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Build your enterprise cloud

It's not if – but how and when

Contents

Move into the cloud

Globally, large enterprises are experiencing a decline in the delivered value of their IT investments. With operations and maintenance accounting for nearly 70% of enterprise IT budgets and almost 50% of capital spending supporting the status quo, today's IT investments rarely introduce new capabilities.[1] This may explain why many large organizations are attempting to enhance IT effectiveness by making virtualization technologies – including cloud computing – a central element of their enterprise technology portfolios.

Yet, despite the promise presented by cloud computing, 62% of Canadian executives remain confused by the concept.[2] Although the cloud's abstracted service delivery offers significant flexibility, the path forward is not always simple or obvious – and the rapid pace of innovation only further muddies the waters. Many organizations are also saddled with an extensive legacy of interconnected systems, built long before cloud computing became a practical reality, making it even harder to realize the cloud's benefits.

Part of the challenge lies in the fact that large organizations are unlikely candidates for wholesale migration to public clouds and private clouds alone cannot deliver maximum benefits. As a result, organizations with extensive investments in mature and interdependent systems have begun to consider hybrid cloud models the preferred future state of their enterprise IT ecosystem. Because hybrid clouds include non-private components, they introduce issues related to privacy, compliance and the regulatory implications of using a public (and often foreign domiciled) infrastructure.

To address these concerns, organizations must start by defining a clear strategy:

- Establish a framework to describe cloud services
- Build a workload assessment and migration analysis model for their environment
- Create a cloud computing roadmap that links business imperatives to cloud-enabled IT services

Armed with a common framework, a clear assessment and analysis model and a business-linked roadmap, you can begin to investigate early candidates for migration, such as development and test environments. The payoff can be rapid and the wins will help address some of the largest complaints of packaged application implementations: complexity, expense and rigidity.[3]

The rapid evolution of cloud computing

Before adopting cloud technologies, it is important to understand the way in which cloud service access and positioning are evolving. Although most cloud models are characterized by agility, speed to market and lower costs – delivered through a transparent billing model that charges only for actual consumption – fully developed cloud services typically display five key characteristics (PURSE):

Pay per use	Ubiquitous network access	Resource pooling	Self-service	Elasticity of supply
• Consumption model rather than an allocation model • Subscriber incurs a charge only when consuming resources	• Access is not tied to a specific physical machine or device • Accessed via a URL/IP number	• Resources are pooled from all available sources independent of physical location	• Users can directly access the service, usually through a web portal • Provisioning is on demand and near real-time	• From the perspective of users cloud services have unlimited capacity, which can be expanded or reduced based on usage
Cost-of-service transparency	**Increased productivity**	**Maximize asset utilization**	**Agility through diminished procurement barriers**	**Facilitates testing and meeting market demands**

To support delivery of cloud services to internal clients and external partners, you can rely on the same virtualization and hypervisor technologies that enable vendor cloud services, such as Google Apps and Salesforce.com. Although organizational risk tolerance and competitive positioning may discourage you from offering cloud services to the public, gaining competency in the delivery of cloud-based services can open new doors and drive new revenue opportunities. Developing internal cloud-service capabilities also increases IT agility and supports the transition to a service-based organization capable of meeting both business requirements and market realities.

Cloud computing categories

There are three different types of cloud computing services: software as a service (SaaS), platform as a service (PaaS) and infrastructure as a service (IaaS).

Service type	Description of service	Market examples
Software as a service (SaaS)	Customers run finished applications from the cloud services provider on a subscription basis, with no software license and limited operational control.	• Facebook • Google Apps • NetSuite • ORACLE • Salesforce.com
Platform as a service (PaaS)	Customers develop and operate software on cloud platforms through subscription services, without visibility to the underlying service environment.	• Caspio • Force.com • Google App Engine • Windows
Infrastructure as a service (IaaS)	Customers provision servers, storage and database services on cloud infrastructure through a subscription service, with direct operational control of most system components.	• Amazon Web Services • Eucalyptus • GoGrid • Right Scale

With the influx of new entrants to the market, other service types are also proliferating, including database as a service, compute as a service and identity management as a service, among others. As cloud computing becomes more pervasive, anything that can be virtualized, extended and scaled is likely to show up as a cloud service.

Flexible delivery models

When selecting cloud services, organizations can also choose from five common delivery models:

Public cloud (external)	Cloud computing services from vendors that can be accessed across the Internet or a private network, using one or more data centres, shared among multiple customers, with varying degrees of data privacy control.
Private cloud (internal)	Computing architectures modeled after public clouds, yet built, managed and used internally by an enterprise; uses a shared services model with variable usage of a common pool of virtualized computing resources. Data is controlled within the enterprise.
Hybrid cloud	A mix of public cloud services, internal cloud computing architectures and classic IT infrastructure, forming a hybrid model that uses the best-of-breed technologies to meet specific needs.
Community cloud	Community clouds, also known as consortium clouds, are used across organizations that have similar objectives and concerns, allowing for shared infrastructure and services.
Virtual private	Uses public cloud IaaS capability and capacity that is virtually dedicated to a single organization.

Despite these standard definitions, cloud computing services and models continue to evolve rapidly, making it difficult for organizations to follow a reference implementation of particular infrastructure. As such, when building a cloud environment, it is essential to ask the following key questions for each delivered service – whether it is vendor based, completely internal or a hybrid.

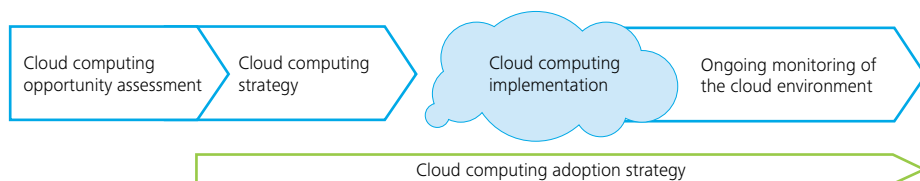|	Key questions
Type of service	What is the functional domain of the virtualized service? For example: • Software applications • Platforms • Infrastructure • Desktop • Storage • Compute
Transaction model	What type of transactional model does the service rely on? • Subscriber • Provider • Broker • Enabler
Service source	Where is the physical source of the service relative to the enterprise firewall? • External to the enterprise • Internal to the enterprise • Hybrid
Costing model	What metrics and volume criteria determine the cost of using these services? For example: • Data storage • Data movement • Bandwidth consumption • Compute cycles • Number of users
Access model	Who has access to the multi-tenant environment? • Unrestricted: "public access" • Private access: Only one organization has access to an isolated virtual instance • Restricted access: More than one organization has access, as in a consortium

Jurisdictions	• Geography
	  - Regional (province, state)
	  - Multi-region
	  - Multi-country
	• Regulatory
	  - Industry
	  - Information characteristics

Find the fit: Cloud adoption strategies

Deciding to transition to cloud computing is only the first step in most organizations' efforts to enhance IT performance. The next step involves identifying a sponsor prepared to champion the implementation throughout the organization. To win this type of executive support, you need to understand the varying motivations for adopting cloud computing and the differing concerns of each C-suite member.
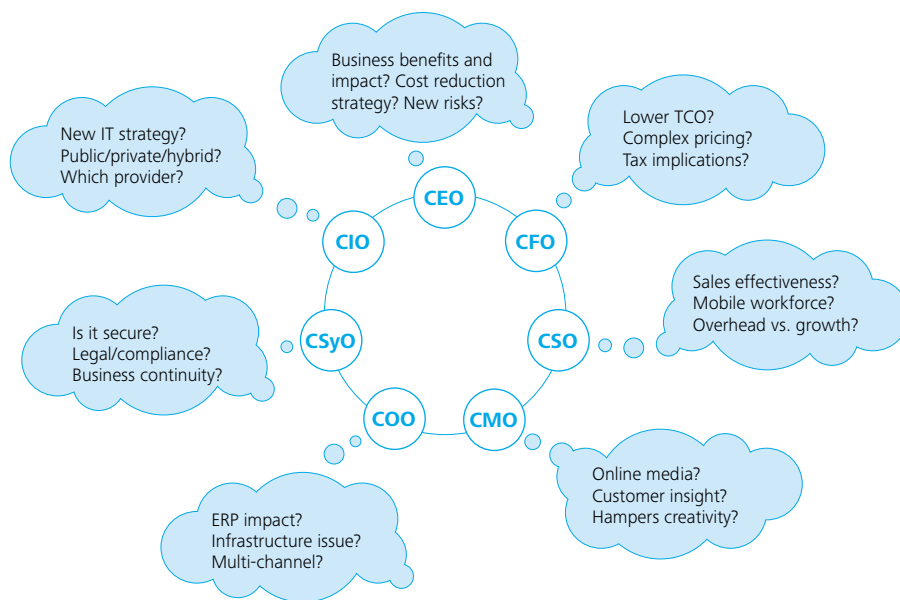
To be sure, organizations of different sizes will have different considerations. New companies, or those with relatively small legacy portfolios, can often adopt cloud-based solutions more easily than larger enterprises, accessing business capabilities that would otherwise be out of reach. Conversely, cloud implementations can occur gradually over several years within larger organizations.

In either case, the adoption of cloud computing is generally both transformative and disruptive, necessitating the development of an enterprise-wide adoption strategy capable of mitigating the risks and maximizing the benefits of the cloud access and delivery model.

While no hard and fast solution exists, the following four phased approach
has proven successful:

Cloud computing opportunity assessment → Cloud computing strategy → Cloud computing implementation → Ongoing monitoring of the cloud environment

Cloud computing adoption strategy

1 Conduct a cloud computing opportunity assessment

The cloud computing opportunity assessment provides
the foundation for your cloud computing strategy. It
begins with an examination of your enterprise application
portfolio and uses an evaluation framework to assess the
suitability of applications for cloud migration based on
the impact to:

- Regulatory compliance, such as Sarbanes-Oxley (SOX)
  and Health Insurance Portability and Accountability
  Act (HIPAA)
- Data privacy and protection standards, as well as
  data location/segregation standards
- Your organization's security posture and the likelihood
  of increased vulnerabilities

Based on the outcome of the assessment, you can better
nominate candidate applications for cloud migration.

2 Develop a cloud computing strategy

Once you complete the opportunity assessment, you will
better understand your possible options, enabling you to
create a cloud computing strategy. As part of the strategy
you should:

- Evaluate vendor capabilities and map them to
  requirements, with financial benefits
- Assess the security, control and monitoring capabilities
  of the various cloud providers
- Assess the tax implications of the various alternatives
- Define your cloud computing architecture, migration
  approach and operations plan
- Create processes to integrate cloud computing into
  your existing security framework

3 Implement cloud computing

By helping you define your goals and setting parameters
for success, the cloud computing strategy supports the
launch of a measured implementation. To execute
that strategy:

- Conduct cloud proof of concepts (POC) and pilots
  to assess performance and evaluate actual risk – as
  opposed to perceived risk
- Support installation, configuration, testing, migration
  and operational transition for candidate applications

As you introduce cloud computing capabilities, they
can also evolve your IT service delivery capacity. Through
the experimentation that comes through proof of concept
deployments, staff members develop competence with
new service models, enabling new possibilities to
emerge. As you get comfortable with first trials, you
can then expand your deployments into other, more
business-critical areas.

4 Engage in ongoing monitoring

To sustain the success achieved during the pilot, IT
organizations must ensure that systems deployed to the
cloud meet the expectations of the business and that no
incidents jeopardize execution of the cloud strategy. To
meet these expectations, it is critical to conduct ongoing
security reviews that assess the probability and impact of
vulnerabilities. Similarly, to ensure effective performance
over the long term and take advantage of the evolving
cloud ecosystem, you must conduct additional monitoring
on an ongoing basis.

Develop the adoption strategy

To ensure the success of your cloud computing program, organizations must also gain buy-in with users through a formal adoption strategy designed to communicate the change, socialize and educate users and implement the solution across the entire business. Based on the experiences of early adopters, enterprises that begin with a multi-dimensional approach to cloud computing adoption achieve greater success. To realize similar results, consider incorporating four dimensions into your adoption strategy:

- Technology
- Business and financials
- Regulatory and compliance
- Operations

Technology	Business & financials
• Do the workloads exhibit characteristics that can derive real benefits from scalability and elasticity?	• What are the anticipated usage patterns for the application? Will it be cost effective to move to the cloud?
• Will the application run on commodity hardware and a supported operating system?	• Do your business sponsors prefer capital vs. operating expenses?
• Can you architect application components for deployment to a cloud-based solution?	• How will designing for cloud readiness affect your implementation cost and timelines? Can you achieve lower overall total cost of ownership?
• What design trade-offs are needed to make this application cloud ready?	• Will moving to the cloud help capture new sources of value for the business?
• Are your internal IT architecture and organizational structures "ready"?	• Are cloud offerings mature enough for these workloads?
Regulatory & compliance	**Operations**
• Can cloud satisfy risk management and compliance requirements for this application?	• What are the application's availability requirements? Can they be met by cloud technologies?
• Does the application hold confidential or customer data? Can you easily mask this data?	• How will the support model for this application change if it is moved to the cloud? Are the potential changes acceptable?
• Does the application data need to reside within the organization? Are you prohibited from moving data outside of the country?	• How will cloud affect your chargeback model? Can you support the changes? Will business users accept these changes?
• Who owns the data? How is it used? Are controls in place?	• Can cloud meet your business continuity and disaster recovery requirements?
• How will you achieve security? What level of privacy protection do you require?	• Is the vendor limiting interoperability or access to your data?

Risk management:
Same book, different cover

While most enterprises have begun to favour the hybrid cloud model, the numerous different deployment options introduce varying degrees of risk. Primarily among those are risks related to privacy and security which, together with related risks and costs, can affect each option's total cost of ownership (TCO).

To realize an appropriate return on investment, organizations must address their risk factors in advance. While security and privacy challenges are real, they are not insurmountable and can frequently be mitigated through traditional risk assessment approaches. For instance, independent organizations such as the Cloud Security Alliance (CSA) promote best practices for providing security assurance within cloud computing environments, and keep consumers and providers informed of emerging security issues.[4] The Centre for the Protection of National Infrastructure – the UK government authority that provides protective security advice to the national infrastructure – published a briefing that provides a broad view of cloud related security issues and a global perspective.[5] This briefing can be leveraged when charting your own course.

With this guidance in hand, executives with risk management responsibilities can more easily begin to investigate some of the critical risk areas, including:

• Data controls and ownership
• Retention and disposal
• Identity and access management
• Availability and reliability
• Legal and compliance
• Disaster recovery
• Audit and assurance
• Scalability
• Encryption

In response to customer feedback, cloud providers have already started building industry-specific solutions that account for regulatory and compliance requirements (e.g., PCI compliance, e-mail retention and archiving). Nonetheless, various vendors have different offerings and half the battle involves asking the right questions.

Gauge the ROI

Over the past 18 months, cloud computing has consistently and frequently demonstrated the ability to substantially reduce both capital expenses and operating costs, increase the capacity of IT departments to meet the needs of the business, enhance the reliability of IT services and introduce greater transparency into IT costing. Cloud, however, is not a panacea. For organizations with substantial legacy portfolios and data centre commitments (outsourced, leased or wholly owned) these benefits can come at a cost.

Unlike the three-year lifecycle of end-user computing, enterprise level assets have lifecycles of seven, ten, even 25 years. Real estate commitments on data centres are often substantial, with expensive termination clauses. There may be material tax implications – positive and negative – to moving from existing arrangements to cloud-delivered models. All of these factors must be considered when gauging the ROI of adopting cloud computing and detailing the go-forward strategy.

Factor	Description	Benefit received		
		Low		High
Real estate space optimization	Effective utilization of physical space that is released by migrating applications to an external cloud environment	Little benefit if space sits idle	Some benefit if space is reused	Greater benefit if space can be monetized
Operating model revision	Changes to IT operating models may be required to allow seamless integration and support of internal and external cloud service offerings (e.g., service catalogue changes, modifications to chargeback models, revised service delivery processes, updates to support models, modifications to governance, etc.)	Low return if operating model does not evolve with the service model	Redeployment captures value from past investments	Right sizing can further reduce operating costs
Asset optimization	Effective utilization of hardware and software assets freed up by migrating workloads to an external cloud environment	Writing off surplus assets may have tax benefits	Reusing the assets captures value of past investments	New revenue streams can be created by monetizing freed up assets
Application selection	Deliberate strategy to determine the optimum hosting solution for applications based on business needs and technology constraints (e.g., criticality, time to market, virtualization, security/privacy, resilience, etc.)	Continuing creates a competitive disadvantage as others increasingly adopt cloud delivery model	Internal clouds facilitate asset optimization and respond to evolving business needs	External clouds are the only way to achieve the scale required for dramatic cost reductions
Workload migration	Time, effort and costs associated with migrating applications to a new hosting environment (e.g., data migration, server build, decommissioning, application migration, etc.)	Worst case occurs when significant risk arises during the process of disentangling existing applications and data sources	Optimized case will migrate existing applications amenable to the cloud delivery model	Best case will include migrating existing cloud-friendly applications and refreshing the portfolio with workloads architected for cloud delivery

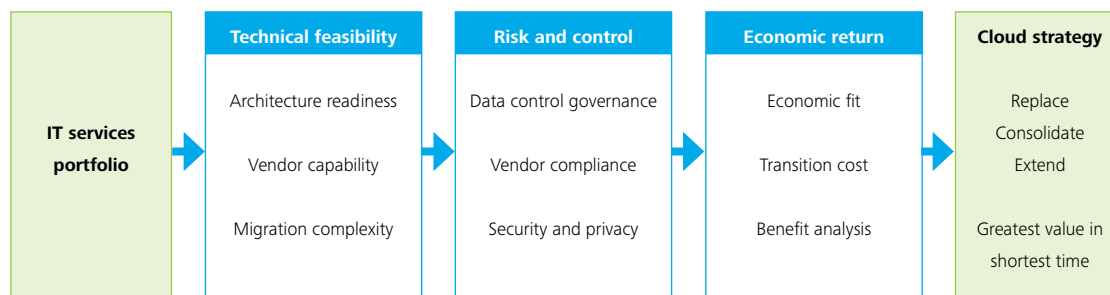# It's not if – but how and when

Cloud computing is changing the traditional sourcing and consumption models of business and IT services. Enterprises increasingly procure cloud-delivered services that provide flexibility and speed to market, and align with their risk tolerance. IT units are evaluating the ability for the cloud computing model to address key strategic and operational issues, such as:

- Data centre architecture and capacity management
- Enterprise architecture transformation and evolution
- Policy-based management of IT platforms

For many IT vendors and services providers, cloud computing is the new focus of competition, putting pressure on incumbents in several verticals (e.g. telecommunications, business process outsourcing, media access, etc.). In response, vendors in technology, telecommunications, co-location and hosting are investing heavily to compete for market share. Within a few years, the IT managed services industry will increasingly need to supply flexible cloud-based services to a growing number of co-location and hosting customers.

Preparing for cloud computing begins by assessing its technical feasibility. You can then examine workloads that would benefit from cloud delivery from a risk and control perspective, considering as well the data they process and how cloud deployment will affect the location of that information. To build an effective cloud adoption business case, organizations require this type of detailed understanding of the associated technology pragmatics and risk profile.

The real power of cloud computing lies in its potential to enable a redesign of enterprise IT foundations. Companies that gain early experience with the new design patterns and service delivery models enabled by the cloud will be best positioned to capitalize on new opportunities in the business landscape and to respond to threats that emerge as globalization continues its steady march forward.

IT services portfolio	Technical feasibility	Risk and control	Economic return	Cloud strategy
	Architecture readiness	Data control governance	Economic fit	Replace Consolidate Extend
	Vendor capability	Vendor compliance	Transition cost	
	Migration complexity	Security and privacy	Benefit analysis	Greatest value in shortest time

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