Realizing the Potential of the Cloud in Government

Maximizing Return on Investment with Cloud Services

Executive Summary

No longer a new or unproven concept, "the cloud" and the related services it enables are an established technology and business strategy for bringing a new level of efficiency to organizations. The powerful capabilities and potential savings of time, money, and resources offered by the cloud and cloud-based services cannot be overlooked. In government as well as private enterprise, the cloud is here to stay.

Opportunities are abundant for using the cloud in government organizations. Significant incentives beckon, including operational cost savings; lower cost of ownership; improved efficiency; increased agility; a greener footprint; and enterprise-class reliability, security, and availability. Cisco® Services can help government agencies realize these compelling benefits through an effective cloud implementation strategy.

Forward-thinking government leaders are looking now to understand why and how to deploy cloud platforms securely. Ultimately, their choices—regarding opportunities, approaches, and partners—have the promise to revolutionize government and its way of doing business.

Though adoption of the cloud in government organizations might lag behind private enterprise, the foundation is being laid. Governments around the world have programs and initiatives in place to speed government adoption. Early government cloud implementations in the United State are demonstrating average cost savings of 25 to 50 percent, and in the UK, the government's G-Cloud initiative, together with the Public Sector Network and associated frameworks, will promote adoption across the UK government.* These encouraging developments are equipping government leaders to foster and expand the adoption of cloud technology in their organizations.

**Saving Money Through Cloud Computing*, Brookings Institution, April 7, 2010.

The Cloud and Cloud Services Defined

There might be as many attempts to define this technology as there are clouds in the sky, which makes it easy to lose sight of the fundamentals. At its most basic, the cloud is a model for delivering services, infrastructure, and application software on demand using the network. Cloud technology is enabled by virtualization, which essentially abstracts details of the underlying hardware from the user of an application, service, or platform. Though it pools resources, the cloud effectively presents itself as a single system.

References to "the cloud" have become a generic way of describing the virtual location in which various cloud services–IT entities such as software applications, data services, software development frameworks, and so on–might reside. Multiple subscribers, also referred to as tenants, can be enabled to access and share these entities on demand, from the cloud, using a consumption-based pricing model.

The network can be considered the fabric within the cloud, enabling the connection between the cloud and the user and/or between multiple clouds. There are multiple deployment cloud models. The most common:

- Public cloud: A cloud infrastructure shared or accessible by all, such as the clouds operated by Amazon or Google, with applications/services delivered through the Internet. Cloud-based productivity applications such as Google Apps and gmail, as well as enterprise applications in areas such as asset management or customer service, are examples of public cloud offerings.
- Private cloud: A restricted cloud infrastructure operated by or on behalf of a specific organization, available exclusively to approved users affiliated with that organization; cloud services are delivered using a private network. A number of early government cloud implementations use a private cloud. Several of these are described later in this paper.
- Community cloud: A multitenant private cloud infrastructure that supports a specific community, consisting of two or more organizations that exhibit shared concerns.
- Hybrid cloud: A combination of the preceding three cloud types.

Cloud Services

However it is defined, the cloud is largely about providing access to services: for example, software as a service (SaaS), infrastructure as a service (IaaS), or platform as a service (PaaS). In large part, the value of cloud services is to help manage–and make immediately available and useful–information rather than infrastructure. Since government organizations to a large degree must collect, distribute, access, and interpret large amounts of information and data, cloud services prove particularly useful.

Introduction

Momentum Building in Government

In the private sector, the adoption of cloud technology is a historic given; the market is maturing. However, analysts and industry observers continue to predict steady growth in the overall cloud market. Gartner believes that the worldwide market for cloud services revenue will nearly triple over a five-year period, from revenues of $56 billion in 2009 to $150 billion in 2013.*

In a 2009 global survey, market research firm Kelton Research found that six of ten C-level executives and IT decision makers worldwide—and nine of ten in the United States—were familiar with cloud computing. In the same survey, nearly two-thirds of respondents worldwide—and 80 percent in the United States—believe that cloud computing reduces initial costs.**

In government organizations, the movement is well under way. U.S. Federal Chief Information Officer Vivek Kundra, a major proponent of cloud technology within government, has established initiatives and programs to help accelerate adoption in the United States. From the federal level down, the cloud is viewed as an important path to innovation as well as a critical tool for reducing costs.

A full 82 percent of respondents in a survey of government technology and procurement professionals conducted by U.S.-based INPUT see a role for cloud computing in government.*** The same report forecasts a steady growth in federal government spending on cloud technology, from $277 million in FY2008 to $832 million in FY2013.***

Some government organizations are using the cloud today to deliver applications such as email, voice, or services such as data storage and computer resources. Others are building and operating their own private clouds for specialized application or platform needs. In an April 2010 survey by Public Technology Institute, a national U.S.-based nonprofit technology research organization created by and for city and county governments, 45 percent of responding local governments reported the use of cloud services and technology. Another 19 percent reported plans to use cloud computing services in the next 12 months.**

In the UK, where the government spends an estimated $25 billion annually on IT, the G-Cloud model is being implemented to improve efficiencies and reduce costs. With this cloud initiative, UK government leaders hope to reduce IT expenditures by 20 to 30 percent over five years.***

*_Gartner Says Worldwide Cloud Services Revenue Will Grow 21.3 Percent in 2009_, Gartner, March 2009.
www.gartner.com/it/page.jsp?id=920712

**_2009 Global Survey of Cloud Computing_, Kelton Research, June 2009, as cited by World Academy of Science, Engineering and Technology
www.waset.org/journals/waset/v58/v58-190.pdf

***_Evolution of the Cloud: The Future of Cloud Computing in Government_, INPUT Federal Industry Insights, March 2009.

The Cloud's Return

While cloud technologies are maturing rapidly, and it is widely held that the cloud model is here to stay, discretely defining the return on investment (ROI) for cloud technology initiatives remains a new frontier. There is uncertainty in how to project, measure, and prove the actual cost savings for a given cloud project. There is nearly universal agreement, however, that the potential is there, and it is too valuable to be ignored.

Beyond the Silo

In general, government IT organizations have largely evolved an isolated, standalone approach to information systems, dedicated to a single department or application. This has led to a lack of collaboration or standardization: the so-called "silo" mentality. Agencies and departments tend to budget and plan technology vertically, rather than maximizing its use horizontally.

There has been much discussion and effort to bring about a more effective sharing of IT resources within government, but progress has been slow. Many see the rise of the cloud as a promising catalyst for reform. There is new optimism that cloud technologies and services will help fuel efforts to transition government IT to a shared services model, fundamentally transforming government processes.

The current economic problems are promoting a requirement for government departments to reduce costs. This cost reduction agenda can be seen as the primary incentive for cloud adoption, to minimize the costs of delivering IT and services, and encouraging a move toward a shared services model across government departments.

Fiscal Advantages

The silo effect is costly, yielding repeated examples of redundant and inefficient IT infrastructure. This phenomenon is a major contributor to a rapid proliferation in the number and size of federal data centers in the United States: from 432 data centers in 1998 to more than 1,100 in 2009. The United States has become the largest purchaser of information technology in the world, spending more than $76 billion annually.***

*_Transforming Government Services with a Secure, Compliant Private Cloud Environment_, Cisco, 2010.

**Read, Clive. Director of Cisco Advanced Services, Public Sector. Telephone interview, July 2010.

***_Full Remarks by Federal CIO Vivek Kundra at Brookings on Cloud Computing_, Government Computer News, April 7, 2010.
http://gcn.com/articles/2010/04/07/prepared-remarks-by-federal-cio-vivek-kundra-at-brookings-on-cloud-computing.aspx

Unfortunately, the vast majority of data center storage and processing power goes largely unutilized: general estimates of average data center utilization rates typically range from a scant 5 to 15 percent. Underutilized infrastructure represents a monumental waste of hardware, power, management, and cooling resources that can have a dramatic effect on government agency budgets.

By using a virtualization model and shared infrastructure, cloud implementations promise greatly reduced expenses in these areas. This increases long-run capital efficiency, while allowing government IT departments to bypass lengthy procurement and provisioning processes, avoid equipment-obsolescence traps, and comply with green computing expectations and initiatives.

The benefits promised by the cloud model are clear and already being recognized by early adopters. Fiscal advantages abound. The pay-per-use system used by the cloud model reduces IT asset requirements and transforms large capital expenses into smaller operational ones. Personnel costs are dramatically lowered. Example cost savings from existing government implementations are described later in this document.

Increased Efficiency and Availability

The cloud model provides the ability to rapidly acquire, provision, and deploy new IT platforms, services, applications, test environments, and so on in a sustainable way that is more efficient and better for the environment. Cloud capabilities allow governments to use resources more effectively and make sure green computing expectations are met. Lengthy, months-long IT hardware procurement processes can be eliminated, reduced to a matter of hours or even minutes in the cloud. Cloud capabilities also assure that governments are up and running and always available regardless of the circumstances. The result is a more agile and efficient organization that can swiftly respond to changing conditions and requirements.

Simplifying and Standardizing

The lack of coordination and consistency among different governmental agencies regarding security introduces unwarranted risk. The emergence of the cloud and associated services, however, is bringing more attention and scrutiny to the standardization of security practices in the government IT environment.

By encouraging the dissolution of the siloed approach, the cloud brings about the opportunity to consolidate and simplify government data centers and facilities while standardizing practices and improving compliance with regard to security, all while enhancing access to that most critical of commodities, information. In addition, government IT spending and practices—which are not often understood or easily defined—can be unified and clarified under the cloud model.

Although security is largely accepted as the single greatest hurdle for widespread use of the cloud in government, characteristics of the cloud actually present opportunities for making IT security practices and policies more robust than in the current environment. For example, the multitenant architecture of the cloud model forces a clear delineation of access levels and clearances. The cloud's centralized data model provides an increased opportunity for control and monitoring of that data. The ability to easily replicate data, processes, services, and/or test environments reduces risk and facilitates management and testing.

Security challenges must not be underestimated. Thus, the best approach to a government cloud implementation includes the support and expertise of a partner that is knowledgeable about government security issues and accreditation processes. With a long history of experience in delivering secure solutions over the network for countless clients, including defense and intelligence organizations, Cisco is uniquely qualified to assist government departments design and implement secure cloud services.

Cloud implementations enable government bodies to build a solution once and then use that solution many times. This lowers costs, increases reliability, and reduces implementation times.

A Basis for Innovation

Finally, the cloud can enable new ways for government entities to interact with employees, constituents, other agencies, or perhaps new categories of collaborators not yet envisioned. Moving services to the cloud provides a basis for innovation, allowing government organizations to evolve from the historical position of being late adopters of technology to instead being technology innovators.

Responsibility to the Public

Embracing the cloud can also help a government organization deliver on its responsibility to the public. This concept is described by the Center for Technology in Government (CTG) as the public return on investment, or PROI. CTG emphasizes two equally critical aspects of PROI: the delivery of benefits directly to citizens and enhancing the value of government itself as a public asset.*

The global public increasingly expects its respective governments to spend smarter, improve services, innovate, become more efficient, and demonstrate better stewardship of the environment. Although difficult to quantify in financial terms, PROI can be bolstered greatly through cloud initiatives.

**Advancing Return on Investment Analysis for Government IT, A Public Value Framework*, Center for Technology in Government University of Albany. September 2006.
www.ctg.albany.edu/publications/reports/advancing_roi/advancing_roi.pdf

Measuring the Return

There are many inputs to and factors that affect the ROI assessment for a government cloud initiative. One challenge is the difficulty in discretely quantifying the financial effects of benefits such as increased responsiveness, reduced or eliminated procurement processes, improved efficiency, higher levels of innovation, and so on.

The privacy and security requirements of a given cloud implementation will also have a significant effect on the ROI. The ability to use a public cloud compared to the need to build a private cloud, as dictated by the sensitivity of the data involved, is a big factor.

Another factor affecting ROI assessment is whether the cloud implementation constitutes a new solution or replaces an existing system. In the former case, cost comparisons to a noncloud implementation are difficult to extrapolate. In the latter case, the complexity of the migration affects the eventual ROI. Compounding this challenge is the fact that, in many cases, the total cost of ownership and ROI for existing systems are unknown.

In moving to the cloud, there exists great potential for dramatic cost savings on power, cooling, and hardware expenses because of underutilized federal data center resources. However, the availability of historical government data center utilization rates—typically very low, but often unknown or not measured—can be another obstacle to calculating this aspect of ROI.

Maximizing the Return

When undertaking any major technology initiative, it is necessary to carefully define objectives and requirements, aligning them with the business needs as well as the technology architecture and strategy. It is also imperative to understand the risks and develop plans for mitigating them. This approach is critical in order to maximize success and return on investment.

The availability of specialized services such as Cisco Cloud Enablement Services can help government leaders follow these steps to maximize the ROI on cloud implementations. As a strategic partner, Cisco can provide a team of highly skilled experts who will provide guidance in determining how to best employ and exploit the cloud within government organizations. These experts have specialized domain knowledge and close familiarity with the requirements and considerations unique to government IT, several of which are discussed in the next section.

Although some cloud services requirements are universal, there are needs and circumstances unique to government installations that must be thoughtfully considered.

Robust Security Is Critical

Security and data privacy implications are first and foremost. A country's national or economic security is dependent upon a robust and consistent approach to IT security and data privacy practices. Political issues and in-country requirements are additional factors when the actual physical location of cloud-based resources is in question.

While history certainly shows that security and data privacy breaches occur in the noncloud world, making sure of robust security and data privacy is critical to the success of a cloud—or any government IT—initiative.

The Vertical Legacy

The vertical, siloed approach in most government IT departments has been years in the making. Transitioning government IT organizations to a shared services model is a fundamental shift that requires delicate handling and intimate understanding of the issues, biases, and concerns involved. It also requires investment in robust change management programs to accompany the rollout of new cloud computing architectures and systems.

Public Returns

Another consideration unique to government organizations—but often overlooked by vendors and service providers—is an overriding responsibility to the global public. Of course, taxpayers and constituents worldwide expect their government leaders to employ responsible practices in the normal course of operation. But this expectation goes beyond fiscal responsibility: there is ever-increasing demand around the world for government leaders to pursue policies and initiatives demonstrating a commitment to increased efficiency, greener practices, improved agility and collaboration, as well as a citizen-centric approach to governing.

Cloud services can help government leaders deliver on all aspects of this responsibility to the public.

Cloud Services for Government

It is important to note that cloud services are not a one-size-fits-all solution. Nor is a potential move to the cloud an all-or-nothing proposition. As with any paradigm shift, a gradual and incremental approach to adoption typically yields the best results.

Early adopters of the cloud in government are having success by identifying low-hanging fruit, whether addressing a universal need such as email service or implementing an entirely new, agency-specific, niche cloud solution from the ground up. An examination of some of these government successes follows.

Cisco's Cloud Enablement Services organization assists government clients with developing the most promising cloud adoption strategy for their agency or organization. This typically involves an initial identification of the opportunities and risks, followed by concrete plans and strategies for realizing the former while managing the latter. In this way, the maximum business benefit can be delivered.

Government Cloud Case Studies

When pondering an overall cloud strategy, it is instructive to examine existing cloud successes within government organizations and, when available, efforts to quantify the ROI of those implementations. The following descriptions of existing government cloud implementations present a broad sense of the possibilities. In many cases, early adopters are reporting average cost savings between 25 and 50 percent when compared to precloud implementations.

Cloud-Based Email Service

Email service has been popular as a first foray into cloud technology, especially for local government. In 2009, the City of Los Angeles adopted cloud-based email services from Google for its 30,000 city employees. Analysis of licensing and hardware expenses showed a cost savings of 23.6 percent in the five-year cost of running the cloud-based service compared to retaining the previous in-house solution. Other savings resulted from personnel cuts and redeployment of hardware.*

**Saving Money Through Cloud Computing*, Brookings Institution, April 7, 2010.

Also in California, the City of Carlsbad in 2008 transitioned to a cloud-based solution from Microsoft for email and web conferencing. With 1100 users, the city estimated savings at 40 percent annually. Washington, DC also adopted cloud-based email services from Google in 2008 as an option for many of its 38,000 employees, resulting in cost savings estimates of 48 percent*

Data Storage Solutions in the Cloud

The City of Miami, Florida adopted a cloud-based data storage solution in 2009 to support services related to the city's 311 nonemergency telephone system. When storage requirements skyrocketed well beyond projected levels, the city migrated to the Microsoft Windows Azure platform to avoid incurring file server expenditures far exceeding forecasted amounts. A reported 75 percent cost savings was generated by reduced hardware, software, and staffing needs.*

Another remarkable example of cloud-based data storage cost savings involves the U.S. Air Force 45th Space Wing. An analysis of the organization's 60 file servers exposed a meager 10 percent CPU capacity utilization. To address this, officials replaced the 60 servers by implementing virtualization software on just four servers in two locations, using an Internet cloud to link them. Hardware, maintenance, power, and other savings are estimated at $180,000 annually.*

Private Cloud Infrastructure Solution

The U.S. National Aeronautics and Space Administration (NASA) has embraced the cloud at the federal level by developing an innovative cloud system referred to as Nebula. High bandwidth requirements and specific security needs led the organization to develop its own cloud, which supplies infrastructure and platform services. Although Nebula primarily supports the powerful computing and storage requirements of internal NASA projects, some excess capacity is leased to another U.S. federal agency in order to maximize utilization. Nebula has enabled significant time savings–and thus cost savings–for NASA, reducing the time requirements for some tasks from months to minutes.*

Federal Commitment to the Cloud

The U.S. federal government has fully embraced the cloud. Federal CIO Kundra has designated the National Institute of Standards and Technology (NIST) to lead efforts to develop standards and guidelines that will accelerate the adoption of cloud technology and services within the federal government.

As evidence of a commitment to make cloud technologies easier to adopt, in 2009 the U.S. federal government launched Apps.gov, a centralized marketplace from which government agencies can access approved, cloud-based solutions. Available options include business and productivity applications, cloud services, and social media software.

Demonstrating further commitment on the part of the U.S. federal government, the vast information portal usa.gov moved to the cloud in 2009. This site receives over 100 million hits annually. The General Services Administration (GSA), responsible for the portal, anticipated as much as 90 percent savings in infrastructure costs, as well as increased flexibility and enhanced capabilities, by migrating to a cloud-based platform.

**Saving Money Through Cloud Computing*, Brookings Institution, April 7, 2010.

U.S. military personnel use a private cloud-based platform to develop, test, and deploy new software applications. The Rapid Access Computing Environment, known as RACE, was built and is operated by the Defense Information Systems Agency (DISA). Since the system was established in 2008, it has supported the development and testing of hundreds of military applications; RACE was expanded in 2009 to support applications in production mode as well. RACE enables military personnel to develop and deploy new applications much more quickly: for example, the time required to provision a new develop-and-test environment has been slashed from six months to 24 hours.*

Also at the federal level, the U.S. Dept. of Health & Human Services has embraced cloud services by certifying certain public cloud providers to send, manage, and store sensitive data utilizing encryption and other security measures.

The Cloud Knows No Borders

Cloud technology is gaining momentum in government organizations around the world. In addition to these U.S. examples, ambitious government cloud implementations are also planned or under way in countries such as Thailand, the UK, Germany, Australia, Canada, and Japan.

As noted earlier, cloud solutions are hoped to reduced government IT spend in the UK by an impressive 20 to 30 percent over five years. The government of Japan's Ministry of Internal Affairs and Communications (MIC) has announced ambitious plans to build a nationwide cloud infrastructure, termed "Kasumigaseki Cloud." With a planned staged deployment through 2015, MIC intends to consolidate all government ICT systems in a single cloud to improve operational efficiency and reduce costs.**

In Thailand, the Government Information Technology Service plans to roll out a private cloud implementation in 2011 to government agencies. The first applications will be email and a booking service for governmental facilities.***

Pentagon: Our cloud is better than Google's, Network World, October 5, 2009.
www.networkworld.com/news/2009/100509-pentagon-cloud-computing.html?hpg1=bn

***Cloud Computing in the Public Sector: Public Manager's Guide to Evaluating and Adopting Cloud Computing*, Cisco, November 2009.

****Six Questions Every Government Executive Should Ask About Cloud Computing*, Accenture, 2010.

The Time Is Now

With the maturing of the cloud market in the private sector and the burgeoning interest within government, large market-driving vendors are entering the cloud solutions market. This in turn helps reduce costs and propel standardization efforts. Additionally, many of these vendors have product and service offerings specifically customized to the government landscape.

Cisco Advisory Services is one such offering, combining truly global experience with a proven understanding of government technology needs. As the worldwide leader in networking and collaboration, Cisco has a unique vantage point and perspective on cloud technologies and services. Cisco Advisory Services provides government organizations access to senior strategy consultants who combine world-class technology and management expertise.

Maximizing Return on Investment

With the expected returns on investment in the cloud on the increase, there is widespread conviction that cloud technology will be widely and successfully used by government organizations. Opportunities to slash IT capital expenses and related costs, increase organizational efficiency, improve agility, standardize and simplify practices, and stimulate innovation by migrating to the cloud cannot be ignored.

As a catalyst for overcoming the traditional siloed approach and mentality surrounding government IT, cloud services will contribute to a more efficient, responsible, and safe IT environment. The continued emergence of government success stories, described here and elsewhere, can be used by forward-thinking government leaders to create, validate, and justify an adoption strategy for the cloud.

Thus, the time is ripe for government leaders worldwide to identify opportunities, prioritize project candidates, and engage with cloud market leaders as technology partners. In this way, the return on investment in the cloud will be maximized. Expert guidance is available from Cisco Advisory Services to strategically translate organizational goals and objectives for cloud services projects into an actionable plan for adoption, deployment, and successful realization of true business benefit.

For More Information

For more information about Cisco Cloud Enablement Services, visit the Cisco website:

www.cisco.com/go/cloudenablement

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV Amsterdam,
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at **www.cisco.com/go/offices**.