

Integrated service management and cloud computing:

More than just technology best friends



Contents

- 2 Introduction
- 3 Setting the stage: Service management is...
- 4 Cloud computing is...
- 5 Lessons learned: Service management is to cloud as electricity is to computing
- 10 Conclusion

Introduction

- *Are you wondering about the role Integrated Service Management plays in cloud computing?*
- *Are you wondering how all that hard work you did to implement ITIL® applies to a new cloud computing environment?*
- *Are you wondering what new requirements cloud computing will introduce for your existing service management capabilities?*
- *And while cloud computing may save you money, are you wondering where the integration necessary to connect and operate efficiently will come from?*

While the business side and user community have long had an appreciation of services-based thinking, many IT organizations are just beginning to adopt the principles behind service management and its benefits. Following the successes of process re-engineering, IT (and its customers) came to understand that they were providing and consuming services, not just providing access to technology. As a result, traditional

systems management disciplines evolved, and there has been much discussion and many publications clarifying the proper role of IT service management. IT and IT services are now described in a different way. The IT Infrastructure Library®, Version 3 (ITIL V3) defines service management as “a set of specialized organizational capabilities for providing value to customers in the form of (IT) services.”¹ The consensus is that excellent service management is essential to derive the maximum benefit from a firm’s investment in information technology.

More recently, cloud computing has become an increasingly popular means of delivering valuable, IT-enabled business services. Customers and end users access the IT service catalog through self-service portals, using and paying for only those services they need, when and where they need them. For many enterprises and their IT organizations, adopting a cloud model is one path to cost efficiency and effective IT-enabled business. And vital to being able to deliver, or even access, a cloud-based environment is Integrated Service Management.

While most traditional IT service management disciplines remain sound practices, a cloud-based service delivery model emphasizes essential competencies in new ways. Cloud services may originate from a variety of sources and the CIO must transparently integrate and manage these services to customers and end users. Integration is crucial to success in cloud environments because of the need to orchestrate the actions of partners, vendors and customers in keeping with the firm’s strategic intent for IT. The requirements are clear: Integrated Service Management is more, not less, important in a cloud environment. In fact, it is indispensable.

This paper defines key aspects of Integrated Service Management and cloud computing and describes their symbiotic relationship. As tightly intertwined as are electricity and computing, Integrated Service Management and cloud computing are now a matched pair. We discuss lessons IBM has learned on how to weave them together to achieve optimal business results at the lowest level of risk.

Setting the stage: Service management is...

When examined at a greater level of detail than the ITIL V3 definition, service management comprises the whole of the governance, processes, role and responsibility definitions, tools for automation, required information and best practices that integrate and operate available resources to produce valued services, and respond quickly to the needs of a business and its customers—for both legacy and cloud environments. The scope of service management includes anticipating business needs, service portfolio management, service life cycle management, service operation and continuous improvement. Service management is about the collaboration that takes place to create value between communities of customers and users, and communities of providers and suppliers. This means going beyond infrastructure management to provide business service management.

The mission of Integrated Service Management has finally received long overdue recognition as a critical success factor in enterprise information technology. Integrated Service Management enables organizations to deliver innovative business services by providing higher levels of visibility, control and automation that extend beyond traditional management of IT service delivery and into business service delivery.

Integrated Service Management extends the traditional notion of an IT infrastructure to one that encompasses many intelligent devices such as smart electric meters and traffic controllers into high automated networks. These devices work together to generate technology-enabled business services. Integrated Service Management recognizes IT management processes as a specialized form of integrated business processes rather than something outside “the rest of the business”; therefore, the same techniques and value provided through integrated applications to business processes apply equally well to IT management processes.

Tailored for specific industry requirements and business situations, Integrated Service Management is the latest evolutionary step in IT management, enabling organizations to:

- Blend the processes, organization and technology necessary to support current and future IT-enabled businesses
- Promote the widespread use of defined policies in support of fast and accurate responsiveness
- Provide the foundation for analysis of critical, real-time information, enabling the quick decision making that the dynamic global marketplace demands

The result is that Integrated Service Management links the entire business, including IT management, directly to the technology resources it needs.

The Service Integrator role

Integrated Service Management spans the business, IT and partners. The CIO sponsors effectiveness and innovation initiatives for all technology elements of the business infrastructure, not just the traditional catalog of IT-enabled business services. The Service Integrator role is formally chartered to

carry out governance, ensure well-managed relationships and retain accountability for end-to-end service performance. The Service Integrator must also facilitate organizational change that results in staff becoming more productive faster and a culture of cooperation, all as part of managing a complex multi-sourced environment. The individual or team performing this role must be responsive, unhampered by organizational boundaries, and decisive.

Cloud computing is...

Cloud computing is emerging as an important model for delivering valuable, IT-enabled business services. It is a model that enables and supports both a particular style of business model and a specific kind of user experience. Cloud computing applications, data and IT resources are presented to users through self-service portals. Requested services are delivered transparently over the network. “Cloud,” as it is commonly called, offers economies of scale and flexible sourcing options to the business. Another part of this emerging construct is an infrastructure management methodology for managing large numbers of highly virtualized resources. These virtualized resources can reside in multiple locations, but still perform as a single large resource to deliver services. Figure 1 illustrates the relationships between virtualized resources and various types of services. Basic cloud services are organized into four categories. Within the common cloud management platform, business support services (BSS) enable the identification, order management, accounting and subscriber management functions related to consumers and end users. Operational support services (OSS) support successful cloud service delivery and operations.

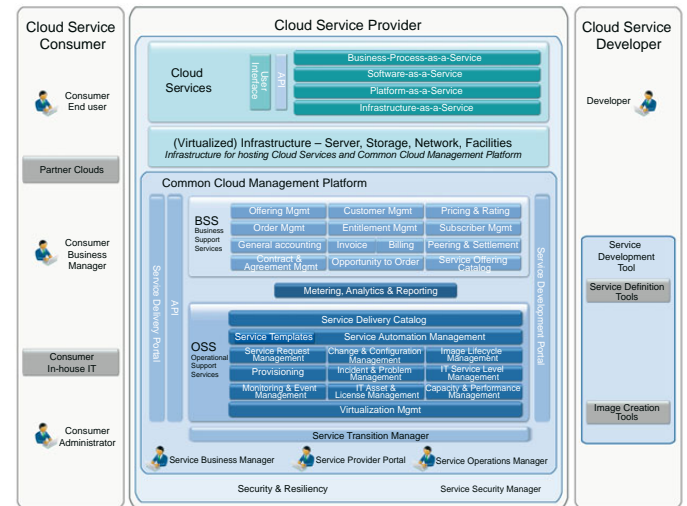


Figure 1. IBM Cloud Computing Reference Architecture

The IBM Cloud Computing Reference Architecture highlights how service management functions and services can be structured in the context of a “cloud,” linking the business to the technology resources it needs as Integrated Service Management.

What are cloud delivery models?

Cloud delivery models represent different ways to obtain and organize resources for the delivery of services. Options include clouds that are internal to the enterprise (private), external

(public) and a combination of both (hybrid). These three commonly recognized types of cloud environments are defined by the following characteristics:

- **Private:** Activities and functions are provided “as a service,” via a company’s intranet. A private cloud, also called an “internal cloud,” is built by an organization from resources it owns for its customers and its internal users. All services are delivered within the organization’s firewall (versus the Internet). The private cloud owner does not share resources with any other company, so multitenancy (i.e. a single instance being shared across more than one enterprise) is not an issue. The focus is on operational excellence and maximization of resource utilization.
- **Public cloud:** IT activities and functions are provided “as a service” via the Internet from external suppliers, using resources not owned by the consumer. Public clouds, also called “external or open clouds,” allow access to technology-enabled services without knowledge of, expertise with, or control over the technology infrastructure that supports them. In this model, the CIO and IT must address the Service Integrator role.
- **Hybrid cloud:** External and internal service delivery methods are seamlessly integrated. Rules and policies are established by the partnering organizations based on factors such as security needs, criticality and underlying architecture so that activities and tasks are allocated to traditional IT, external or internal clouds, as appropriate. As in public cloud, the Service Integrator role is essential for beneficial collaboration between all parties involved in the cloud.

Organizations around the globe are assessing the applicability of cloud computing to their infrastructures. They recognize its potential to reduce costs through standardization and

economies of scale, as well as to speed time to value. Service capacity can be expanded or contracted as demand changes; the use of well-designed and managed clouds can create greater overall elasticity. Some organizations also expect to leverage clouds for improved staff efficiency and optimization of IT resources, leading to higher returns on IT investments. Early cloud computing adopters have already gained valuable insights.

It is essential to balance Integrated Service Management capabilities and cloud options in a way that can support optimal business results at the lowest level of risk. The next section of this paper discusses the lessons learned in achieving both balance and results.

Lessons learned: Service management is to cloud as electricity is to computing

The CIO of the firm providing a business service retains accountability for the quality of all the IT services delivered. CIOs and their staff must be innovative and flexible in how they adapt service management best practices to respond to continually changing business needs. Adaptability is important because the characteristics of service management can change based on the environment and the service solution—whether it is a legacy system, cloud based or a combination of the two.

Over the past three decades, IBM has learned valuable lessons through its own research and experiences in service management and, more recently, cloud computing. With nearly 8 million square feet of raised floor under management supporting 400,000 internal users and a large base of outsourcing and managed business process customers, IBM’s IT organization is

constantly seeking ways to become more effective and efficient. These lessons are then used to assist our clients in improving their IT operations. Through this experience, we have reached the following conclusions.

“IT infrastructure” extends well beyond the equipment owned by an enterprise.

An IT infrastructure is an expansive collection of networked services from many potential sources—services that collectively enable and support vital business operations. Historically, IT focused on application development and systems management, yielding stable business-as-usual computer operations. In reality, very little is business-as-usual now. The rapid and continuously changing expectations of IT dictate that governance predicated on sound service management is essential to reliable and consistent service delivery. IBM has helped the evolution to Integrated Service Management by developing best practices that leverage the integration and optimization of people, processes, technologies and information—all of which must collaborate to achieve cost and quality objectives in the form of services that support the business. With this optimized collaboration, IT is positioned to expand its role in pursuit of additional revenue-generating services.

Standardization is an important and pervasive requirement.

Technical standards have existed for decades, which is what allows interoperable systems. But standardization is increasingly extending into the software stack to encompass business processes. Models, reference architectures and a common language for technical terms promote increasing standardization, and with it, agility—that is, knowing where and how to make changes, and what the effects will be.

A service architecture that maps each business process to its enabling services is required to understand all of the relationships and dependencies, as well as to manage change.

In addition to simple process-to-service correlation, the map will indicate whether the service is an input or output and outline typical demand cycles as it is used. The understanding captured in a service architecture is necessary to design well-bounded applications. Clearly specified application boundaries are a key requirement for workloads being considered for migration to a cloud environment.

Clear policies and standards are important.

For example, from a service catalog perspective, when a service is planned for delivery through a public or hybrid cloud, IT should establish a policy relative to the level of information customers or users will have about external providers and their roles. A complete and clear set of unambiguous policy statements is required, so they can then be automated to permit the dynamic changes necessary for cloud infrastructures.

Cloud computing readily supports both application development and operations.

Cloud computing offers great potential, but that potential is realized only by a combination of new technologies, reuse of accurate business models and advanced Integrated Service Management capabilities. Innovation and efficiency depend upon the proper mix of all three. Service management enables cloud cost savings and accelerates the availability of new services at nearly every level of the value chain. The savings from cloud may also strengthen the business case for improvements in your service management environment.

Several service management objectives and results are vital to all types of cloud delivery models.

Whether the cloud delivery model is private, public or hybrid, the following service management objectives are critical:

- Standard services
- Clear, complete description of services, including definition of service levels
- Pricing quoted per use or by consumption
- Highly available networks and connectivity, supported by both business support and operational support services and automation
- Easy access, self-service enabling portals for service selection and request
- Rapid fulfillment and rapid decommissioning, supported with end-to-end automation
- Service guarantees
- Secure computing and storage

These objectives all require a high level of service management maturity to attain. We refer to that high level as Integrated Service Management. Specifically, it includes goals and objectives, process characteristics, interfaces, measures, organizational structures, roles and responsibilities, supporting automation or integration and continuous improvement components of service management. These should all be synchronized to work effectively and efficiently with business processes to provide critical IT-enabled business services. Your IT function needs to perform the same service management activities it has been doing, and do them very well. We recommend that key service management processes be at a high level of maturity on the IBM Service Management Maturity Scale. However, IBM studies to date have indicated that many companies have significant gaps in service management capabilities and infrastructure readiness for cloud computing.²

The CIO and IT organizations must commit to full participation and leadership in the governance, introduction and piloting of new cloud or service management initiatives for enterprise business use.

Key issues and considerations for service management include:

- Service portfolio management and service life cycles
- Compliance
- Risk mitigation
- Financial practices and cost benefit analysis
- Faster time to value
- Improved quality
- Agility and responsiveness to competitive threats
- Security
- Ability to rapidly scale up and down
- Customer Satisfaction Management

For a CIO, understanding which service management capabilities are required and how they will be achieved may be as important as understanding the services themselves.

If the underpinning capability is lacking or unreliable, then the situation is likely to have a negative impact on more than one service and on overall business objectives. Consider, for example:

- Network availability, connectivity and reliability are essential. No connectivity or unreliable connections means no service.
- Service catalog management and operations are essential. If the catalog is not available or corrupted, then no services can be ordered.
- Event, incident and problem management must be oriented to, and tuned for, highly available networks, service catalogs, end-to-end service monitoring and rapid service restoration, and encompass all intelligent components that contribute to the service. These all become more complex in a virtualized environment.

- Self-service and highly automated provisioning of service requests is a foundational capability in service management for clouds.
- Change and configuration management must now assess the impact on services and service performance, in addition to the processes and performance of assets. Change practices must not only be more thorough in virtualized environments, but much, much faster.
- With the central role of services, service level management really means the ability to manage and report on end-to-end service performance, not just the service level of physical components in the infrastructure.
- Beyond basic availability and network reliability, cloud backup and disaster recovery become very important service management considerations.
- Supplier management, particularly with regard to public and hosted private clouds, sets the expectations and guides collaboration activities amongst partners.

In many ways, cloud represents the next evolution of virtualization. Virtualization is certainly nothing new to the world of information technology. Virtual hypervisors have been around since the mid 1970s with products such as the IBM VM operating system. But each time virtualization is extended to new elements of the infrastructure, our experience has proven that new challenges emerge. Cloud offers virtualization at a new level of the infrastructure, and therefore requires adaptation to existing virtual management capabilities such as security, storage management, capacity management and asset management, just to name a few.

Also, certain cloud delivery models require more focus on specific service management capabilities.

Depending on the cloud delivery model you intend to use, some additional service management aspects may need to be considered. Figure 2 outlines some of the capabilities that may require greater focus.

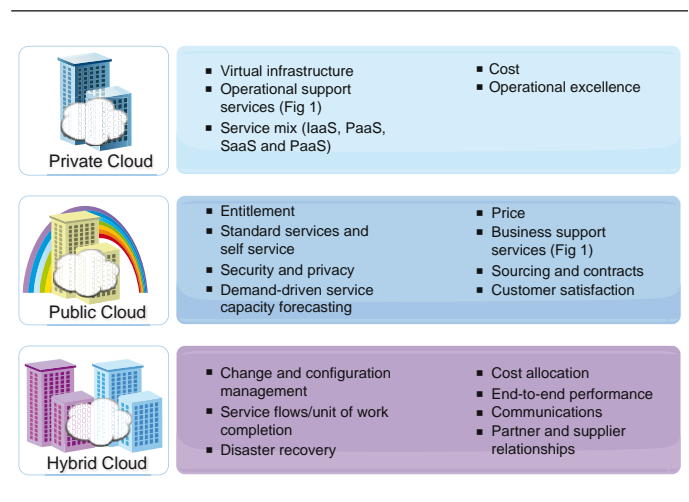


Figure 2. Service management capabilities emphasis by cloud type

Certain business activities, or workloads, perform best in a specific cloud environment.

Workload classification is a prerequisite to effective Integrated Service Management practices for cloud computing and is very complementary to service modeling and architecture. Workloads that are well structured and well bounded make the transition to cloud more easily. Each workload needs to be factored into the services required to deliver it and any unique service management characteristics to be associated with it.

For example, database- and application-oriented workloads are better suited to private clouds, such as:

- Data mining, text mining or other analytics
- Data warehouses or data marts
- Long-term data archiving/preservation
- Transactional databases
- Industry-specific applications
- Enterprise resource planning (ERP) applications

As the owner of the private cloud, the CIO is directly responsible for the successful operation of new technologies in virtualized infrastructure. That means strong levels of operational support services (Figure 1) and clear service catalog descriptions, as well as careful attention to the mix of services (IaaS, PaaS, SaaS and BPaaS) offered through the catalog. Above and beyond all of the good service management practices in legacy computing environments discussed earlier in this paper, your service management maturity levels will need to be fairly high across the majority of IT processes. And of course in private clouds, IT will be expected to cost justify the benefits and prove measurable advances in operational excellence associated with the acquisition of cloud technology.

On the other hand, infrastructure workloads are better suited to public clouds. For example:

- Audio/video/web conferencing
- Service help desk
- Infrastructure for training and demonstration
- Wide area network capacity, voice over IP infrastructure
- Desktop
- Test environment infrastructure
- Storage
- Data center network capacity
- Server platforms
- Business continuity and disaster recovery

A public cloud provider has all of the responsibilities and focus areas mentioned in the preceding description of private cloud service management. The CIO of an enterprise that uses a public cloud to deliver services should add more focus to understanding the standard services offered through the cloud and who will be entitled to request them. CIOs will also need to assess the provider's security and privacy capabilities and ensure that any differences in needs are resolved. Since price,

rather than cost, is the concern for the CIO of the user organization, there will be more emphasis on the ability to accurately estimate demand (and for the provider to provide scalable capacity). As the overall integrator, the CIO should focus on business support services (Figure 1), especially those related to sourcing, contracts and customer satisfaction. CIOs employing public clouds will need strong communications skills and strong Integrated Service Management capabilities.

Other infrastructure workloads work best with hybrid clouds. For example:

- Complex transactional processing that requires the successive efforts of multiple applications and multiple partners, presenting service management challenges to ensure a complete unit of work with high integrity
- Global workloads that span time zones or market times
- Processing that must reconcile differing local/international legal requirements

Participants in hybrid clouds can be both providers and consumers. They are likely to have all of the responsibilities mentioned for the previous two types of workload/cloud combinations, so the CIO's primary challenge is integration of both processes and technologies between all participants, while maintaining compliance and producing audit-ready results. Operating level agreements are also much more demanding in this environment. Transparent and well coordinated change and configuration management is very important, as is end-to-end performance and equitable cost allocation between partners. Dependable disaster recovery capabilities must be engineered as an integral part of the service management solution very early on. Partner/supplier relations are another aspect of service management that can be very complex in hybrid clouds. CIOs employing hybrid clouds will need superb communications skills matched with Integrated Service Management.

The service strategy portion of Integrated Service Management must include solid insight into business objectives as well as the workload and service implications of those objectives to both cloud and traditional IT.

No matter whether you choose to use legacy computing, one of the three types of clouds, or some combination of them for your service strategy, achieving business objectives is the end game. CIOs must ensure that any new infrastructure solutions and services are tightly aligned with business intent and that their value can be readily measured.

Cloud computing will accelerate the need to adapt relationships between IT and the business.

In this new generation of Integrated Service Management, conversations with users, business units and executives are materially different—less about technical parameters and more about business strategy, intra- and inter-enterprise collaboration and flexible operations. In one form or another, cloud computing will shape the future.

Integrated Service Management and cloud computing are now a matched and symbiotic pair, as tightly intertwined as electricity and computing.

Conclusion

At the beginning of the paper, we posed four questions. Based on the information provided throughout the paper, here are the answers:

Are you wondering about the role service management plays in cloud computing? As we have discussed throughout this paper, service management and Integrated Service

Management in particular are essential to cloud computing. Clouds depend on infrastructures to be well managed and transparent to most customers and users.

Are you wondering how all that hard work you did to implement ITIL applies to a new cloud computing environment? Both ITIL V2, which focused on systems management, and ITIL V3 with its focus on service management are still foundational to moving forward in cloud. They provide high-level descriptions of many IT best practices that prepare IT for better services and service delivery. But IT cannot rest on these past accomplishments. As technology advances, so, too, must the practices that provide support and integration.

Are you wondering what new requirements cloud computing will introduce for your existing service management capabilities? Overall, cloud is very likely to require maturity level four service management capabilities for your infrastructure to be both effective and efficient. Depending on the business services and cloud delivery models you select, specific service management factors such as business support services and operational support services need additional close attention.

And while cloud computing might save you money, are you wondering where the integration necessary to connect and operate efficiently will come from? Integration, both technical and organizational, is the responsibility of enterprise CIOs and their IT staff. It is important enough to warrant a well-defined role for service integration. The CIO also retains accountability for end-to-end services, service management and service delivery.

You cannot successfully implement cloud computing without strong service management. As Integrated Service Management and cloud are applied together, they present new challenges and opportunities for CIOs. To make the most of them, CIOs need to be prepared to:

- Become equally adept at managing traditional technical commitments as well as emerging business innovations
- Apply expert-level Integrated Service Management to optimize the use of IT by the overall business
- Act decisively on behalf of the enterprise to ensure that all cloud and partner solutions meet or exceed value expectations

As you consider commitments to cloud environments, remember that the ability to implement service management with visibility, control and automation across an extended enterprise will distinguish the most successful implementations. IT leaders will be at the forefront of efforts to create smarter enterprises with business processes that are:

- Dynamically responsive to any customer demand, market opportunity or external threat
- Integrated end-to-end across the company
- Integrated across industry value nets of partners, suppliers and customers

The increased responsibility and deeper level of partnership with the rest of the business allows—or rather, requires—IT leaders to wield more influence, lead innovation and change, as well as to provide more value. As a CIO, you will be at the very center of this transformation.

Not sure how to get started? Figure 3 shows a typical road map. The standardization, automation and self-service associated with cloud can certainly lower costs and unlock productivity, but only if service management and cloud are deftly applied with a clear idea of how the parts fit and operate together seamlessly. As the road map illustrates, you can start with a plan phase that is comprehensive and defines the basic direction and anticipated outcomes from both the business and IT perspectives. Define and assign the integrator role, then build a robust service management environment with cloud capabilities that span all partners. Deploy these capabilities and optimize the results.

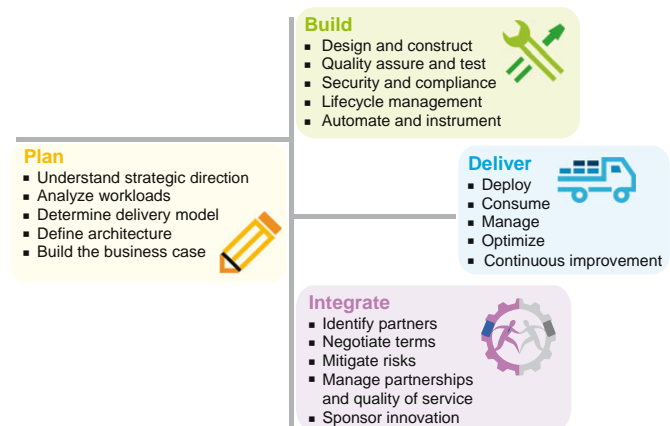


Figure 3. Service management and cloud capability road map

Start with a plan phase that is comprehensive and defines the basic direction and anticipated outcomes from both the business and IT perspectives. Define and assign the integrator role; then build a robust service management environment with cloud capabilities that spans all partners. Deploy these capabilities and optimize the results.

Whether you are upgrading your service management capabilities or just beginning to move to cloud computing, IBM can assist you. We are a proven partner with decades of extensive experience in virtually all of the constituent IT elements and aspects that could be relevant for your cloud journey. With knowledge gained from operating several commercial clouds, we are an industry leader in both Integrated Service Management and cloud computing. We provide a range of service management and cloud computing offerings and tools, which can be customized to suit your unique needs. We also offer a full spectrum of assistance, from business consulting to joining an operational IBM business cloud.

For more information

IBM welcomes the opportunity to discuss your specific needs with regards to integrating service management into your cloud computing strategy. Please contact your IBM marketing representative, or visit the following websites:

ibm.com/services/itsaconsulting or ibm.com/cloud



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September 2010
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¹ IT Infrastructure Library, Version 3

² IBM Market Insights, Cloud Computing research, July 2009



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