The concept of a cloud ecosystem

Cloud computing provides transformative advantages: standardized self-service offerings, rapidly provisioned services, flexible pricing and more. These advantages support a variety of business needs, such as analytics and collaborative capabilities, and the rapid development of new products and services.

As a result, moving to a cloud environment is no longer just an information technology (IT) strategy—it’s a business decision as well. Cloud is motivating business and IT to emerge from their respective silos and forge partnerships that apply new technologies in innovative ways. But converting cloud’s considerable benefits into business opportunities requires an astute understanding of your cloud ecosystem, including:

- Determining the type of cloud environment (public, private or hybrid) best suited for your organization
- Developing your cloud adoption vision, including governance strategy, business outcomes, and project benefits
- Establishing use cases and a detailed plan
- Understanding the implications of adopting specific Cloud Service Layers, including business process as a service (BPaaS), software as a service (SaaS), platform as a service (PaaS), and infrastructure as a service (IaaS)

Just as your organization’s business and IT functions are no longer strictly autonomous, the components of a cloud ecosystem are by definition interdependent on one another. You’ll want both business and IT stakeholders
to devote some “think time” around these key foundational entities. A clearly defined and documented cloud ecosystem serves as a compass that guides your supporting decisions and strategies, and is well worth the upfront effort required.

Defining and documenting your cloud ecosystem can result in a series of deliverables:

- **Cloud deployment model analysis**—Defining the deployment model type (public, private, hybrid or community cloud) that will deliver your planned IT services
- **Cloud readiness assessment**—Evaluating your capabilities to manage and orchestrate the deployment of cloud-enabled solutions
- **Cloud adoption vision**—Outlining your governance strategy, anticipated business outcomes, and business cases that illustrate projected benefits
- **Use cases**—Constructing a set of case studies and scenarios to guide the analysis, selection and prioritization of “cloud friendly” candidate workloads
- **Cloud adoption plan**—Building a step-by-step plan to frame your cloud journey in an optimal sequence
- **Cloud adoption principles**—Developing durable statements of direction (for example, guiding principles) that will initiate and direct a transformative cloud strategy
- **Architectural considerations**—Evaluating information architecture (data, structure and deployment standards) and application architecture (applications, structure and development standards)

**Public, private, or hybrid: Which cloud is for you?**

The first step in conceptualizing your cloud ecosystem is to perform a **cloud deployment model analysis**. This defines the deployment model type that will deliver your planned IT services. Should your services be internally delivered (private cloud), externally sourced (public cloud), or should they embrace the mix of delivery capabilities in a hybrid cloud design? (See “Composing a business on a dynamic hybrid cloud” on page 3.)

Another option could be a community cloud, which is a shared cloud infrastructure that coalesces around common requirements or applications shared by an industry or other related organizations. For example, a consortium of healthcare organizations that is developing applications to accommodate industry regulations could use a community cloud for development purposes.

- **The workload (application)**—What are the use cases and business outcomes that your organization is looking for? What delivery channels are available? What are the projected benefits of moving the application to cloud? What are the cost and chargeback implications? Is it technically feasible to migrate the application, and what is the impact to the rest of the technical environment?
- **Your cloud adoption maturity level**—Performing a **cloud readiness assessment** for your organization raises critical questions. Do you possess the capabilities to manage and orchestrate the deployment of cloud-enabled solutions? If not, do you have a plan to hire appropriate partners? In all cases governance and enterprise architecture are key enablers. As well, if you have previously incorporated service-oriented architecture (SOA) into your enterprise architecture, you’ve embraced shared services and have already progressed down the cloud path. Cloud adds the unique capability to expand and contract resources on demand to fulfill shared services requests.
- **Public vs. private criteria**—You might adopt a public environment if you require a rapid time to market to fill an urgent business opportunity. Or perhaps you want to quickly “test drive” applications in a public environment to see if they meet specific requirements. You would pursue a private cloud if you need a security-rich environment to comply with industry regulations or to protect sensitive employee data. But it’s not an either/or decision. Increasingly, organizations opt for hybrid clouds that combine desirable features of both public and private environments. (See “Composing a business on a dynamic hybrid cloud” on page 3.)
• **IT service delivery funding strategies**—Your transition to cloud will significantly impact the composition of IT service delivery within your enterprise. Cost, investment and associated budget and procurement processes will shift from a capital to operational funding approach, which can give you more flexibility. Services will deliver your business value, and management processes need to migrate over to that paradigm.

• **IT skills portfolio evolution**—No matter which delivery model you choose, your IT organization must shift focus toward service portfolio management, governance and risk management, cloud-based techniques for resiliency and integration, and service-level agreement (SLA) management for both end users and service providers. (See “The future of the IT department” on page 5.)

---

**Composing a business on a dynamic hybrid cloud**

Killer cloud apps disrupt entire industries. Cloud computing shifts yesterday’s personal computer (PC)-oriented tasks to today’s mobile devices. Business offerings unbundle and diversify on the cloud.

Today’s business strategies are no longer etched in stone—there’s no time for that. Strategies now embrace constant innovation, what is called a composable business, one that can improvise and adjust at any time.

To achieve this new idea, organizations need to seamlessly extend their enterprise IT with the scalability of cloud, and the answer is often a hybrid cloud model. (See Figure 1.)

A hybrid cloud involves the secure consumption of services from two or more sources, including private cloud, public cloud, or traditional IT, to enable any or all of the following:

- Integration of applications, data, and/or services
- Composition, orchestration and management of workloads
- Portability of data and applications

The results are a dynamically managed, security-rich environment; a flexible choice of delivery models; and access to open standards that provide interoperability.

In response to the pressure for constant reinvention, organizations increasingly embrace a dynamic, hybrid cloud as a crucial part of business and IT strategies. In fact, research shows that 68 percent of organizations will adopt some kind of hybrid cloud model by 2015, a 19 percent increase over 2013 hybrid adoption rates.¹

---

![Figure 1. A dynamic hybrid cloud can be an integral part of your business and IT strategy.](image-url)
Your cloud adoption vision: Governance, business outcomes and business cases

A common pitfall for organizations embarking upon a cloud journey is a failure to envision a clear destination. How exactly will you benefit from cloud computing? How will your organization maintain control over a complex cloud environment? Establishing a well thought out governance strategy, measurable business outcomes and compelling business cases will help keep your journey to cloud on track.

Governance strategy—Governance is a broad concept. It involves control and oversight by your organization over policies, procedures and standards for IT service acquisition, as well as the design, implementation, testing, use and monitoring of deployed services. Given that cloud services are often sourced outside the IT organization, lack of controls often expose the organization to privacy, security, legal and oversight risks. Cloud “silos” or “cloud clutter” can result when governance is not clearly established. A robust cloud governance strategy and framework includes:

- Establishing stakeholder decision rights, such as determining authority roles for procuring solutions and the required level of stakeholder involvement
- Developing cloud decision-making processes
- Establishing and enforcing policies to manage cloud providers

Business outcomes—Business outcomes should be measurable and developed with key stakeholders. Cloud can help facilitate enhanced business value in areas such as:

- Enabling new business models and client relationships
- Delivering security-rich IT with fewer boundaries
- Improving the agility and dexterity of business
- Facilitating more rapid delivery of product and service innovation

Business cases that illustrate projected benefits—The advantages of cloud computing are well known. They include a scalable, flexible infrastructure; rapid deployment; decreased capital expenditures; and enhanced innovation. Still, these advantages must translate to concrete value for your organization. Developing solid business cases will demonstrate to your executive sponsors exactly how cloud can achieve quantifiable business gains.

Identifying your use cases

Use case development typically starts with the identification of potentially “cloud-friendly” workloads (applications). For example, you may need to reduce capacity limits, or your workloads may experience peaks and valleys in usage. Perhaps your applications require intensive batch processing, or rapid deployments and infrastructure adjustments. Cloud-friendly workloads often enhance collaboration and customer interaction, implement business processes, embed analytics, and can facilitate development and testing.

The next step should involve developing a set of use cases that will help with the analysis, selection and prioritization of candidate workloads. See Strengthening your Business Case for Using Cloud: Cloud Business Use Cases for additional information (http://www.opengroup.org/cloud/whitepapers/wp_cbuc/cbuc.htm).

Where possible, link your use cases to potential innovation that will create concrete business value. Consider how your organization could benefit from standardization or business process models that feature improved efficiencies. Other possibilities include business intelligence or big data; collaboration enablement and enhanced customer service through social computing; proofs-of-concept; and agility or time-to-value improvements.
The future of the IT department: Exploring the impact of cloud on IT roles and responsibilities

IBM analyzed the impact of cloud on roles and responsibilities within the IT organization and published its findings in an IBM white paper, *The Future of the IT Department*, downloadable at [http://ibm.co/1rTs1Wy](http://ibm.co/1rTs1Wy).

The paper is based on the premise that outside cloud providers will supply all IT services, and that assumption determines the makeup of the IT organization’s roles and responsibilities. It suggests utilizing the IBM® Component Business Model™ for the Business of IT, a technique and tool IBM uses to guide discussions with clients around business and IT alignment.

![Figure 2](image)

**Figure 2.** Potential impact of cloud on roles and responsibilities in an IT organization.

---

### Table: Strategic, Tactical, and Operational Responsibilities

<table>
<thead>
<tr>
<th>Strategic</th>
<th>Plan and manage</th>
<th>Build</th>
<th>Run</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>Business</td>
<td>Business risk and compliance strategy</td>
<td>Information strategy</td>
</tr>
<tr>
<td></td>
<td>technology and governance strategy</td>
<td>Business resilience strategy</td>
<td>Information architecture</td>
</tr>
<tr>
<td></td>
<td>Portfolio management strategy</td>
<td>IT business model</td>
<td>Service and solution lifecycle planning</td>
</tr>
<tr>
<td></td>
<td>Customer business intelligence</td>
<td>Enterprise architecture</td>
<td>Service and solution implementation planning</td>
</tr>
<tr>
<td></td>
<td>Customer transformation needs identification</td>
<td>Service management strategy</td>
<td>Service delivery control</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tactical</th>
<th>Plan and manage</th>
<th>Build</th>
<th>Run</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Market planning and communications</td>
<td>Financial control and accounting</td>
<td>Information lifecycle planning and control</td>
</tr>
<tr>
<td></td>
<td>IT management system control</td>
<td>Business risk and compliance control</td>
<td>Security, privacy and data protection</td>
</tr>
<tr>
<td></td>
<td>IT management system control</td>
<td>Human resource planning and administration</td>
<td>Continuous business operations planning</td>
</tr>
<tr>
<td></td>
<td>Customer transformation consulting and guidance</td>
<td>Site and facility administration</td>
<td>Service and solution architecture</td>
</tr>
<tr>
<td></td>
<td>Portfolio value management</td>
<td>Technology innovation</td>
<td>Change deployment control</td>
</tr>
<tr>
<td></td>
<td>Technology innovation</td>
<td>Sourcing relationships and administration</td>
<td>Service and solution development</td>
</tr>
<tr>
<td></td>
<td>Service demand and performance planning</td>
<td>Service and solution deployment</td>
<td>Service and solution deployment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operational</th>
<th>Plan and manage</th>
<th>Build</th>
<th>Run</th>
</tr>
</thead>
<tbody>
<tr>
<td>Execute</td>
<td>Service and solution selling</td>
<td>Procurement and contracts</td>
<td>Service and solution creation and testing</td>
</tr>
<tr>
<td></td>
<td>Project management</td>
<td>Business compliance analysis</td>
<td>Technology implementation</td>
</tr>
<tr>
<td></td>
<td>Service performance analysis</td>
<td>Business resilience operations</td>
<td>Service and solution maintenance and testing</td>
</tr>
<tr>
<td></td>
<td>Knowledge management</td>
<td>User identity and access processing</td>
<td>Service and solution rollout</td>
</tr>
</tbody>
</table>

**Figure 2** is an excerpt from the white paper, and is represented by the following legend:

- Dark gray cells represent functions no longer needed in the new model.
- Light gray cells represent functions that have reduced scope.
- Cells highlighted by a red outline represent components whose importance grows following the adoption of public cloud-delivered services.

While few organizations migrate to a complete portfolio of publicly delivered cloud services, the white paper uses this extreme scenario to provide insights to pending changes within IT organizations.
Developing your plan
Defining a high-level plan helps frame the journey to cloud in an optimum sequence. This plan serves as a tangible representation of the process to stakeholders, as well as a template to initiate project scope and budgeting. See Figure 6 on page 11 for a typical diagram—one that also outlines how our series of white papers, Your roadmap to cloud adoption, takes you through the development process.

Understanding the implications of Cloud Service Layers for your framework
As you develop your cloud adoption vision, you’ll need to understand the implications of adopting cloud services such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), and Business Process as a Service (BPaaS). The Cloud Adoption Framework (CAF) in Figure 3 helps you visualize how the service layer impacts the balance of provider, integrator and consumer roles, with your CSP assuming more responsibilities as you opt for services with increased structure and standards. This perspective can help you better establish governance processes and your enterprise architecture, as well as help you select the most appropriate Cloud Service Provider (CSP). (Note that the provider’s role at any given level includes all lower level roles.)

Figure 3. This Cloud Adoption Framework depicts how various Cloud Service Layers impact the balance of provider, integrator and consumer roles.
**Business Process as a Service (BPaaS)—Establishing Cloud Adoption Principles**

If BPaaS is part of your cloud adoption vision, you should establish a set of Cloud Adoption Principles that reflect durable statements of direction (for example, guiding principles). You’ll need to vet these principles with key stakeholders. As well, you can use the guiding principles to refine requirements so they satisfy the suitability of vendor and partner solutions. Guiding principles need to pass the “so what” test. That is, if the guiding principle does not create impact or spur debate, it may not be a durable statement of direction. The intent of guiding principle development is to avoid statements that everyone agrees with. Non-transformative statements are not as valuable as those that impact change and progress strategic goals.

Some sample cloud adoption principles are listed in the table below.

<table>
<thead>
<tr>
<th>Cloud Adoption Principles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud adoption for BPaaS will reinvent business processes while providing rapid delivery of new services that are independent of organization boundaries.</td>
</tr>
<tr>
<td>Ownership models will be established as cloud portfolios, and governed and managed jointly by business and IT owners.</td>
</tr>
<tr>
<td>Cloud adoption will include optimized workloads that preserve capital by driving greater efficiency and performance.</td>
</tr>
<tr>
<td>Standardized processes that require rapid deployment of new infrastructure or platforms should be deployed in a cloud model.</td>
</tr>
<tr>
<td>Cloud adoption must comply with regulatory and organization policies.</td>
</tr>
<tr>
<td>Applications with unacceptably high costs will migrate to a cloud model as soon as possible.</td>
</tr>
<tr>
<td>CSP candidate solutions must employ open standards and provide business interoperability.</td>
</tr>
<tr>
<td>A cloud exit strategy must exist for each cloud deployment, addressing data segregation, privacy and security.</td>
</tr>
</tbody>
</table>

You should ask yourself the following questions:

- Will the provider have the flexibility to implement changes to the business process or business rules as required in the future?
- Will your organization be empowered with tools to make those changes?
- Will the implementation allow for those changes?

Always remember, the important consideration for potential BPaaS solutions is *agility*.

**Software as a Service (SaaS)—Architectural considerations**

When it comes to SaaS solutions, consider these two key architectures:

- **Information architecture**—Your organization’s data, structure and standards for deployment
- **Application architecture**—Your organization’s applications, structure and standards for development

SaaS adoption can augment or replace your information systems in part or entirely. Just as business considerations and agility are key to BPaaS solutions, in this section, we examine information and application considerations for cloud adoption for SaaS services.

**Information architecture**

Your business and information systems must be integrated to maintain the ongoing value of SaaS investments. With the arrival of cloud, boundaries for information ownership and accountability can blur. Easy access to SaaS services, while convenient, can lead to inadequately planned adoptions and an abundance of SaaS solutions that are difficult to integrate and manage. Figure 4 summarizes a view of information management and governance considerations that should influence your cloud adoption decisions.
The following questions can help solidify the context of your information architecture requirements and should be used in your conversations with potential CSPs as you negotiate the selection process:

**Information assurance**
- What information is required to run your business?
- What are the implications if your provider becomes unavailable or gets acquired by another company?
- What mechanisms are required to handle situations where you cannot access your own information or you are forced to continue working with a provider once your contract ends?
- What are your cloud backup, retention and resiliency requirements?

**Information integration**
- What are the requirements for the cloud service to integrate with existing applications?
- How will cloud-based information models and data structures integrate with the organization’s current information model?
- What patterns will be permitted: self-service, broker, federation, others?

**Information security**
- What are the financial and legal issues related to information security and privacy?
- What changes would be required to manage regulatory compliance?
- How will information security breaches be resolved?
- If you are evaluating a community (multi-tenant) cloud solution, what are the requirements for identify and access rights? How will data ownership be determined?

**Information governance**
- Who will make decisions relative to cloud information management? How will they be communicated and enforced, and how will exceptions be handled?
- What is your business policy for on- and off-boarding to and from the cloud?
- Who will own the information? What are your lifecycle management policies?
- What is the chain of custody for information in the cloud?
- How specifically will you handle privacy as laws and regulations evolve across local, regional, national and worldwide governing bodies?
Application architecture

For many organizations, the application portfolio will evolve into an integrated landscape of in-house, outsourced and now cloud-sourced solutions. In order to understand and manage your application portfolio, you need to assign ownership and accountability from both the business and IT organizations. A robust view of your applications equips you to make informed and justifiable decisions relative to SaaS adoption. Similar to information architecture, a set of cloud considerations for application architecture should be evaluated in the context of cloud adoption.

Key artifacts created during this evaluation include:

- Business requirements for application architecture
- Service-level agreements
- Required integration capabilities
- Mandatory standards
- Security model
- An exit strategy, should terminating a CSP relationship become necessary

Platform as a Service (PaaS) and Infrastructure as a Service (IaaS) – Technology and Infrastructure

Adopting public cloud computing for PaaS and IaaS can free IT staff to work on strategic initiatives while non-differentiating workloads are outsourced to the cloud. IT software and hardware expenditures will decline over time, and your data center(s) will reach an inflection point at which you can use alternative cloud centers and no longer invest in internal physical infrastructure.

Key considerations when evaluating PaaS and IaaS providers include:

- **Capacity**—If you require bandwidth for significant “burst” capacity (peak loads, seasonal loads, one-time projects), your service-level agreement with a CSP must anticipate that need. Most CSPs allow capacity to be reserved for a fee.

- **Cloud Computing Management Platform (CCMP)**—A CSP’s CCMP defines the operational and business support services commonly needed for delivering and managing any cloud service. Will your CSP provide visibility to your operational staff via a portal interface? Is that interface also available programmatically, so that you can integrate it with your own management tools? Is the CSP provider’s management platform open or proprietary? What happens if you need to move the service to another provider?

- **Network latency**—Communications over a wide area network (WAN) can add to network latency. Some application designs are more sensitive to latency than others. You should test candidate applications prior to committing to any contract provisions.

- **Virtualization and standardization**—Your virtualization and standardization initiatives should be well established before acquiring IaaS and PaaS services from a CSP.

Cloud transition plans sometimes omit training for these more foundational Cloud Service Layers, and often the acquisition of CSP-provided services will require changes in existing IT processes and skills. This is an excellent time to review the use cases you developed during the workload identification activity (see page 2) and identify any required changes to skills and processes. Also see “The future of the IT department: Exploring the impact of cloud on IT roles and responsibilities” on page 5.
The business and IT partnership: Utilizing cloud to gain strategic advantage
As we discussed at the start of this paper, devoting the time and resources to defining and documenting your cloud ecosystem can create rich synergies between your business and IT functions. Embracing a cloud transformation requires substantial effort, but research shows the rewards can be considerable.

A recent IBM study of more than 800 cloud decision makers defined organizations that utilize cloud to gain competitive advantage as “Pacesetters.” These organizations use cloud to re-imagine business models, make better decisions based on analytic insights, and serve customers in new ways to create winning business outcomes. Pacesetters experienced almost 2 times the revenue growth of their peers, and nearly 2.5 times higher gross profit than their peers.2

In fact, when research compares Pacesetters to Chasers (organizations that are more cautious about cloud and in early stages of adoption), Pacesetters use of cloud diverges dramatically:3

- Pacesetters are 136 percent more likely than Chasers to use cloud to reinvent customer relationships.
- Pacesetters are 170 percent more likely than Chasers to use analytics extensively via cloud to derive insights.
- Pacesetters are 79 percent more likely than Chasers to rely on cloud to locate and utilize expertise anywhere in the ecosystem.

Attaining this level of performance means never losing sight of cloud as an enabler for business innovation—not just a delivery platform, but also a business model that can transform how we create products, go to market, and maintain and pay for applications and infrastructure.

Why IBM?
A solid strategy for cloud computing is critical to helping you deliver innovative IT services that can create new business value, and IBM Cloud Advisory Services can help. In fact, overall

IBM was positioned as a leader in the IDC Marketscape: Worldwide Cloud Professional Services, 2013 Vendor Analysis. According to IDC’s 2013 Global Cloud Professional Services Buyer Perception Survey, clients highlighted IBM as strongest in providing functional and industry insights and competence, and using resources globally.4

At IBM Cloud Advisory Services, we take a collaborative approach, weaving together business insight, advanced research and technology to give you a distinct advantage in today’s rapidly changing environment. See Figure 5.

Our integrated perspective on cloud consulting, design and implementation can turn strategies into action. With expertise in 17 industries and global capabilities that span 170 countries, we help clients around the world benefit from new opportunities available on the cloud. To learn more, visit ibm.com/cloudcomputing.

Figure 5. IBM Cloud Advisory Services can guide you on your journey to realizing business value through a successful cloud implementation.

With our collaborative approach, we can specifically guide you in:
- Identifying where and how cloud computing can drive business value
- Assessing the current environment to help determine strengths, gaps and readiness
- Providing a stronger value proposition for cloud computing in the enterprise
- Developing a strategy and plan to help successfully implement the selected cloud delivery model
Defining a cloud ecosystem: Second in a Series of White Papers

You’ve just completed the second in a series of white papers, Your roadmap to cloud adoption. These papers guide you through a high-level roadmap toward a future cloud design and implementation, as shown in Figure 6 below.

- **Part One: Creating a cloud computing strategy** ([http://ibm.co/TXqLpE](http://ibm.co/TXqLpE)) has taken you through the steps highlighted in dark blue.
- With **Part Two: Defining a cloud ecosystem** ([http://ibm.co/WiOqm7](http://ibm.co/WiOqm7)), you’ve explored the topics in light blue.
- And finally, **Part Three: Establishing a relationship with your cloud service provider** ([http://ibm.co/1k3alT](http://ibm.co/1k3alT)), covers the areas highlighted in orange.

The papers are designed to be used both separately and together, or with your IBM Cloud Advisory Services consultant, who can provide even more in-depth information.

*Figure 6.* This is the second in a series of white papers, Your roadmap to cloud adoption, which guides you through the steps necessary to create a cloud adoption roadmap like the example shown here.
About the author
Bob Freese is a certified consultant on the IBM Global Technology Services® Cloud Advisory Services global team. He has over 40 years of experience in IT strategy consulting and has spent the last seven years performing cloud strategy engagements for clients and training IBM technology consultants worldwide.