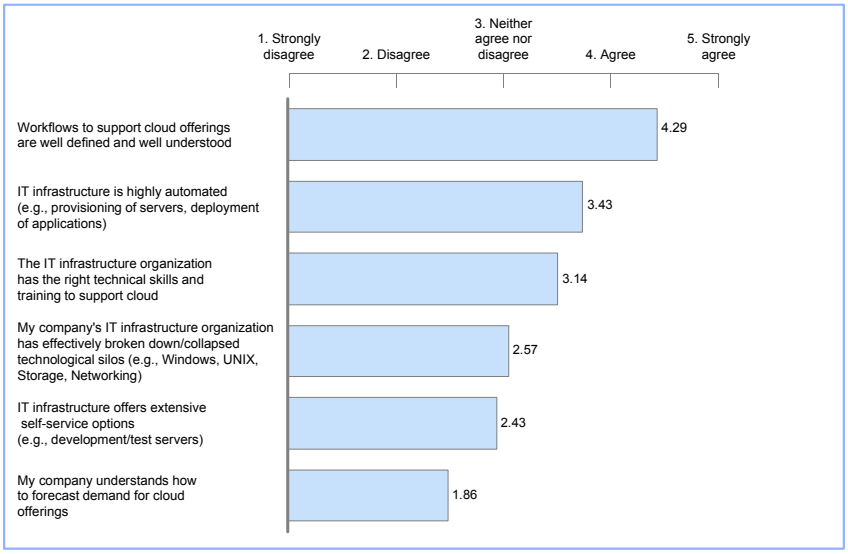


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CITER members also felt their organizations still face significant challenges in adopting the cloud. In particular, they cited systemic barriers to adoption including the lack of "cloud-ready" workflows and low levels of automation for infrastructure provisioning. See Exhibit 3:

Exhibit 3

"Cloud readiness" of current operating model and technological environment



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In terms of how they adopt new technologies, CITER members anticipate a combination of "brownfield" and "greenfield" approaches in adopting next-generation IT infrastructure. We define "brownfield" as the piloting of individual technologies and then deploying them in the current IT environment to replace existing solutions. In contrast, "greenfield" involves situations where a separate standalone environment is deployed for new applications and legacy applications are migrated to the new environment. Overall, respondents indicated that they plan on using a mix of brownfield and greenfield approaches, depending in part on the type of workload or application involved. On average, respondents indicated that brownfield would be used for approximately 60% of future workloads and greenfield for 40%.

There is an increased need for "true program managers"

With the advent of NGI, our members see an increased need for what they call "true program managers:" leaders who know how to work with internal technologists and third-party providers to pull together a solution and deliver an overall program as opposed to simply delivering a point solution or completing a discrete project.

CITER members are less worried about finding people with specific technological expertise. Although people with certain technological skills are in short supply from time to time, the CITER members felt that "you could always send people to a training session."

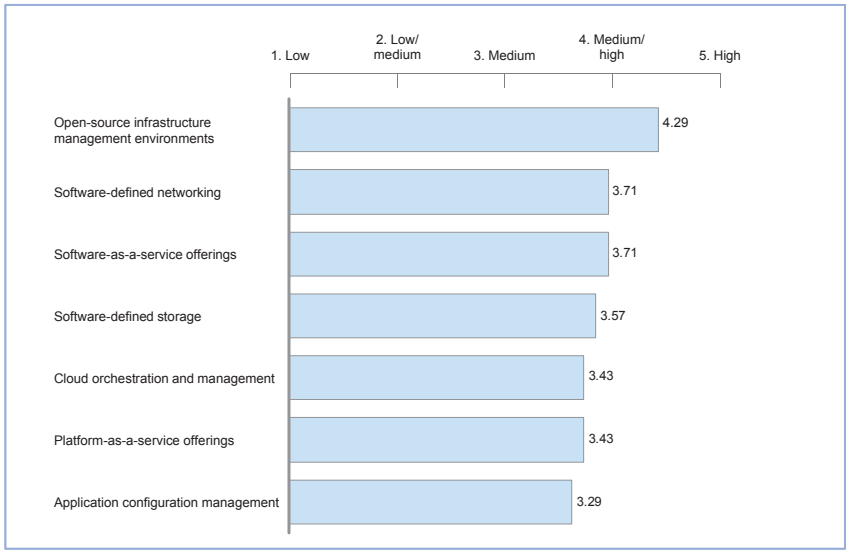
The reason that program managers are so critical is that NGI involves the deployment of technological solutions across the full "stack" – from the datacenter to hardware to middleware and up through the application layer. Moreover, successful NGI deployment often entails fundamental changes to an enterprise's workflows and IT's operating model. For example, interactions between the application development and IT infrastructure groups fundamentally change if test environments can be provisioned through a self-service model.

This need for true program managers is reflected in the number of NGI technologies that CITER members are exploring. Respondents to the survey indicated nearly across-the-board interest in all of the key NGI technologies. See Exhibit 4:

Exhibit 4

Interest level in next-generation IT infrastructure technologies

Scale of 1 to 5, with 5 being highest



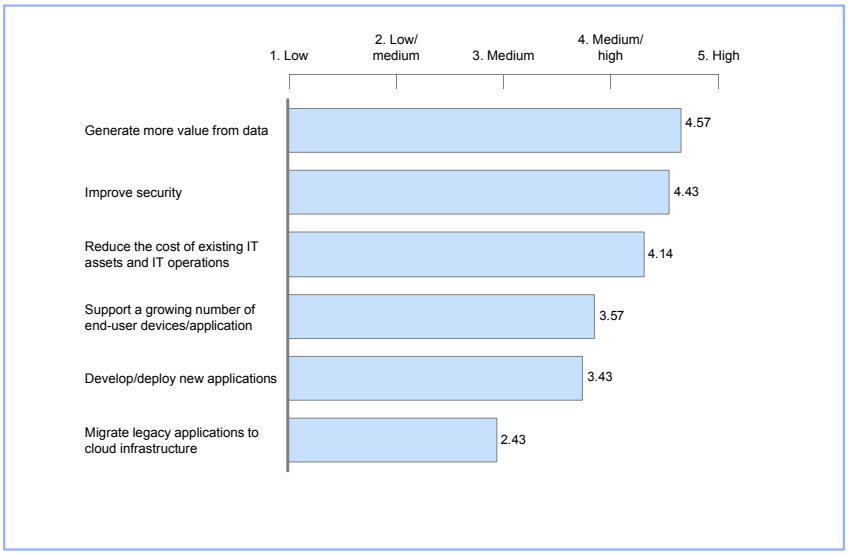
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CITER members are being asked to meet several critical business objectives in the next one to three years. The top objectives include generating more value from data, reducing the cost of existing IT assets and operations, and supporting a growing number of end-user devices and applications. Meeting these objectives will further stretch the abilities of IT leaders to deliver integrated programs. See Exhibit 5:

Exhibit 5

Priority objectives of IT organization over the next 1-3 years

Scale of 1 to 5, with 5 being highest



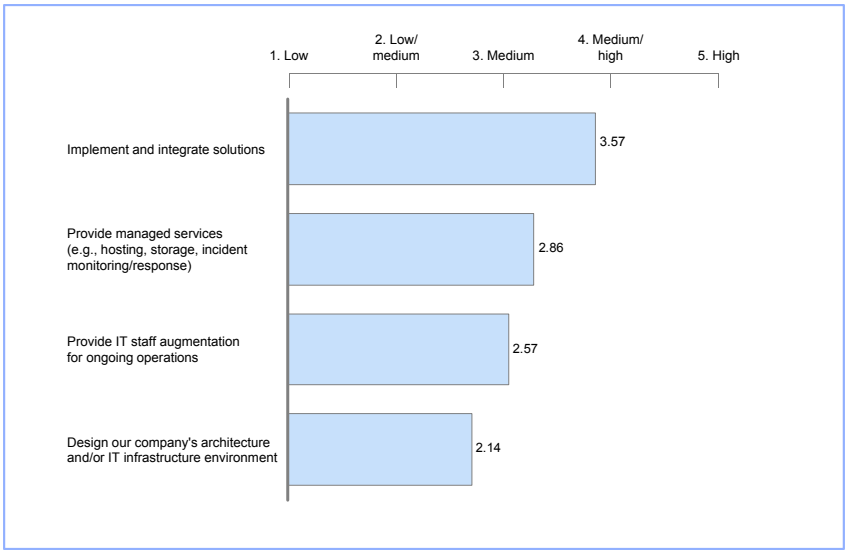
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Finally, vendors will likely play a significant role in the implementation of NGI and be involved in multiple facets of its implementation, though mostly in a supporting role. CITER members anticipate vendors to be most involved in implementation and integration. Managing third party resources will further test the program management abilities of IT infrastructure leaders. See Exhibit 6:

Exhibit 6

Level of vendor involvement

Scale of 1 to 5, with 5 being highest



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* * *

Overall, IT infrastructure leaders are excited about the promises of Next-Generation Infrastructure. Many of these new technologies and approaches hold out tremendous promise to simultaneously reduce costs and improve effectiveness. However, based on the discussions at our recent CITER dinner, it is clear that transitioning to NGI will require overcoming several significant challenges.

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