

Creating an Optimal Cloud-Computing Strategy for Government

White Paper



Introduction

No longer a new or unproven concept, “the cloud” and the related services it enables have become an established technology and operational strategy for bringing a new level of efficiency to government organizations and private enterprises alike. Opportunities for using cloud computing abound and come with significant incentives, from operational cost savings and lower cost of ownership to improved agility and mission-critical reliability, security, and availability.

Yet in order to realize these benefits and get the maximum return on their investment, government organizations must take into account the various challenges and considerations unique to their functions. Not only are public agencies tasked with balancing competing demands, such as expanding services for citizens while reducing costs, but they must also address unique needs and concerns—robust security being a top priority—if they want to achieve desired cloud-enabled outcomes.

In the following pages, you will learn why it is critical for government agencies to have a cloud-computing strategy, how a comprehensive architectural approach can help you design an effective and secure cloud-based model that best suits your needs, and how your organization can successfully make the transition to a cloud-computing environment.

A Delicate Balancing Act

Today, government leaders working in all levels of our national, state, and local governments are expected to balance competing demands, such as:

- Expanding services for citizens, while controlling operational costs
- Focusing on internal agency operations, while promoting secure interagency data sharing and collaboration, as well as technical interoperability
- Hiring, retaining, and keeping public employees as productive and efficient as possible, while managing decreasing budgets
- Expanding citizen access to information, while helping to ensure security and privacy

Given that public policy directives constantly change and traditional IT infrastructure remains relatively inflexible, it's no easy task to balance these demands. Governments are faced with IT complexity and scalability, and often they are also stuck in disparate, disconnected communities of interest, which have led to a lack of collaboration and standardization across agencies and departments. The tendency to budget and plan technology vertically also prevents agencies and departments from maximizing the use of technology horizontally.

Of greatest importance, however, is the need to maintain—and ideally to enhance—security.

As the gatekeepers of sensitive citizen information and governmental records, public sector agencies must have a secure and reliable networking infrastructure that protects private data, while meeting regulatory and legal compliance requirements.

Government CIOs and IT managers are trying to manage the growing costs and sprawl of data centers across multiple government organizations. IT teams, on the other hand, struggle with the costs and duration of procurement cycles to purchase, implement, deliver, and support application deployments for multiple organizations. Fortunately, many have found an answer to addressing these challenges—the cloud. An ever-increasing number of IT professionals are exploring how cloud computing can improve operations within their agencies.

The Cloud and Cloud Services Defined

What is the cloud?

A model for delivering services, infrastructure, and application software on demand using the network.

What are the different cloud deployment models?

- **Public cloud:** Cloud infrastructure shared or accessible by all, with applications and services delivered through the Internet.
- **Private cloud:** 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.
- **Community cloud:** Multitenant, private cloud infrastructure that supports a specific community, consisting of two or more organizations that have shared concerns.
- **Hybrid cloud:** Combination of two or more of the preceding cloud types.

Why opt for cloud services?

The value of cloud services lies in shifting focus away from building and maintaining infrastructure and placing the emphasis instead on managing information and making it immediately available and useful. Since most government organizations must collect, distribute, access, and interpret large amounts of data, cloud services prove particularly useful.

Harnessing the Power of the Cloud

Government agencies are laying the foundations for cloud computing, and momentum toward the adoption of cloud-computing strategies is building. The United States federal government, for example, is in the midst of a major effort to modernize its IT infrastructure, and according to the Government Services Administration (GSA), cloud computing is a major feature of that initiative. In fact, United States Chief Information Officer Vivek Kundra forecasts that the federal government will save at least \$5 billion annually by transitioning to the cloud.¹

At the state and local level, 45 percent of local governments are already using cloud computing to maintain applications or provide services.² And according to a 2011 survey, 68 percent of public sector CIOs and senior IT managers viewed cloud solutions as a tactical move or a necessity for their operations.³

All this comes as no surprise when considering the many advantages that cloud computing has to offer for government organizations:

- **Fiscal advantages:** In general, government IT organizations have evolved an isolated, standalone approach to information systems that is dedicated to a single department or application. This silo effect is costly, yielding repeated examples of redundant and inefficient IT infrastructure.

Underutilized infrastructure represents a monumental waste of hardware, power, management, and cooling resources that can have a dramatic effect on government agency budgets. In contrast, a virtualization model and shared cloud infrastructure 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.
- **Increased efficiency and availability:** The cloud model provides the ability to rapidly acquire, provision, and deploy new IT platforms, services, applications, test environments, and more in a sustainable way that is more efficient and better for the environment. Cloud capabilities allow governments to use resources more effectively and make

¹ Testifying before Senate Committee on Homeland Security and Government Affairs, May 25, 2011.

² Public Technology Institute (PTI), April 2010.

³ Advanced Micro Devices (AMD), June 2011.



sure green computing expectations are met. Lengthy IT hardware procurement processes can be eliminated, reducing time spent on such tasks from months to a matter of hours or even minutes.

The cloud model also assures 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.

- **Simplification and standardization:** By encouraging the dissolution of the siloed approach, cloud computing brings about the opportunity to consolidate and simplify government data centers and facilities. Cloud computing can also help government agencies standardize practices, improve security compliance, and enhance 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. 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.

- **Innovation:** 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. According to U.S. CIO Kundra, “Cloud computing services help to deliver on this administration’s commitment to provide better value for

the American taxpayer by making government more efficient. Cloud solutions not only help to lower the cost of government operations, they also drive innovation across government.”

Moving services to the cloud provides a basis for innovation, allowing government organizations to evolve from their historical position as late adopters to blazing new trails and leading the way in technology adoption.

- **Responsibility to the public:** Embracing the cloud can help governments 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. Having a cloud initiative helps government organizations meet these goals.

Cloud Case Study: Data Storage 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 non-emergency 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 reducing hardware, software, and staffing needs.⁴

Considerations Unique to Government

Driven by myriad benefits, as well as the rapid maturing of cloud technologies, many government IT organizations today are creating design and implementation programs for transitions to cloud computing. But with only their in-house resources and expertise to guide them, a majority of these teams are finding they lack the best practices needed for the wide variety of technologies involved. In fact, according to a 2011 survey conducted by AMD, 75 percent of public sector respondents stated they did not feel they had the appropriate IT skills internally to support a cloud-computing environment.

If government organizations choose to take this in-house approach, they risk facing common cloud-computing challenges, such as:

- Security inadequately focused at the application or server layer only
- Lack of customer isolation using secure, scalable multitenant services
- Limited virtualization of endpoint computing resources
- Failure to exploit innovative, cost-saving initiatives such as business continuity/disaster recovery into the cloud

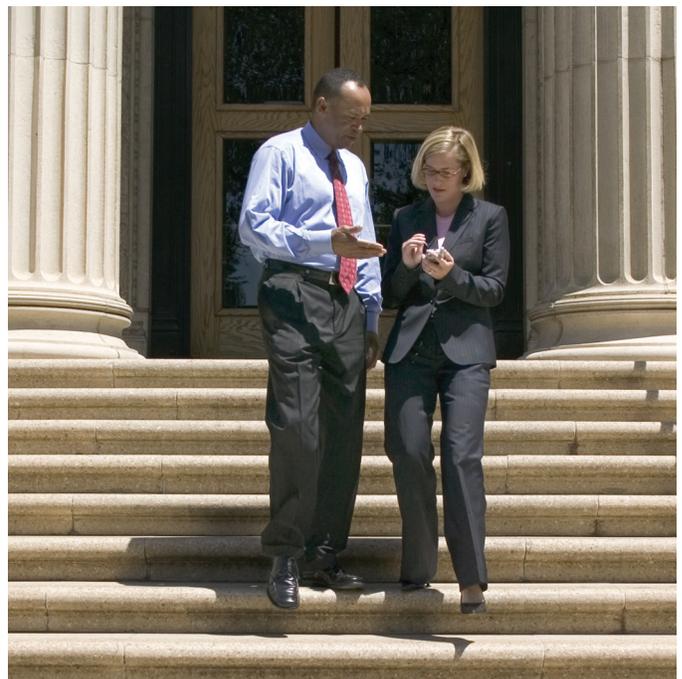
Although some cloud services requirements are universal, there are also needs and circumstances unique to government installations that must be thoughtfully considered:

- **Robust security:** Security and data privacy implications are first and foremost. A country's national or economic security depends on 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 non-cloud world, ensuring robust security and data privacy is critical to the success of a cloud-computing 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 architecture and systems.

- **Public returns:** 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 that demonstrate a commitment to increased efficiency, greener practices, and 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.

It is important to note that cloud services are not a one-size-fits-all solution. Nor is the potential move to the cloud an all-or-nothing proposition. When undertaking any major technology initiative, it is necessary to carefully define objectives and requirements, aligning them with business needs as well as 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.



Thinking About Security in the Cloud

Security is the number one issue for government leaders evaluating cloud computing.⁵ Here is a checklist of security issues and capabilities to consider:

- ✓ Data safety
- ✓ Data confidentiality
- ✓ Data privacy
- ✓ XML signature
- ✓ Browser security
- ✓ Cloud integrity and binding
- ✓ Network security
- ✓ Flooding and denial-of-service attacks
- ✓ Regulatory compliance
- ✓ Data center location
- ✓ Dedicated security team to ease transition

Developing a Cloud-Computing Strategy

Since an exclusively internal approach to building a cloud would use already stretched in-house resources—and even worse, put an organization at potential risk—one solution for ensuring a successful cloud transition is to look to a professional services group for assistance in developing a cloud strategy that best suits organizational needs.

This team of experts will work with government IT teams to create a wish list for making the transition to cloud computing easier. The list of important goals for the transition may include:

- Choice: vendor and technology independent, open, secure
- Alignment with operational strategy and goals
- A comprehensive, architectural approach
- A highly secure development architecture for organization needs
- Rapid time to market

With a clearly defined wish list, organizations must then approach the transition to cloud computing in the following four phases:

1. Strategic preparation

In this initial phase, business and IT decision makers will determine the appropriate cloud computing strategy, asking questions about architecture and security, as well as business objectives. Government organizations should work with experts who have extensive experience in designing complex data centers across multiple technology areas, such as virtualization, service orchestration, automated provisioning, and the security that underpins network architectures.

The costs, benefits, and operational changes required to successfully migrate to a cloud-computing model should also be evaluated, including both the current and required services management approach. A thorough analysis helps align subsequent cloud architectural development, tools, and process integration, as well as implementation, with business returns.

Strategic preparation should also target security. Government IT experts should evaluate their cloud services and architecture security risks, focusing on protecting access and providing on-demand security options within a services catalog for their users. In addition, your strategy should take into account your cloud evolution and post-deployment activities in every stage: strategy, planning and design, implementation, and optimization.

2. Planning and design

When undertaking a cloud transition, strategic planning and design can help reduce time to successful deployment and operation of complex cloud models. This phase requires expert coordination among your team, your partners, and other vendors, as well as a detailed architecture design, data-center-specific expertise, and security designed from end to end.

The resulting designs and plans—including, for example, an end-to-end architecture blueprint, migration roadmap, facilities, mechanical, and electrical design, a common control framework, a security technology framework, physical safety and security, and your future cloud evolution—should link back to your strategy and lay the foundation for subsequent implementation and integration.

3. Implementation

In order to reduce risk during a transition to cloud computing, government organizations need to have someone with experience in providing a virtualized architecture, as well as integrated tools, a facilities plan, orchestration integration, workload migration, and staging and validation activities prior to full-scale implementation. This phase also involves implementing the security technology architecture, the security portal design, automated audit, and physical safety and security designs.

Proven methodologies, best practices, and deep knowledge of the core systems within the cloud environment can facilitate a smooth migration from your existing environment to a cloud utility computing architecture, while helping ensure adherence to plans and enabling on-time delivery of a fully implemented cloud model. During this implementation stage, knowledge transfer should be an ongoing process, providing operational confidence for in-house experts.

4. Optimization

Optimization of the cloud model, which can accelerate adoption throughout government organizations, is the point where the true benefits of cloud computing—lower operating and capital expenses, increased business agility and responsiveness, and scalability—can be maximized. This is done through activities such as:

- Architectural reviews
- Security audits, security architecture and posture assessments, and an ongoing security operations office
- Cost reduction exercises
- Process improvements
- Tool customization
- Post deployment or day 2 support

Cloud Case Study: Private Cloud Infrastructure

The U.S. National Aeronautics and Space Administration (NASA) has embraced cloud computing 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 just minutes.⁶

Transitioning with Confidence

Experts you trust can help you navigate the phases of developing a cloud strategy, helping you to determine where and how cloud computing is an appropriate agency, department, or organizational initiative. These experts can also guide you through architecture and security planning, design, implementation, and optimization techniques.

The Cisco® Services approach draws on expansive data center and cloud computing expertise, proven best practice methodologies, and Cisco's unique intellectual property to support cloud-enabling technologies. As a leader in networking products and solutions, Cisco can help your IT team develop the secure, high-performance network designs required for cloud services delivery. Cisco Cloud Enablement Services help government organizations to:

- Accelerate the development of a financially justified cloud strategy with a measurable ROI
- Design a secure network infrastructure to underpin a government cloud-computing system
- Help ensure that infrastructure, management, people, and processes maximize the success of the transition to cloud computing

- Speed the development and implementation of a cloud architecture and integrated tool design, as well as chargeback and security mechanisms
- Create a phased migration plan to help ensure the successful adoption of the new cloud operational model
- Accelerate time-to-value of a data center architecture for cloud services creation and delivery

No matter what type of cloud model you want to deploy—hybrid, community, private, or public—Cisco, and our pervasive ecosystem of industry-leading partners, can support it. The network is the fabric that links clouds and all their components seamlessly and securely. With our reputation for integrity, our focus on security, and our extensive suite of offerings, Cisco can help your government organization meet critical imperatives and make the transition to cloud computing with confidence.

Cisco provides a complete set of service offerings to help government organizations through each step of its cloud transition. Figure 1 illustrates the specific areas of focus that Cisco Cloud Enablement Services offer.

Cisco Services for Cloud Enablement

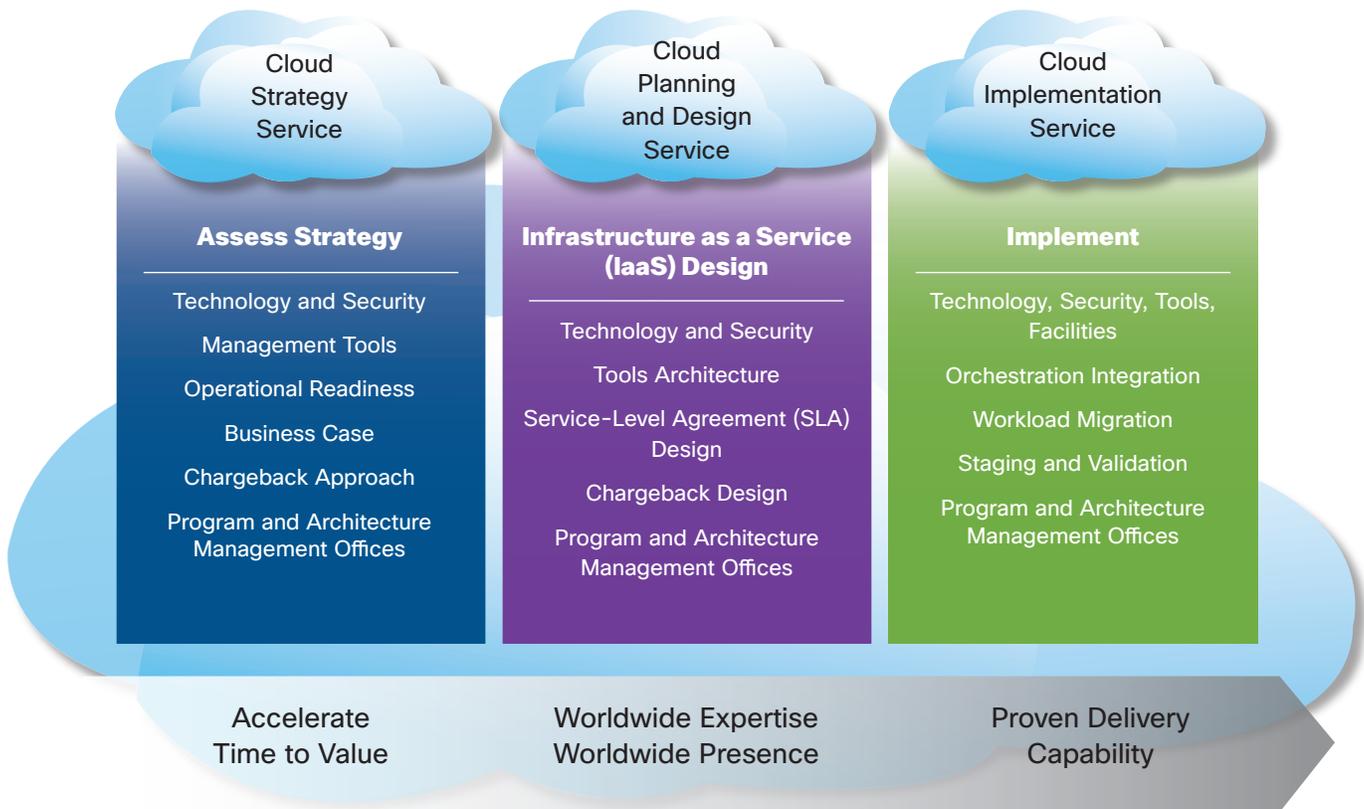


Figure 1 Cisco Cloud Enablement Services



Conclusion

As the expected returns on investment in cloud computing continue to rise, there is widespread conviction that cloud technology will be extensively 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 to IT in government, cloud services will contribute to a more efficient, responsible, and safe IT environment. However, to support a smooth transition and optimal outcomes, public sector agencies must first develop a comprehensive cloud strategy that addresses government-specific objectives and challenges—particularly around security.

Forward-thinking government leaders are currently seeking to understand how to deploy cloud platforms not only securely, but also in the smartest, most efficient way possible. Ultimately, their choices—including the selection of opportunities, approaches, and partners—have the promise to revolutionize government and its way of doing business.

To learn how your organization can accelerate its cloud initiative, schedule a discovery session with Cisco Cloud Enablement Services today.

For More Information

- Cisco Cloud Enablement Services:
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- Cisco Cloud Computing for Government:
http://www.cisco.com/web/strategy/government/cloud_computing_for_govt.html
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