THE GOVLOOP GUIDE

THE VIRTUAL PLATFORM

The Future of Public Sector IT Consumption

INNOVATIONS THAT MATTER

Cisco, Enabling a World of Many Clouds

Government IT organizations are facing a new set of challenges, as the consumption of IT is shifting from the traditional model of acquiring hardware and software and deploying it onsite, to a managed or cloud services model.

Cisco is helping public sector organizations use technology to access applications, content and services through the cloud.

To learn more about how Cisco can help manage these changes in IT consumption, visit Cisco.com/go/ITconsumptiongov.

FOREWORD

Information technology is undergoing a number of changes in the public sector. Growth in federal government IT spending has slowed, and as we look to the future, analysts jokingly remark "Flat is the new up!" CIO management and technology priorities have shifted to focus on data center optimization, cloud computing, information security, mobility, analytics, and big data.

At the federal level, the current administration's policies emphasize cloud first, data center consolidation, shared first, strategic servicing, mobility, and social media. The president's second-term Management Agenda notes technology as the foundation for improving efficiency, enhancing the economy, and changing the way the government serves citizens and businesses.

Those policies are mirrored at the state and local levels, where continued improvement of revenues have caused a pivot from a "slash" agenda to more of an invest-and-improve one that demands technology-driven productivity. For industry, the public-sector market is becoming even more competitive, making takeaways critical. Multiple-award Indefinite Delivery, Indefinite Quantity (IDIQ) acquisition vehicles, and various set-asides are becoming the norm for an understaffed and increasingly stretched procurement workforce.

Wading into these deep waters of what some have called the "big bang disruption," IDC Government Insights Research Director Shawn McCarthy discusses how IT consumption is changing, dubbing the current model the "Third Platform"—one driven by the ability to tap in to IT solutions from any location through multiple types of devices. He goes on to discuss other related issues, such as the Internet of Everything (IOE) and everything as a service (XaaS), and the implications that affect security, data availability, and portability. McCarthy claims that application-centric infrastructure, or ACI, is becoming the predominant model at progressive public-sector sites.

The GovLoop Guide is a must read, and if you need a pocketbook incentive, cloud computing has reached hypergrowth according to Forrester Research. The market is on course to be about 20 percent bigger by 2020 than estimated earlier. Many companies and public sector organizations are moving away from their own data centers in favor of online services. Forrester predicts, by 2020, some 19 percent of the $230 billion spent on servers and storage hardware will be spent on machinery used for cloud data centers. Get ready for an age of devastating innovation!

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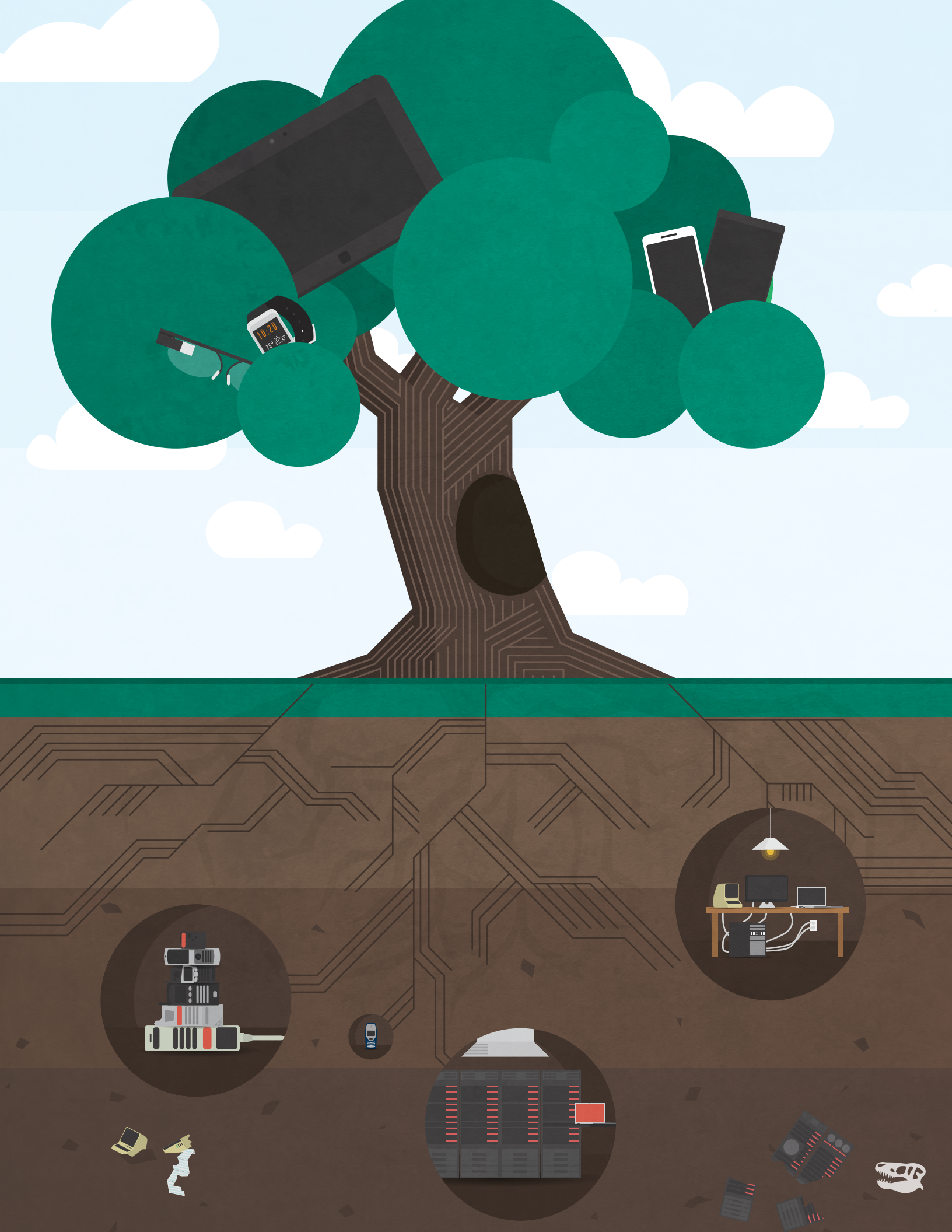
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EXECUTIVE SUMMARY:

PREPARING FOR THE NEXT IT CONSUMPTION PLATFORM

Consider that just a few years ago, users of e-mail were tethered to their primary desktop computers. Even those who had the ability to access enterprise e-mail accounts from other computers could only view new messages; archives were stored locally on their desktops. Now, of course, it is possible to check e-mail from multiple locations and on multiple devices.

E-mail was really just the beginning. We've arrived at a new technology-consumption landscape – powered by cloud, mobile and even social media – that is fundamentally altering the way in which we use and purchase information technology assets.

For public agencies, this shift presents a yet-untapped opportunity for cost savings, as cloud-based solutions allow cash-strapped IT departments to switch from a capital expenditure model of IT investment to a managed service or operating expense model of consumption. This new model also has the potential to make agencies more mission-focused, since cloud and mobile solutions allow the agency to more closely focus on its area of expertise – as opposed to operating all aspects of the IT environment. Additionally, there are IT service delivery benefits, from faster delivery times for applications, to the ability to nimbly scale up to a larger user base.

However, there are pitfalls as well. The decentralization of IT consumption through lightweight and relatively inexpensive solutions provides individual business units the ability to procure and implement IT solutions outside of the auspices of formal IT and procurement channels. This practice, known as 'shadow IT,' poses a number of hazards to the agency, the most egregious of which is the introduction of unknown security and compliance risks.

To help prepare agencies to maximize the value of this new IT consumption landscape and minimize the risks, GovLoop and Cisco have produced the following guide.

In this guide, you will discover:

- **An overview of the changing nature of IT consumption in the public sector.**
- **A success story from the city of Raleigh, North Carolina, highlighting a proactive response to these changes from the IT side.**
- **A case study from the U.S. General Services Administration showcasing the benefits of cloud computing.**
- **A 5-point guide to assessing which consumption or combination of consumption models to choose.**
- **10 best practices from government and industry sources on maximizing the benefits of the new IT consumption landscape.**
- **Your IT consumption cheat sheet.**

This guide is your first step in ushering in the new era of technology consumption. We'll show you how to do it in a way that is cost-effective, responsible and sustainable.

PEOPLE & PROCESS

Throughout our research, we discovered that most challenges often are not limited to technology issues. The real challenge is in understanding how to connect people to process in order to maximize efficiency gains from IT solutions. Look for the icon above to learn special lessons in this area.

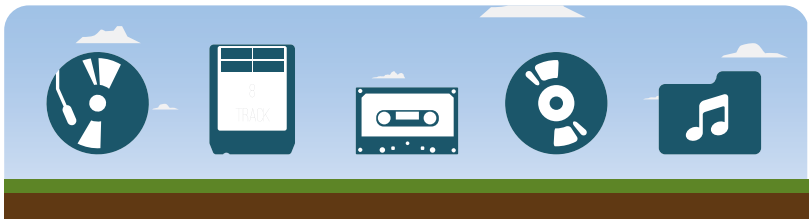
THE CHANGING NATURE OF IT CONSUMPTION IN THE PUBLIC SECTOR

IT CONSUMPTION: THE STORY

At the most basic level, 'IT consumption' refers to the way in which organizations and individuals purchase and use information technology assets. When we say 'changes in IT consumption,' we are talking about the evolving platform for IT delivery. In this case, the introduction of cloud and mobile technologies are completely transforming way we use technology to achieve our goals.

To help illustrate this concept, let's explore an everyday example: the personal consumption of music.

The traditional model of music consumption was to acquire a music player. Using a record player as an example, an individual would first invest and then install the player, a set of speakers and other various implements inside the home to lay the groundwork for musical enjoyment. Then, the listener would purchase a library of vinyl records to play the music – all with the hope that there would be enough time for enjoyment before the next technology rendered that investment obsolete.



Today, technologies such as cloud and mobile have allowed consumers to listen to virtually any song instantaneously, through a subscription service and even on multiple devices. This allows the listener to enjoy music even outside of the home. Some listeners may choose to invest in a high-quality sound system in their homes, but this is no longer the sole model of consumption. In this instance, the service provider makes the investment, and the user only pays for the service she needs.

Furthermore, unlike the vinyl record, which was the prevailing standard for years until it was replaced by newer technologies, changes in IT consumption now allow listeners to keep pace with technological changes. Even if the digital encoding format shifts away from mp3, for example, we have the flexibility to stay current with the latest musical releases without having to reinvest in an entirely new infrastructure.

Correspondingly, in public agencies, as well as enterprise corporations, the traditional model of IT consumption rested on a capital-expenditure model. Only now, through technologies like cloud and mobile, are organizations moving toward an operating-expense model of technology consumption.

Our personal-music example was purposely used to demonstrate a point: Individuals who have become accustomed to the new model of IT consumption in their personal lives are now demanding similar functionality in

their professional lives as well. This demand revolves around the need for agility, speed of delivery and the ability to use managed-subscription-based services. The fact that individual business units are taking a more active role in technology adoption, especially with regards to its role in fulfilling mission objectives, is a positive development. The problem is that, in many cases, business units are adopting these solutions without considering the implications for security and compliance.

CHALLENGES TO THE STATUS QUO: 'SHADOW IT'

In many ways, IT departments are rushing to catch up to the changing IT consumption landscape. "Cloud and other technologies are allowing the business side to go around IT departments," explained Dan Kent, Chief Technology Officer and Director of Solutions at Cisco Systems. Users discover new technologies in their personal lives and seek to replicate that environment at work, which is often facilitated by the fact that individual lines of business have their own budgets with which to purchase IT assets on their own. The industry term for this phenomenon is 'shadow IT,' describing the purchase and use of IT assets outside of the traditional IT and procurement channels.

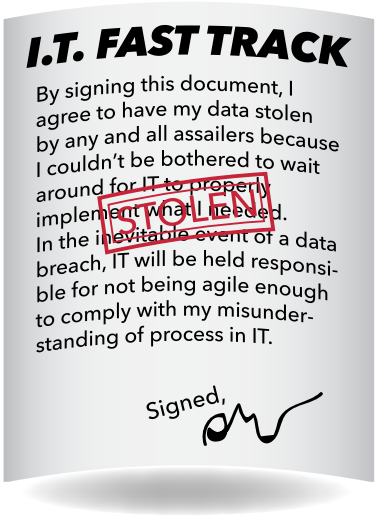
"Often, the mission side of the agency says, 'I can't wait for IT – they are too slow, and I need this functionality right away to help law enforcement or my first responders or my health inspectors do their job better,'" said Kent. There isn't anything malicious about these acts on the business end – these individuals are simply focused on the end result, and they've taken it upon themselves to employ solutions that they feel they need to complete their objectives.

But shadow IT poses a serious threat for IT departments, which are supposed to be the stewards of responsible IT use. "The Chief Information Officer (CIO) still owns the responsibility of making sure there is a cyber-strategy in place or that all the data is cyber policy protected and privacy is controlled" said Kent.

CHALLENGES, YES – BUT ALSO OPPORTUNITIES

Though it comes with its own set of particular challenges, the new IT consumption platform also provides new opportunities and benefits. For example, transitioning to a managed-subscription service reduces the need for large capital investments, which can reduce overall agency IT costs. But the benefits for adopting cloud computing within an agency have positive ramifications that go beyond cost control. "Cost is a factor, but the real driver is the greater agility the organization achieves by putting something in a cloud and receiving the outcome quicker," said Kent.

Kent provided a number of use cases from around the government, from disaster recovery to e-mail and messaging and data storage. "An IT department can deliver storage as a service from a 3rd party offering, keeping the capital expense of that offering to a minimal for that agency," noted Kent.



Behind all of the various possible use cases of a cloud-based deployment model, the underlying benefit is the same: Agencies no longer have to build out a platform for each service. "Eventually, every application can be delivered from a cloud," said Kent. "The real benefit will be that applications can be virtualized and accessed from any device, anywhere", he added.

CAPTURING THE VALUE OF CLOUD: STARTING POINTS

But in order to fully capture the benefits of these new technologies in a responsible, secure and compliant manner, agencies will need to complete two fundamental tasks:

- **IT and individual lines of business will need to work in greater synchrony.**
- **IT departments will need to adapt and prepare its existing infrastructure to facilitate the agency's shift to this new model of IT consumption.**
- With regards to collaboration, the first step for IT departments is to acknowledge that shadow IT will take place if they do not participate in the solution. "So then it's a matter of the two groups [IT and business] working together to achieve the goal of the mission or the business area," explained Kent. "The key is to work together to build out the solution set. It's an outcome-based model that they both agree to, in which they've also agreed to share the risks in order to achieve the outcome in the shortest amount of time, leveraging other assets internal or external to the agency."

Kent then noted that the most important best practice for IT shops on the technical side is to get their houses in order. "The cloud is all about automation," said Kent. "The first thing that IT should do is to standardize their own data centers and start to put in automation tools and processes. At the end of the day, IT will be supporting many clouds – infrastructure and applications – but a lot of capability can be delivered through a private cloud or a hybrid cloud. And in that way, you can at least have a starting point for delivering your own unique applications in a cloud-type environment."

The ability to draw out the maximum value from this new IT consumption environment will take work on both sides, IT and business, of the agency. However, given that IT is 'on the hook' for security, budgeting and compliance, it will be up to the office of the CIO to take the initiative.

One example comes from the CIO of the city of Raleigh, North Carolina, who decided to take a very proactive approach to IT consumption changes – and has achieved remarkable results. We explore this story in the next section.

THE CITY OF RALEIGH:

EVOLVING TECHNOLOGIES REQUIRE EVOLVED OPERATIONS

If there's one lesson to take away from government experiences in IT consumption, it's that an organization needs to adapt to be able to meet challenges and opportunities presented by this new environment.

The city of Raleigh has excelled in the space of public sector organizational evolution. The North Carolina capital is one of the fastest-growing metropolitan regions in the country. It's also on the cutting edge of some of the nation's most ambitious technology programs. One such program is called Raleigh Connected, a plan to 'wire up' the city through the installation of 125 miles of new fiber to its existing broadband infrastructure. Raleigh is also a leader in open source software and cloud computing adoption.

These developments are poised to place Raleigh light-years ahead of its local government counterparts across the country. But the process of transforming Raleigh into an innovation hub wasn't as simple as flicking on a switch. It required the city's IT offices, led by Chief Information Officer Gail Roper, to fundamentally rethink the way they conduct business. To learn more about how these changes have impacted the consumption of IT within the agency, GovLoop spoke to Nicole Raimundo, Chief Operating Officer of IT Administration in the city manager's office.

AN UNSUSTAINABLE STATUS QUO

Just a few years ago, the city's offices faced a confluence of challenges:

- **Like most local governments, Raleigh has had to contend with a flat budget landscape, which made the traditional capital-expenditure model of IT service delivery unsustainable.**
- **Coupled with this limitation was the familiar struggle with growing internal talent, which was often driving the decision as to how to deploy different solutions.**
- **Finally, the commoditization of traditional IT services, such as e-mail and internal messaging, meant that IT service delivery and performance were constantly being compared to private providers. "If our e-mail system goes down, it's being compared to Gmail or whatever [the users] may have at home," said Raimundo.**

THE SOLUTION: TRANSFORM IT

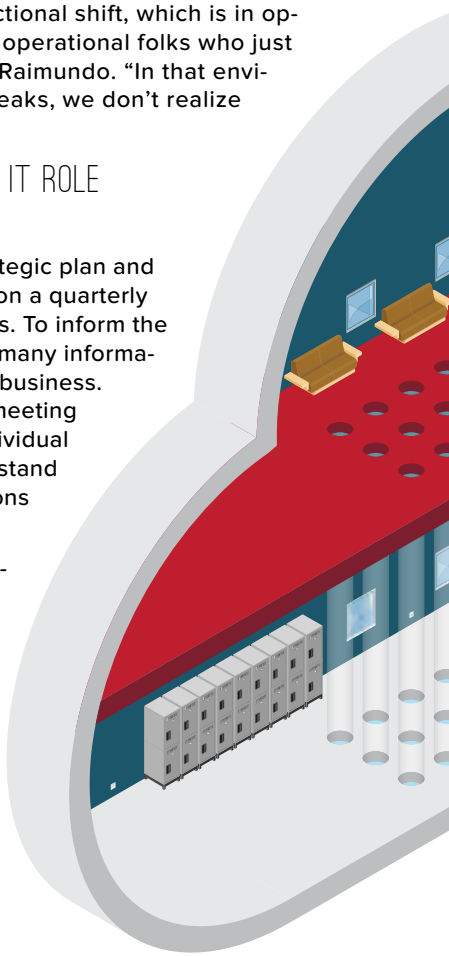
Faced with these challenges, the city's IT offices were transformed to reflect the current IT consumption environment. In short, the department converted to a service delivery provider for business units as opposed to a cost center responsible for maintaining all of their IT functions. "There's been a shift in IT in general," said Raimundo. "Our IT department has positioned itself more to be a strategic enabler for business, rather than being overburdened with operational tasks.

"That's a big cultural and directional shift, which is in opposition to IT as the back-end operational folks who just keep things humming," noted Raimundo. "In that environment, unless something breaks, we don't realize they're there."

BUT WHAT DOES THIS NEW IT ROLE LOOK LIKE?

For one, the CIO has an IT strategic plan and works with department heads on a quarterly basis to understand their needs. To inform the strategic plan, the CIO hosted many information sessions with each line of business. These sessions went beyond meeting with departmental heads – individual users were consulted to understand their needs and their impressions of where things are going.

"We've done a great job working with our departments," said Raimundo. "They understand that we're a resource and we can help them make decisions, whether it's a cloud solution or it's going to be hosted in our internal operation center.

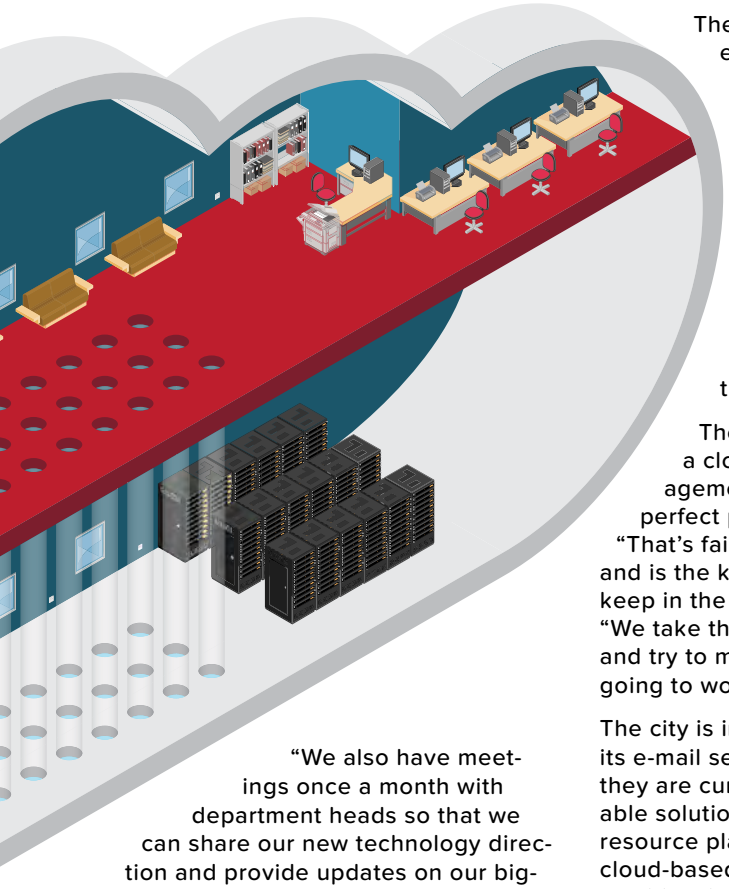


PEOPLE & PROCESS

Cloud computing solutions didn't just drop into the laps of Raleigh's leaders. The CIO has built in the process for new technology adoption into every new initiative. This includes open source software and cloud. "Part of our request for proposal (RFP) process includes requests to let us know if there is a cloud solution," explained Raimundo. "We're always asking for that information whenever we go out looking for solutions. We then take a look to see what that would mean for us."

We've really positioned ourselves to help [business units] think through the decisions, as opposed to having them go off and do it on their own."

This communication channel goes both ways.



"We also have meetings once a month with department heads so that we can share our new technology direction and provide updates on our bigger strategic initiatives that directly impact them," explained Raimundo. "So there's lots of dialogue and communication back and forth."

The Future of Cloud: Shared Services

In surveying case studies about cloud computing, a recurring concept came up that holds significant promise for the future of public sector work: shared services.

The connection between cloud and shared services makes a lot of sense. Looking to pool resources and capture efficiency gains from economies of scale, government agencies have been traditionally wary of public clouds. And for the public, there is something unnerving about having community data housed next to the top-score roster of the latest mobile video game app. But what about a shared cloud environment that houses only government?

Raleigh is inching closer to that idea. When considering a new land-management system, both the city of Raleigh and Wake County selected the same service provider. The city, which requires service providers to propose cloud and on-premise solutions to their RFP, sees value in pooling resources with the county. The two already share 911 services and have integrated their geospatial information system (GIS) environments. "It makes sense technologically, but also makes sense from a user perspective," said Nicole Raimundo, COO for IT at the city of Raleigh. "We're such a growing city, with people coming in all of the time, they don't know whether it is a county or city service."

In the near future, that type of question may not matter.

THE RESULTS: RALEIGH AS A TECHNOLOGY PIONEER

These developments have established a sound organizational foundation for technological innovation. Cloud technology is a key component of this shift. "Cloud provides us with another tool in our toolbox when we look at solutions," said Raimundo. "And in certain cases, it allows us to deploy solutions quickly."

The city has implemented a cloud-based project management tool, which was the perfect place for them to begin. "That's fairly simple, easy to deploy and is the kind of tool we want to just keep in the cloud," said Raimundo. "We take this process chunk by chunk and try to make decisions on what is going to work best."

The city is in the process of moving its e-mail services to the cloud, and they are currently searching for a viable solution to shifting its enterprise resource planning (ERP) system to a cloud-based platform as well. "That would include not only the hosting, but also the day-to-day support of [the ERP system] as well," noted Raimundo.

Currently, the city has a lot of resources dedicated to maintaining its ERP system. "If we freed that up, we'd be able to redeploy the staff," she said. "We would look to shift some of them to our other strategic initiatives and help us look toward the future. This includes unified communications or an upcoming mobile-device management project."

In other words, the shift to cloud is freeing up staff to work on other projects, especially those that are closer to specific business needs. This further complements the CIO's organizational shift. "These solutions are often very specific to their core business," said Raimundo. "It could be something very specific to public utilities, for example, and not something that would be an enterprise solution."

Raimundo was quick to mention that there are a lot of moving parts when considering multiple cloud solutions. But the reason they're able to meet the challenge is that they've learned a valuable lesson: In order to benefit from new technologies such as cloud and mobile, you have to keep pace with it.

LEADING THE CHARGE:

GSA SETTLES INTO THE CLOUD

In 2010, the United States General Services Administration (GSA) announced it would shift its e-mail, document and messaging platform to the cloud. The GSA chose Google Apps as the technology that would power its communication operations, and was the first federal agency to use Google's web-based platform.

In roughly one year's time, the GSA successfully migrated its entire staff of 17,000 users to the web-based platform. The move was expected to reduce costs by over 50 percent over the next five years and was just the first in a larger shift by the agency to cloud-based technologies.

Lena Trudeau, Associate Commissioner for the Office of Strategic Innovation at the GSA's Federal Acquisition Service, provided perspective on the benefits of this shift, which has implications for all agencies looking to capture the benefits of the new IT consumption model.

THE BENEFITS OF CLOUD IN ONE WORD: FLEXIBILITY

To begin, Trudeau emphasized that the fundamental benefit of cloud computing across the enterprise rests in the ability to be more flexible. She broke the term down into two categories: financial and operational, each with its own two subcomponents.

FINANCIAL FLEXIBILITY BENEFITS

OPEX Savings: With cloud-based services, the GSA is driving down IT costs when compared to traditional infrastructure investments. It allows the agency to invest only in the services it uses, rather than making capital investments that will one day turn into aging legacy assets.

One-to-Many Model of Deployment: Trudeau also noted financial benefits of moving to a one-to-many approach to deployment, which ultimately drives down maintenance costs for IT departments, as opposed to installing and maintaining software and hardware at each location, computer or even mobile device.

OPERATIONAL FLEXIBILITY BENEFITS

Untethered Employees: Trudeau noted the benefit of being able to access applications and data from multiple devices and locations. "When you can securely host applications or technical capabilities in the cloud, you now have the operational flexibility to access them from anywhere," she noted. "That provides a level of operational flexibility that doesn't tie people to a desk any longer, or even a particular location."

Redeployment of IT Resources: Once IT staff no longer have to focus on building the entire IT infrastructure for every functional area, they can be redistributed to work more closely with business units to solve problems. "We have the flexibility to redeploy folks," explained Trudeau. "In the GSA's case, this means moving closer to people who are focused on, for example, maintaining the inventory of government buildings in a world-class way, or helping other agencies acquire goods and services. The work-force piece of this issue is something that can't be understated."

In all of these cases, the end goal is diverting staff and financial resources back to the mission. In the case of the GSA, it allows the agency to focus on what it does

GSA Resources for Federal Government Cloud Acquisition

For federal agencies looking for help find the right cloud computing solution, the General Services Administration Cloud Information Technology Services is an invaluable resource.

Federal agencies, like the rest of the public sector, are facing smaller IT budgets, technical capability deficits and a fleet of aging IT assets. Simultaneously, agencies have been asked to comply with new regulations, mandates and executive orders, such at the Office of Management and Budget's (OMB) Cloud-First policy.

This is where the GSA's Cloud IT Services solution comes in.

From the GSA:

GSA's Cloud IT Services offer convenient, on-demand access to a shared pool of computing resources that can be rapidly and easily configured, provisioned and release. These solutions are delivered through the Internet on a pay-per-use or subscription basis in three service models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).

The GSA offers a number of compelling reasons for choosing its solutions:

- Lower IT operating costs.
- Faster IT adoption and implementation
- Cloud-First and sustainability compliance.
- Data security and control
- Less risky pre-competed contracts.

For more information, you can visit the Cloud IT Services website:

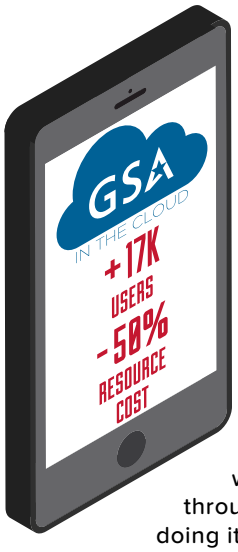
http://ww.gsa.gov/cloud

best – providing the federal government with management, facilities and procurement services and expertise – rather than maintaining all aspects of the IT consumption landscape.

GSA: LEADING BY EXAMPLE

Part of the service mission of the GSA is to demonstrate to the rest of the federal government best practices of and innovative approaches to technology adoption and organizational design. That partially explains why GSA was an early adopter of cloud.

"We have a strategy at GSA where we do things for ourselves first, and then we go and share with other agencies lessons learned and the impact," said Trudeau. "We are like a laboratory for the rest of government, experimenting and then sharing what works."



In that context, what lessons can be drawn from the GSA example?

ORGANIZATIONAL CHANGES TO CAPTURE TECHNOLOGY BENEFITS

An unfortunate byproduct of shadow IT, in addition to security and compliance concerns, is the duplication of services – which was happening at the GSA. "With shadow IT, you end up with duplication, and you end up with a proliferation of tools that aren't aligned to the architecture of the organization or the goals of the enterprise," said Trudeau.

The solution? Once again, lead by example. In 2013, GSA Administrator Dan Tangherlini announced that the agency would consolidate its IT departments to cut costs, reduce redundancies and increase efficiencies at the GSA. Rather than have a CIO within each individual line of business, those offices are being consolidated under the GSA CIO. Administrator Tangherlini also empowered the GSA CIO to have visibility in all IT operations across the agency.

The result is that the CIO is now more directly involved in the provision of IT assets to the business units, which reduces redundancies and facilitates the process of adopting new technologies – like cloud and mobile – that are directly responsible for the more effective delivery of mission services.

For mission-facing units, this approach provides them with a proactive partner directly accountable to their needs. "They just get it," Trudeau said of the office of the CIO. "Their job, of course, is to make sure information is secure. But their answer to information security is always, 'How do we help you share your information securely?' It's never 'no,' and it's never, 'That's going to take a year.'"

This provides the business units an incentive to work with the office of the CIO rather than around it. "We use a lot of different tools – we buy hardware and software," said Trudeau. "But we don't do any of that without holding the hand of our IT shop. They know what we're doing, and we go through them. Even if we end up doing it ourselves as an experiment first, they're aware of everything we're doing.

If there are IT issues with service delivery in a CIO shop, Trudeau continued, hiding IT spending isn't going to solve the problem. "It's just going to prolong that situation because you are not requiring your IT shop to perform at a level that supports the entire enterprise," she said.

The process of consolidation, and making management and performance issues transparent so that they can be tackled out in the open, provides benefits for both sides of the IT consumption equation – the CIO and the individual lines of business. "It's not easy, but it's necessary," said Trudeau.

Throughout these case studies, you've seen some great examples of agencies capturing value from IT consumption changes. In the next section, we focus solely on best practices for other agencies looking to follow suit.

PEOPLE & PROCESS

Despite GSA successes, Trudeau was careful not to play down the challenges. This was particularly true when she spoke about searching for appropriate procurement vehicles to meet new demands, as well as legal obstacles to moving and sharing data outside of the agency. "But I think it's unfair to lay these problems at the feet of legal or procurement," said Trudeau. "I think the challenge is really one of culture. In government, we're used to having things in boxes that are physically located in our environment. We can touch them and have control over them. And of course we limit access." But government is also committed to providing effective services to other agencies and to the citizenry, which is nearly impossible without openness. "Cloud is great for that," added Trudeau.

With regards to procurement, Trudeau doesn't see a problem with current regulation. "I actually think federal acquisition regulations allow us to do a lot of what we want to do already," said Trudeau. "Where we tend to run into issues isn't so much in the rules themselves, but in the process and practices that we've built around them."

Trudeau mapped out three takeaways from this issue:

Our app-centric world is driving demand for the latest technologies, which drives up a demand for procurement services.

When it comes to cloud, or multiple cloud solutions, agencies are buying in smaller bites, which also increases demand on the procurement site.

This means that the traditional, protracted procurement system won't be able to keep up, which necessitates greater automation and streamlining.

"None of that is regulation," said Trudeau. "That's process."

ARCHITECTURAL OPTIONS:

FINDING THE RIGHT MODEL FOR YOUR AGENCY

The Raleigh and GSA case studies, which highlight successful implementation of cloud technology adoption strategies, raises the next inevitable question: What is the correct response to IT consumption changes in your agency? As with most questions around technology adoption, the answer is the same: It depends. There are a number of factors to consider when constructing an IT environment, from security to personnel.

In this section, you will gain a better understanding of the various factors to consider when choosing an IT consumption environment that best allows the agency to achieve its goals – whether that goal is compliance, agility or simply to free up physical space. Glenn Hirsh, Senior Manager of the Architecture & Solutions Group for Advanced Services at Cisco U.S. Public Sector, provided a five-point guide to help agencies navigate this process.

But First, a Reminder: The Technology Is Fundamentally the Same.

The first step in understanding the effects of cloud computing on IT consumption is to realize that the underlying technology is essentially the same. "At a really fundamental level, the technology for the most part hasn't changed," said Hirsh. "It's still a rack full of equipment. It still contains the following elements: compute, network and storage."

However, what has changed is the management and control of this technology. This development changes the discussion from, 'How do we invest, build, maintain and deploy across the enterprise?' to, 'Who can best manage, store and secure the resources we need to get the job done?' The response to this second question will determine the agency's solution.

CONSIDERATIONS FOR CHOOSING AN APPROPRIATE ARCHITECTURE

There are a number of different cloud computing architectural models, but in its most essential form, this discussion can be boiled down to four categories: public, private, community and hybrid cloud solutions (see opposing page. In order to find an appropriate solution, organizations must begin mapping out the links between business processes and the technologies that enable them. From there, agencies will be able to choose which services are appropriate for each particular operational area. The remainder of this section contains a few starting points to help guide our discussion.

1. Control Governance

Perhaps the most important consideration when deciding between architectures is the extent to which an agency needs to directly control its IT assets. Whenever agencies move toward external management of IT resources, questions arise with regards to data ownership, service level agreements (SLAs), upgrades and security. The reality is that there are simply some applications that are too sensitive to be feasibly moved off-site, which is why Hirsh sees hybrid clouds as the future of IT consumption. "I don't see agencies, in the near future, migrating to an entirely public cloud solution," said Hirsh.

Of course, outsourcing elements of the enterprise – from the network to software delivery – does not mean the agency concedes control. The extent to which the agency can implement a proper governance structure will largely determine the link between the service expectations and actual service delivery.

2. Personnel

Any personnel discussion must begin with an examination of the short-term and long-term staffing outlook, including budget constraints and retirement and attrition rates. If agencies find themselves dwindling in numbers or lacking institutional knowledge and capacity, the transfer of responsibility to external parties may be a viable option. This is especially true if this shortfall is coupled with increasing demands for productivity and service delivery on the business side.

Leaders must also examine the ability of staff members to transfer out of traditional roles into new roles that more appropriately suit new models of IT use. The key here is that you may find greater value in focusing your people on mission-related projects, as opposed to back-end infrastructure administration. "Those individuals that were designing network infrastructure, they are going to have to change their roles from bits and bytes and speeds and feeds into one that is focused on results, applications and end-user experiences," said Hirsh.

However, this is not always as simple as crunching the numbers or auditing departmental capacity. There are a number of regulations including union rules that may challenge a fundamental shift in roles and responsibilities for IT personnel. Furthermore, there are political sensitivities to consider when utilizing external resources, even if the shift results in cost savings.

3. Capital Expense & Budgeting

Across the government spectrum, IT budgets are shrinking. This means that large investments in network infrastructure or other traditional investments may not always be appropriate. Agencies must look at their budget constraints and decide where it is appropriate to find alternate models for IT deployment.

Any shift in IT consumption models must be accompanied by a similar shift in IT funding models. As agencies move away from a capital expenditure model toward an operating expense model, they must be aware that their funding must align with departmental priorities. "If an agency does not change its funding model, it will continue to buy capital expenditures simply because money still exists in that category," said Hirsh.

4. Seasonality

Many agencies experience seasonality in terms of network traffic and use. Two examples are the U.S. Census Bureau and the Internal Revenue Service, but nearly all agencies experience some spikes and lulls in IT resource requirements, either due to recurring projects or service delivery schedules. This often makes capital expenditures an outdated model of investment. An analogy would be a small family that purchases a five-bedroom home to accommodate the hosting of relatives two or three times a year during the holidays. Shifting to a managed service delivery model means that agencies can scale up during periods of increased requirements and scale down during lower-demand periods.

5. Disaster Recovery & Business Continuity

Technology has progressed to the point where we can now transfer 'images' of live applications to alternate data centers thousands of miles away in a matter of seconds – all with minimal impact to the environment. The use of cloud, both public and private, can yield remarkable results as it relates to business continuity, but it is important to understand the risks.

- **First, it is critically important to understand application dependencies. According to Hirsh: "You may choose to host an application with a provider, or possibly in your own cloud, where uptime may exceed 99.999 percent. But if it is dependent on a database or other resource that has 99 percent availability, then you will be offering an application that has an availability of the lowest of the combination." This holds true for the compute, network, and storage components.**
- **Second, it is important to assess the requirements for the application, as this becomes critical when planning the appropriate environment and the SLAs that support it. This means understanding how the application was developed, as well as its ability to support the latest cloud technologies. "You may develop an amazing cloud solution," said Hirsh. "But if the application is unable to recover quickly or take advantage of special capabilities within your hardware and software infrastructure, your investment will have limited returns."**
- **Finally, whichever cloud solutions are employed, it is imperative that you plan, brief, execute and debrief all tests of your business continuity plan on a frequent basis. You must be willing to test the failure of components as well as entire systems.**

PEOPLE & PROCESS

Once again, even when the discussion turns to the choice of technological solution, the real issue relates to people and process. "Whichever policies exist within a given agency, they have to be able to extend those policies to [external] providers or to the virtual environment," advised Hirsh. "Whether the solution is a consolidated private cloud, a public cloud or a hybrid mix, the policies must extend beyond the physical boundary of the agency."

This is especially true of security policies, which have the capability to establish standards across the enterprise to prevent breaches into the network, as well as to drive the response and recovery expectations in the event of a cyber incident.

Definition of Public, Private, Hybrid

Public Cloud: Cloud infrastructure provisioned for use by the general public. Generally owned, managed and operated by commercial vendors, the physical infrastructure exists on the premises of the provider. (Examples: Amazon Web Services, Hewlett-Packard, VMware, etc.)

Private Cloud: Cloud infrastructure provisioned for exclusive use by a single organization but comprised of multiple customers (such as the different individual lines of business). The infrastructure may be owned by the organization, a third party, or some combination of both. It may exist on or off premises. TIP: For most classified data, an on-premise private cloud is generally the preferred option.

Hybrid Cloud: Cloud infrastructure employs a composition of two or more distinct cloud infrastructures (public or private) that remain unique entities. Solutions are bound together by standardized or proprietary technology that enables data and application portability. TIP: This model is considered the future of public sector IT consumption.

Community Cloud: Cloud infrastructure is reserved for exclusive use by a specific community of consumers with shared concerns, such as mission, security requirements or compliance with regulations. It may be owned, managed and operated by one or more members of community or by a third-party. It may exist on or off premises. TIP: This type of environment holds the best promise for government shared services.

*These definitions were adapted from the National Institute of Standards and Technology's (NIST) definitions of cloud computing.List la quateni hillor magnate in cum ende omnimus coreium dunt evelluptas dolore cus evelest, officiis ut et lic to conse iliqui nobis

IT CONSUMPTION BEST PRACTICES

MAXIMIZING VALUE FROM CLOUD COMPUTING

You should now have a clear understanding of the changing nature of IT consumption, and the manner in which innovative agencies have worked to extract as much value as possible from this rapidly evolving landscape.

The fundamental challenges (and opportunities) revolve around these three developments:

- **Powered by new technologies such as cloud and mobile, IT resources are being purchased and consumed in new ways.**
- **These technologies have the potential to reduce agency cost, improve service delivery, and optimize staff and financial agility.**
- **However, without proper CIO stewardship, adoption of these technologies can take place in an unregulated, duplicative and inefficient manner. This practice is often referred to as 'shadow IT.'**

To help you with these issues, we've compiled 10 best practices and recommendations for agencies looking to get a head start on these developments. The ultimate goal is to minimize the risks posed by these technologies and maximize the gains. As bold as this may sound, the choice to adopt or not to adopt has passed. Today, the choice is between creating a smart, effective implementation strategy or watching your agency move forward without proper IT stewardship.

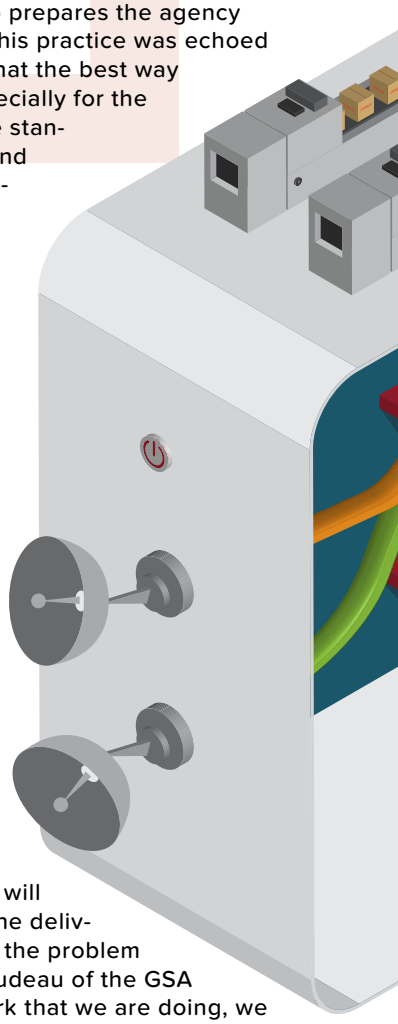
CIO BEST PRACTICES: LAY THE FOUNDATION FOR SUCCESS

1. Work Closely With Departments

As the GSA case study demonstrated, it is essential that the CIO work closely with the business departments to map technology solutions to business needs. But the emphasis needs to be on facilitation and stewardship, rather than control and restrictions. This keeps IT departments relevant so they can capture the benefits of cloud solutions while also managing risks due to data security, regulation compliance and the duplication of technology solutions across individual business units.

2. Prepare Your Existing IT Assets for Automation

As previously mentioned, one of the primary benefits of cloud computing is the ability to deploy applications much faster than in the traditional model. But this requires preparation. In addition to consolidating CIO shops, Administrator Tangherlini also announced that the GSA would be consolidating its data centers. The goal was to reduce real estate and energy costs, but it also prepares the agency for a transition to cloud services. This practice was echoed by Cisco's Dan Kent, who argued that the best way to prepare for cloud solutions, especially for the on-premise cloud, is to put in place standardization and automation tools and to process across the existing infrastructure. "That's where you see the huge cost savings because it can be done with tools rather than people," said Kent. "But without having that framework – automation across the hardware and the network – you can't capture the benefits of automation on the application side."



CLOUD IMPLEMENTATION BEST PRACTICES

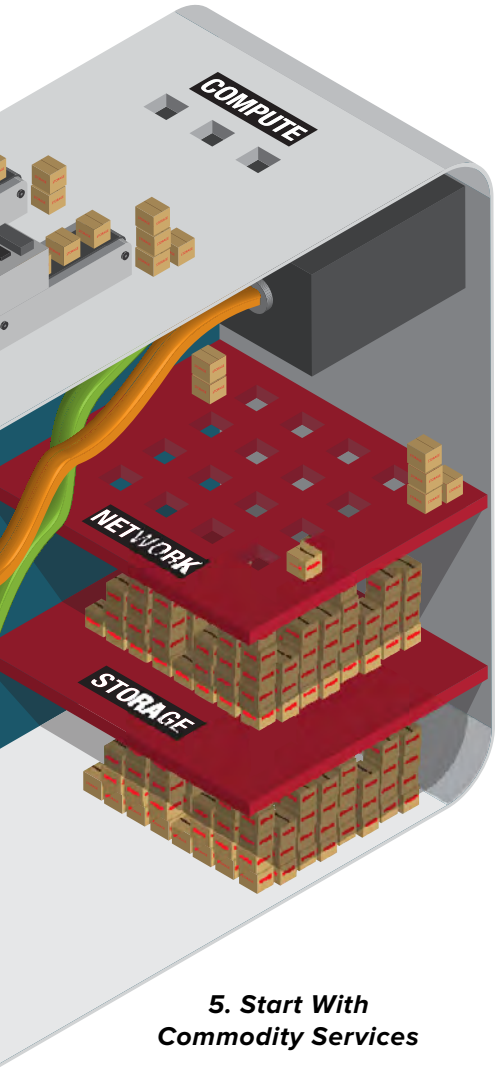
3. Focus on Business Needs and Requirements

The current IT consumption environment invariably invites capricious consumption – there are dozens of new cloud-based 'toys' being released on a weekly basis. Similarly, the desire to capture cost savings and efficiency gains may lead to overinvestment before you have a clear sense of how you will use your technology. "In terms of the delivery of digital services, we focus on the problem we're trying to solve," said Lena Trudeau of the GSA approach. "In the development work that we are doing, we use cloud services pretty heavily, and we're always on the lookout for things – infrastructure, platform or software as a service – that can help us do our work better."

4. Agile Development Is Perfect for Cloud

The best thing about cloud technology is that its scalability potential is virtually limitless, which means that agencies can start small and expand once they've achieved a proof of concept. "What we try to do at GSA is leverage low-cost experimentations," said Trudeau. Her team works in sprints, trying new things over a short period of time. They then test and iterate the results based on feedback from users. "That's not just an argument for cloud best practices," said Trudeau. "That's also an argument for best practices in problem solving in general."

Agile development allows agencies to take full advantage of the shorter lifespan of new technology solutions. It is also the ideal complement to an organizational shift toward greater collaboration, since it requires closer contact with and constant feedback from business users.



5. Start With Commodity Services

In virtually every early-adopter case study, the agency began with a commodity service, such as e-mail or messaging services. This provides agencies with a relatively safer environment with which to experiment. "They're fairly self-contained. It's something that lots of providers do, and I think it's a good place to start," said Raimundo.

6. Gather Enterprise Support

This message has been implied throughout the guide: Adopting a cost-effective, compliant and scalable cloud solution must be a unified process. "The entire organization has to buy into the cloud vision and strategy," said Cisco's Glenn Hirsh. "If you don't get buy-in, there will likely be multiple roadblocks put in the way, which will prevent you from doing it right the first time."

PEOPLE & PROCESS

Once again, even when the discussion turns to the choice of technological solution, the real issue relates to people and process. "Whichever policies exist within a given agency, they have to be able to extend those policies to [external] providers or to the virtual environment," advised Hirsh. "Whether the solution is a consolidated private cloud, a public cloud or a hybrid mix, the policies must extend beyond the physical boundary of the agency."

This is especially true of security policies, which have the capability to establish standards across the enterprise to prevent breaches into the network, as well as to drive the response and recovery expectations in the event of a cyber incident.

7. Choose the Right Partner

When choosing a vendor or third-party provider, there is no substitute for performing a thorough review process. There are a number of pieces to this process. First, familiarize yourself with the marketplace. "Do some really good market research at the front end so you can distinguish between firms that truly add value versus those that partner up but then just act as a pass-through," said Trudeau. Second, take advantage of proven architectures or validated designs. "When you choose to work with partners, make sure those partners have an established record with the private sector," recommended Hirsh. Finally, in a similar vein, try to borrow solutions from peers. "Don't go out and build a custom cloud of your very own when in all likelihood someone's built it already," said Trudeau. "Try to see if you can leverage it at home."

8. Establish a Robust Governance Model

Even the best relationship between agency and solution provider – or between the CIO shop and business units – can run afoul without proper governance measures. "Government agencies should put in place a proper governance model to make sure they get the services they are expecting," recommended Kent. This includes establishing proper protocols for the use and storage of data so that agencies are in compliance with their individual regulations and policies. It also involves the establishment of implementing service level agreements (SLAs) and other governance tools between agencies and vendors. For resources on establishing SLAs and other governance tools, please see our IT consumption cheat sheet at the end of the document.

9. Focus on the People & Process

Cloud is one of the most dynamic industries right now, so agencies should expect the landscape to change very rapidly. "Down the road, cloud providers may be interchanged as easily as we change cell phone or other utility providers," noted Hirsh. Therefore, agencies must ensure that its people and process are able – and willing – to adjust to these changes. This emphasis cannot be overstated. "When we see our customers deploy technology and are unable to leverage the full capabilities, that has nothing to do with the technology," said Hirsh. "The technology has the capability latent within it. It's an unlocking process, and to unlock it, you have to work on the people and process."

10. Invest in Your People

Beyond preparing your organization to successfully navigate the changing IT consumption landscape, the best agencies are investing in their staff as well. Leadership must be prepared to take a proactive role in helping their staff grow into their future roles. "That's the message we're trying to instill in our staff," said Raimundo. "You were hired not because of the one skill set you possess at the time. It was your ability to grow and adapt and better the organization. We will provide them the opportunities to grow and whatever training there is to learn, but our expectation is that they'll be able to adapt and embrace it."

Your Consumption of IT Cheat Sheet

LOOKING TO GET SMART FAST ON IT CONSUMPTION? LOOK NO FURTHER.

Governance Resources

State Government: NASCIO Guide

http://www.nascio.org/publications/documents/NASCIO_CloudComputing_PartIII.pdf

FedRAMP: Standards for security, authorization and continuous monitoring for cloud products

http://cloud.cio.gov/fedramp

Federal Information Security Management Act (FISMA)

http://csrc.nist.gov/groups/SMA/fisma/

Mini-Glossary

- **IT Consumption:** This term refers to the way in which organizations and individuals purchase and use information technology assets to achieve their objectives. In the context of public sector, this can include technology-powered administrative functions, collaboration, analytics, business improvement processes and delivery of mission services.
- **Shadow IT:** The practice by an organization's users, or groups of users, of purchasing and using information technology solutions outside of the traditional IT and procurement channels. Shadow IT can pose security and data compliance risks to the agency.

Cloud Consumption Models:

- **Public Cloud:** Cloud infrastructure provisioned for use by the general public.
- **Private Cloud:** Cloud infrastructure provisioned for exclusive use by a single organization but that is comprised of multiple customers.
- **Hybrid Cloud:** Cloud infrastructure employs a composition of two or more distinct cloud infrastructures (public or private) that remain unique entities. Solutions are bound together by standardized or proprietary technology that enables data and application portability.
- **Community Cloud:** Cloud infrastructure is reserved for exclusive use by a specific community of consumers with shared concerns, such as a common mission, security requirements or compliance with regulations.

Benefits of Cloud Computing

Financial: Cloud provides opportunities to reduce or eliminate IT capital expenditures and decrease operating expenses by allowing agencies to pay only for the serves they use, when they use them.

Agility: Web-based application delivery can drastically decrease delivery times, avoiding the need to buy hardware, desktop licenses and implementation services.

Flexibility: Cloud computing is better able to match IT resources to business functions – this is often called 'elasticity.' It can also facilitate greater staff mobility and productivity through device-flexible accessibility options.

Scalability: Agencies can more easily scale up or scale down depending on their network loan requirements.

Organization: When agencies no longer have to constantly worry about server updates and other back-end computing issues, they can focus and redeploy staff on higher-value tasks.

Mission-Centric Ability: For the most part, agencies' core mission tasks do not involve the management of the data warehouse or certain software applications. Cloud computing, in its many formats, can take some of these auxiliary tasks 'off the plate' of the organization, thereby freeing it up to better deliver its core mission objectives, from national security to public education and commercial regulation.

Best Practices

- **Collaboration** between IT and business units is key to optimizing value from cloud computing. One group can't succeed without the other.
- **Prepare** existing assets for cloud migration, so that you are fully able to take advantage of the benefits that come from greater automation.
- **Focus** on business needs before you start hunting for the right solution.
- **Agile** development is perfect for cloud: Small bites and iterations are ideal complements to the technology.
- **Start** with commodity services: E-mail and messaging make much better pilot projects than data centers.
- **Gather** enterprise support to avoid delays and suboptimal deployment results due to internal resistance.
- **Choose** the right partner: Not all solution providers are the same; take your time to find the right match.
- **Establish** a robust governance model so that your organization is as adaptable as the technology.
- **Focus** on people and process. The technology is the easy part.
- **Invest** in your people so that they are able to help you maximize gains from any technological change you make.

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 100,000 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.

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> At a really fundamental level, the technology for the most part hasn't changed.
> It's still a rack full of equipment.
> It still contains the following elements: compute, network and storage.
> What has changed is the management and control of this technology.

– Glenn Hirsh, Cisco U.S. Public Sector

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