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Why CIOs need to be ahead of the game
Developing a cloud strategy

Public sector

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Are you ready for the cloud?

A fundamental shift is taking place around how to deliver technology solutions to support business.

By now, you've undoubtedly heard about cloud computing. Traditionally implemented as a method to cut and contain information technology (IT) costs, it's no longer considered just a better IT solution, but rather, a better *business* solution.

The key to make cloud a value-added part of your organizational framework is to develop a sound strategy at the outset. Today's business leaders are increasingly using the cloud to transform their capabilities, gain business agility and competitive advantage. But what are the implications for public sector agencies and government organizations? What should public sector CIOs consider when preparing for this dynamic business trend?

This paper is designed to help you on your journey as you select and develop your cloud solution. In this paper we:

- explain cloud computing and the various deployment and service models
- highlight the implications of cloud on the public sector (perceived barriers and benefits)
- review the public sector experience to date in various jurisdictions around the world
- outline an approach to developing a cloud computing strategy.

Understanding the cloud

Cloud computing is a shared services model that provides for flexible network-based delivery of IT services on a pay-as-you-go basis.

The National Institute of Standards and Technology (NIST) has defined five essential attributes of cloud computing[1]:

- **Measured service**: Usage metering, with charges based on the amount of resources used, such as usage/minute, gigabyte (GB) of storage, and number of transactions.
- **On-demand self-service**: Services are ready to use and serve specific consumer needs, and capabilities can be rapidly provisioned by the end user, often through a self-serve portal.
- **Resource pooling**: Shared underlying infrastructure, software or platforms, allowing available resources to concurrently serve multiple needs for multiple consumers.
- **Rapid elasticity**: Quickly scalable up or down based on the user's demand.
- **Broad network access**: Accessible through the internet on thin or thick client platforms.

Deployment and service model options cater to different needs

Cloud computing offers a different paradigm for delivering IT services as compared to traditional in-house and outsourced arrangements. Understanding the various deployment and delivery models associated with cloud computing and how these differ from traditional models is key to determining the suitability of cloud computing services to meet your needs.

Some variations of these deployment models have emerged to address public sector consideration, including:

- Private vendor-hosted cloud: This deployment model provides for public cloud computing services to be offered by commercial vendors to public sector customers only, through a dedicated government intranet. This variation provides for cloud services which are delivered within defined geographic borders and in conformance to heightened data security and privacy requirements.

Deployment models

Cloud sourcing comprises three models:

Public cloud deployments pass the responsibility and associated risk for an IT infrastructure from the business to a third party in a cloud-sourcing model that is available to all users.

Private cloud is a popular choice for governments. Infrastructure is provided virtually via the internet or through dedicated networks, but from designated facilities, whether owned or managed by the client or the vendor.

Hybrid cloud augments the private cloud with public-based cloud services when needed.

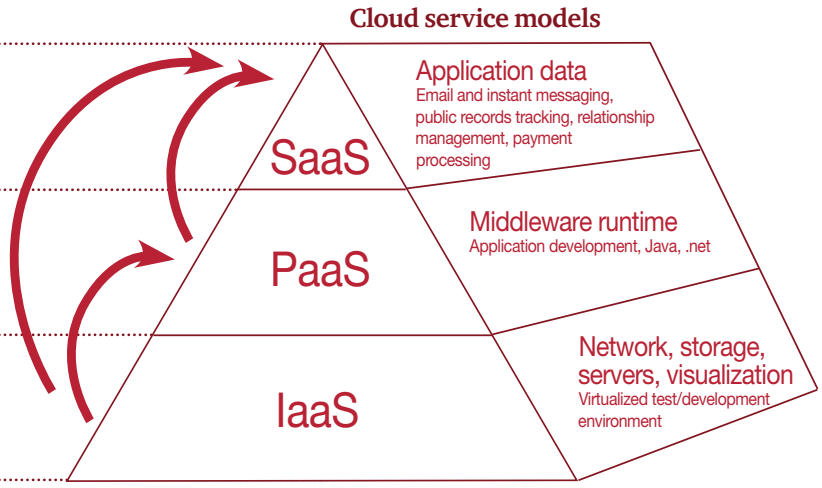
Service models

There are multiple IT offerings that can be accessed via the cloud:

Software as a Service (SaaS): The cloud vendor provides the hardware, network, operating systems and applications. Consumers access the application remotely.

Platform as a Service (PaaS): The cloud vendor provides the hardware, network and operating systems. Customers provide the applications, which are accessed remotely.

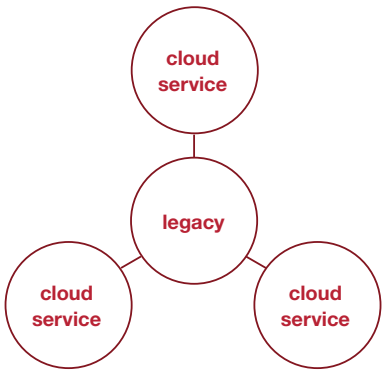
Infrastructure as a Service (IaaS): The cloud vendor provides the hardware and network. Business units add and manage their own applications and operating systems.



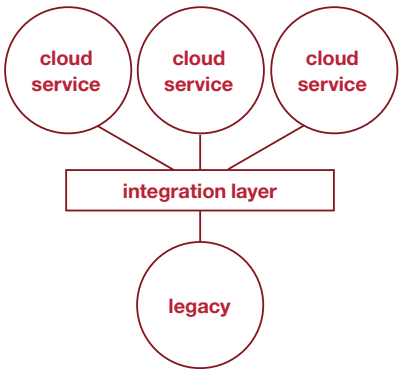
Public sector implications: The best defence is a good offence

Canadian governments and public sector agencies across the country are being driven by new economic realities to reduce deficits and debt. What's more, CIOs are being asked to look for new ways to adopt technology innovations to enhance service delivery and increase citizen and business satisfaction.

Ad-hoc point-to-point integration



An architected approach



- *Cloud computing is ideal for organizations like the government, which operate as loosely coupled federations organized around mutually beneficial opportunities.*
- *In the short term, cloud impacts finance, tax, legal and IT the most, but in the long term, it impacts every business function.*
- *Although cloud is still an emerging technology, some components are mature and compelling enough to adopt today.*

The US Federal Government has instituted a "Cloud First" policy requiring agencies to evaluate cloud computing options for new investment. Under the *Federal Cloud Computing Strategy*[2], the Government identified $20 billion (of $80 billion total IT spending) that has the potential to move to the cloud, equating to billions of dollars of potential savings.

When properly planned, carefully monitored and well executed, a sound cloud strategy can lay the foundation for next-generation business services built on an efficient, responsive and flexible infrastructure—one that can support effective service to Canadians and back-office cost reduction regardless of the geography or market.

Individual departments and ministries are already considering how they can benefit from the cloud. This makes establishing a strategic adoption plan as an integral part of your business framework even more essential to avoid potentially disparate and costly approaches.

In contrast to the hosting services provided to government ministries and agencies by a shared services organization, cloud computing vendors promise to provide a self-provisioned model where servers are available in minutes rather than months and costs are tied to business volumes rather than cost recovery. Unless the public sector infrastructure provider has carefully examined the applicability of cloud computing models to their hosting delivery and can articulate a cloud computing strategy to their clients, they will quickly find themselves on the defensive. Ministries and agencies will view their own shared services organization as an impediment to being able to rapidly and cost-effectively deploy new applications.

In some cases this can lead to the phenomenon of "shadow IT", where ministries and agencies bypass their own IT organization and procure services from public cloud computing vendors directly. Only later in the implementation cycle will the realities of cloud computing manifest themselves, as users come to understand the myriad of issues that must be addressed when adopting cloud computing models. Examples of such issues include how well cloud services exchange data with legacy applications and who will manage the integration.

As we see it, public sector chief information officers (CIOs) cannot afford to think of cloud as strictly a better IT solution; rather, when strategically evaluated for risks and rewards, and then carefully implemented and well-managed over time, cloud computing can go beyond cost savings.

The benefits

Cloud computing has the potential to:

- **Accelerate innovation** by increasing the experimentation cycle and improving time-to-market. Cloud computing reduces reliance on the time, expertise and expense traditionally required to build dedicated technology to facilitate innovation.
- **Focus on customer engagement** by offering inexpensive and flexible options to handle the immense data storage and analytical resources required to meet changing customer demands.
- **Improve connections** by choosing the right cloud-based systems that integrate seamlessly and rapidly to better orchestrate across networks of suppliers, time zones and cultures.
- **Generate revenue and opportunities** by avoiding duplication and redundancies across multiple departments and ministries by aligning them under one government strategy. Along with this, sourcing certain commodity services for the cloud can help to optimize the total cost of technology for the enterprise.
- **Help shift custom development** to standardized cloud utility services.
- **Enhance employee productivity** by providing access to services and data anytime and anywhere.
- **Increase efficiency during peak times** by reducing the reliance on systems and resources often dedicated strictly to specific programs, such as tax time, census and elections.
- **Decrease "bow wave" of IT capital investment costs** by moving traditional capital expenditure costs to operating expenditure costs. Public sector organizations typically defer replacing IT assets in a timely manner thus creating a "bow wave" of IT capital spending that is usually funded by one-time lapses and year-end spend. The cloud creates the opportunity to address and smooth the "lumpy" IT capital investment cycle by focusing on operational expenditures.

The barriers

Embracing cloud principles means a shift in the way your organization does business. With this comes a host of new risks and challenges, which can often be showstoppers if they're not addressed. The key to getting it right is to understand the risks and take significant care when sourcing business services, infrastructure and applications from the cloud.

Top barriers faced by CIOs include:

Finance: Cloud computing is challenging the treatment of IT as a capital expense because of the ability to procure IT infrastructure and software as a service. The new pricing schemes will result in volatile IT costs as consumption ramps up and down. The expectation is that cloud service providers can price more competitively, but be prepared to do the math.

Security: Data security and privacy consistently rank among top concerns with cloud solutions. While the concerns are certainly valid and relevant, they are manageable through various cloud implementation models. In fact, the sheer complexity of non-cloud IT infrastructures can make it more difficult to prevent intrusions and breaches. The private cloud industry doesn't currently offer service level agreements (SLA) and privacy protection assurances to meet all government regulatory requirements; it is rapidly maturing, but should be taken into consideration in the meantime.

Compliance: Public sector and government industries have specific governance and compliance requirements. There are country-specific protections and export laws surrounding the movement of data, and many of these regulations are predicated on the ability to identify the physical location of data and technology. Businesses should assert their needs about data ownership and control while negotiating SLAs with cloud vendors. Can the company, for example, audit the controls themselves? Cloud services are not yet standardized at this stage. It's important to make sure that SLAs are best suited to your distinct compliance needs.

Political sensitivity to services not delivered by internal IT organizations: Most governments in Canada are sensitive to entering into relationships with a vendor that is not delivered and managed by internal IT organizations. There are a number of reasons for this which may include an offshore delivery component, employment of Canadians and control of personal information and data to name just a few. Companies which are emerging as leading cloud providers recognize that governments have unique requirements as compared with private enterprise. As such, these companies have begun to execute plans to deploy and market made-for-Canada cloud solutions to address specific Canadian public sector requirements.

Repatriation: Some cloud services are not offered by vendors for internal use, even if the customer is willing to license the offering. Should the business wish to terminate the service, they may have to revert to "day one".

Cloud's descent onto the public sector worldwide

Cloud computing is already being adopted on a global scale, and in some areas the public sector is ahead of the private sector.

A recent survey[3] revealed that public sector CIOs in the US are adopting cloud computing at a faster rate than their counterparts in private sector organizations. These findings may be attributed to the pressure that the public sector finds itself under to cut spending.

The US Federal Government issued its Federal Cloud Computing Strategy[2] in February 2011, which described cloud computing as a "profound economic and technical shift [with] great potential to reduce the cost of Federal Information Technology systems while … improving IT capabilities and stimulating innovation in IT solutions". Major vendors such as Microsoft and Google have announced contracts with various US states to provide cloud services such as email to hundreds of thousands of users. IBM has already launched a $42 million cloud computing centre in Canada[4] and other vendors are expected to follow suit in the next year or two.

In the UK the Government Procurement Service is seeking suppliers for "G Cloud" services[5], including IaaS, PaaS, SaaS and specialist cloud services. The Asia Cloud Computing Association recently conducted a Cloud Readiness Index[6] measuring the state of readiness for cloud computing in 14 countries throughout the Asia-Pacific region. Based on 10 key attributes such as regulatory conditions, data connectivity, data protection policy, broadband quality and other risk factors, the index found a wide disparity throughout the countries, ranging from Japan, ranking #1 with a total score of 85, down to the Philippines, scoring the lowest at 45.

In April 2011, the Australian Government issued its "Cloud Computing Strategic Direction Paper"[7] which explored the opportunities and impacts of cloud computing and provided guidance to its agencies on the issues.

Canada has begun to evaluate opportunities for attracting cloud service providers into their geographies and the role that the public sector can play in leading the charge.

The barriers to adoption by government are being removed. For example, the US General Services Administration (GSA) has granted government-wide Authority to Operate (ATO) to a number of vendors to provide IaaS cloud services[8]. Amazon Web Services (AWS) has been awarded FISMA (Moderate Authorization and Accreditation with the Federal Information Management Act) certification[9]. FISMA is a key hurdle for companies to pass to ensure their solutions can meet the security needs of the US Federal Government.

Additionally, with the variations of deployment models geared toward the needs of the public sector, such as 'private cloud vendor hosted' which works using a dedicated government intranet, adoptability is becoming easier.

Evolution, revolution or outsourcing status quo?

Cloud computing is fundamentally different from the traditional outsourcing paradigm.

Understanding the distinction between the two is critical to how you procure, contract, evaluate and operate cloud services.

Cloud computing services are delivered using multi-tenancy infrastructure, rather than dedicated hardware and software. Customers can make real-time adjustments in the level of service usage to accommodate changes in business needs. In general, the supplier retains control over the infrastructure and determines the location from which services are provided. Payments are based on real-time usage of the supplier's resources using a more granular set of metrics. Legal terms and conditions must be adjusted to deal with a different set of business risks, such as privacy and confidentiality, service level commitments, data ownership, liability and indemnity issues, dispute resolution and termination provisions. Public cloud service providers may not be as willing to negotiate these issues, as would typically be the case in an outsourcing agreement.

Understanding the difference between cloud computing services and outsourcing is key to how the public sector must address the procurement, contracting and vendor management of these services.

Leveraging cloud begins with a comprehensive strategy

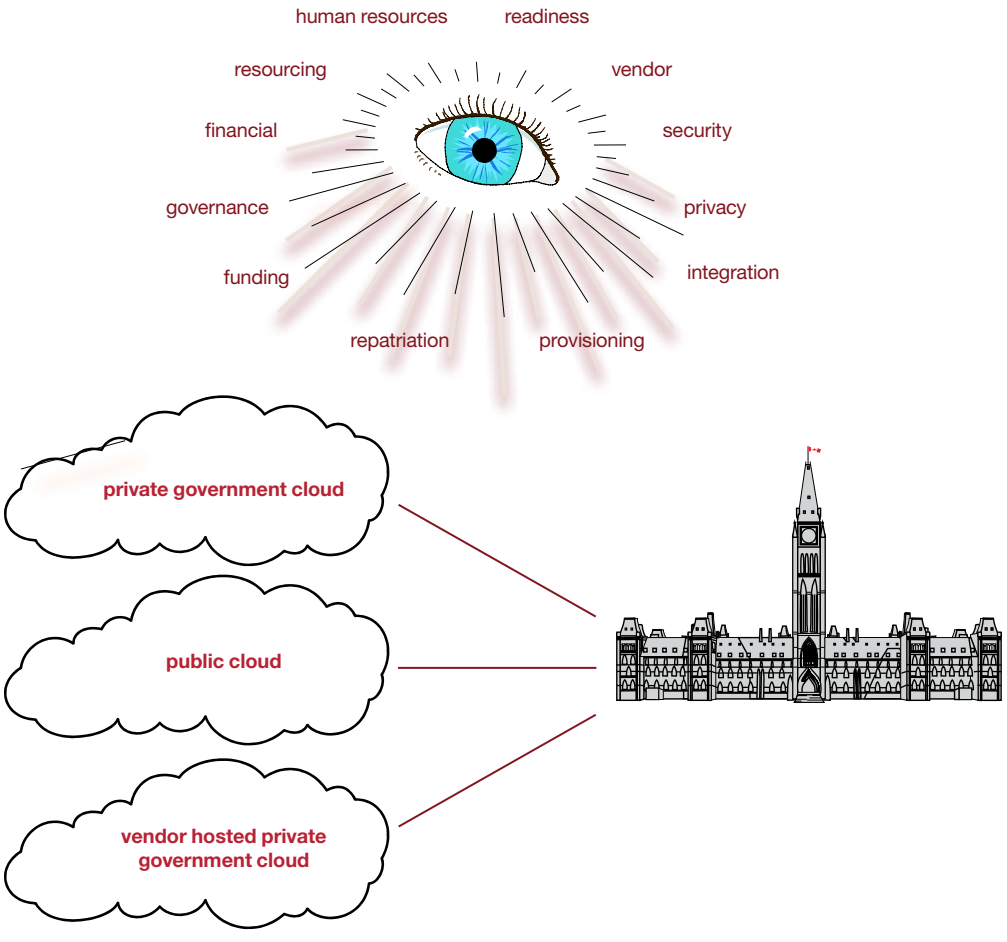
Cloud is a long-term journey, so it's crucial to develop a sound cloud strategy that considers all aspects of IT service delivery.

Why? The very nature of government lends itself for different rogue ministries or agencies to move forward with their own cloud decisions if they're not guided under the umbrella of a vision or overall strategy. This can result in a patchwork of business-unit cloud relationships.

At the same time, even at its most basic, a sound cloud strategy cannot be developed in a vacuum. Think about how legacy systems integrate with the cloud. It's important to take a look at the big picture; many organizations focus only on the technology and migration of existing processes, but few identify the required business function changes or new revenue generating opportunities.

So, how do you develop a strategy?

Developing a cloud strategy requires a multi-dimensional approach by delivery model and deployment model viewed across several lenses such as vendor, security, privacy, integration, provisioning, repatriation, funding, governance, financial, resourcing, HR and readiness.



1. Review

Creating a cloud strategy begins by establishing a baseline. Consider all aspects of cloud computing with your executive team: the challenges you're facing as business leaders; the sourcing solutions that the cloud can deliver to meet those challenges; the related risks, potential rewards and the impact of each option; and the overall business goals of the enterprise. This will help to reach agreement on the key components and objectives of your cloud sourcing strategy.

From there, look at your current situation, such as existing cloud services and current pilot activities, back-end architecture and security standards and requirements. It's important to consider how your applications will get "into the cloud" and "out of the cloud".

In particular, take into account:

- **Infrastructure capacity:** Cloud infrastructure can reside anywhere. What can your organization support in-house? How will cloud system integrate with legacy systems and what are the implications?
- **Legal:** There are limited SLA and privacy protection assurances to meet government regulatory requirements. At the same time, risk management often defaults to legal opinion, without the right background or looking at the enterprise more holistically. What are the legal implications and can your organization navigate through them?
- **Procurement of services:** Public sector procurement traditionally favours clear deliverables and fixed prices to fairly and objectively evaluate vendor offerings. Contracts typically have time limits that are short-term. With such a big change, is it viable to go back to the table every five years? Do you truly understand the benefits and risks of each service provider? Who is overseeing the movement of the systems? And who has the ultimate sign off?
- **Number of vendors:** As more departments consider the shift to the cloud, there's the risk that too many vendors may be contracted without falling under the banner of a holistic strategy. Do you understand the unique needs of each line of business within each department? Have you taken a truly rigorous approach to make sure that a similar cloud sourcing methodology is used across the entire organization to reduce redundancies and costs in the long run?

2. Assess

Each cloud deployment and delivery option has unique characteristics. The appropriate strategy should consider all development options, for example a hybrid cloud strategy. For each deployment and delivery model:

- conduct an opportunity analysis based your needs (e.g. rapidly scale up or down) and the qualities the vendor can provide, such as the ability to meet architectural, security, privacy, integration and financial constraints
- develop indicative cost/benefit model and gap analysis that factors in both direct and indirect costs
- perform a detailed risk analysis
- create a strategy and roadmap.

Cloud computing is here to stay—it's an important business trend that's expected to significantly affect how business is conducted over the next decade and beyond. A coordinated plan will help you assess the implications on the entire organization, including business strategy, people, processes, technology and structure. In doing so, you'll see the possibilities beyond strictly a better IT solution, and better position the organization to benefit from cloud empowered cost savings, growth and agility.

Helping you take advantage of a strategic cloud approach

PwC's direct knowledge and expertise within the public sector, coupled with our vendor-objectivity ensures you get the advice that is right for you.

The process of identifying and implementing your cloud strategy involves all aspects of your business, and requires you to consider the obvious implications as well as the not so obvious functional areas. We work with you to think through all of the areas affected by the shift to the cloud, including strategy, structure, process, people and technology. What's more, we understand the unique needs and challenges faced by public sector organizations.

We can help you address all cloud considerations:

- **Strategic planning and evaluation:** Developing a consensus view of the cloud opportunity in the organization and executive sponsorship
- **Economic and financial:** Applying a proven methodology for cloud business case development and buy-in
- **Policy and architecture:** Developing and managing a cloud enabled enterprise architecture
- **Security and privacy:** Managing risk and compliance against the backdrop of pay-per-use IT
- **Governance and change management:** Recasting mission and business processes and functions in a cloud enabled world
- **Users and IT workforce:** Sourcing, integrating, and managing cloud solutions

About the authors

Geneviève Bonin
416 815 5191
genevieve.m.bonin@ca.pwc.com

Geneviève Bonin (P.Eng, FCMC, MBA) is a Senior Vice-President with PwC, responsible for driving Business Transformation in Public Sector and is also a member of a global team responsible for creating consulting methods and tools. She helps organizations go through complex changes and solve problems with innovative solutions. Her deep knowledge of technology enablers and infrastructure-related implications ensure a comprehensive approach to design of business transformation programs and related change considerations to deliver sustainable benefits to clients.

Albert Silverman
416 869 2990
albert.silverman@ca.pwc.com

Albert Silverman (B.Sc, D.Comp.Sci, EMBA), is the Senior Managing Director and Chief Architect at PwC, responsible for enterprise architecture and technology solutions. He has assisted both public and private sector organizations with all aspects of architecture, including business architecture, information architecture, application architecture and technology architecture. In addition, he has over 20 years of sourcing experience and has served as lead negotiator/advisor for some of the largest outsourcing deals in the country.

Contributors

Mark Hoy, Michael Jordan, John Kirkwood, Ivan Milam, Michael Rowen

Endnotes

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