

IBM's Vision For The New Enterprise Data Center

A breakthrough approach for efficient IT service delivery



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Introduction

The pace of business is rapidly accelerating. Globalization and knowledge-based economies are forcing companies to embrace new business models and emerging technologies to stay competitive in a dynamic market.

The problem is, not all of today's IT infrastructures were built to support the explosive growth in compute capacity and information that we see today. Many data centers have become highly distributed and somewhat fragmented. As a result, they are limited in their ability to change quickly and support the integration of new types of technologies or to easily scale to power the business as needed.

A more integrated IT approach is needed. We must rethink IT service delivery to help move beyond today's operational challenges to a data center model that is more efficient, service oriented and responsive to business needs. With improved levels of economics. Rapid service delivery. And one that can provide tighter alignment with business goals.

IBM has developed a strategy for the New Enterprise Data Center—an evolutionary model for efficient IT delivery that helps provide the freedom to drive business innovation. Our approach allows organizations to be better positioned to adopt integrated new technologies, like virtualization and cloud computing, to help deliver dynamic and seamless access to IT services and resources. As a result, IT departments spend less time fixing IT problems and more time solving real business challenges.

Through our unique approach to efficient IT service delivery, IBM captures an end-to-end view of the IT data center and its key components. As such, the strategy for the new enterprise data center integrates the elements of:

- Highly virtualized resources
- Efficient, green and optimized infrastructures and facilities
- Business-driven service management
- Business resiliency and security
- Information Infrastructure

This paper shines a spotlight on—and provides an outline for our strategy. From technology to consulting and strategy services to the implementation of business processes, the New Enterprise Data Center helps enable innovation. This paper will show you what it can do for your business.



Market forces are driving change

Right now, technology leaders are challenged with managing sprawling, complex distributed infrastructures and an ever growing tidal wave of data, while needing to remain highly responsive to business demands and continued cost pressures.

Dynamic collaboration capabilities, Web 2.0 technologies, integrated information infrastructures and cloud computing are gaining mindshare within the CIO community, but questions about implementation costs, return on investment and ongoing management resources prevail, and could reduce the overall business value these capabilities could deliver.

Daily operational challenges

IT professionals have continued to express concerns about the magnitude of the operational issues they face. These operational issues include:

- **Costs and service delivery:** The daily expense of managing systems and networking is increasing, along with the cost and availability of skilled labor. Meanwhile, there is an explosion in the volumes of data and information that must be managed, stored and shared. These pressing, issues result in growing difficulty for IT departments to deploy new applications and services. Some facts to consider:
 - Server management and admin costs have grown four-fold since 1996¹
 - Data volumes and network bandwidth consumed are doubling every 18 months with devices accessing data over networks doubling every 2.5 years²
 - 37 percent of data is expired or inactive³
- **Business resiliency and security:** Global expansion has increased the need for tighter security measures. Users require real-time access to confidential, critical data. Enterprise risk management is now being integrated into corporate ratings delivered by such organizations as Fitch, Moody's and Standard & Poor's.⁴ At the same time, companies are demanding that users have instantaneous access to this information, putting extra—and often conflicting—pressure on the enterprise to be available, secure and resilient.

The 2008 CEO Study and CIO Implications Report noted that more than 80 percent of CEOs anticipate significant change in their marketplace over the next three years yet voice concern over their ability to handle, even embrace this changing environment.



Consider:

- The average US legal discovery request can cost organizations from \$150,000 to \$250,000⁵
- Downtime costs can amount to up to 16 percent of revenue in some industries⁶
- 84 percent of security breaches come from internal sources⁷

- **Energy requirements:** The larger a company grows, the greater its need for power and cooling. But with power at a premium—and in some areas capped—organizations are forced to become more energy efficient. In fact, energy costs related to server sprawl alone may rise from less than 10 percent to 30 percent of IT budgets in the coming years.⁸

These trends are forcing technology organizations to become more energy efficient—to control costs while developing a flexible foundation from which to scale. In fact:

- Power and cooling costs have grown eight-fold since 1996⁹
- During the next five years, it is predicted that most U.S. enterprise data centers will spend as much on energy as hardware—and twice as much on server management and admin costs¹⁰
- Over 40 percent of data center customers report power demand outstripping supply¹¹

- **Changing applications and business models:** A major shift has taken place in the way people connect—not only between themselves but also to information, services and products. The actions and movements of people, processes and objects with embedded technology are creating vast amounts of data, which consumers use to make more informed decisions and drive action.
 - By 2011, it is estimated that:
 - 2 billion people will be on the World Wide Web
 - Connected objects—cars, appliances, cameras, roadways, pipelines—will reach one trillion

The bottom line? Enterprises report that IT operational overhead is reaching up to 70 percent of the overall IT budget. And that number is growing—leaving precious few resources for new initiatives.¹²



Harnessing new technologies to support the business

If you're spending most of your time mired in day-to-day operations, it's difficult to evaluate and leverage new technologies that could streamline your IT operations and help keep your company competitive and profitable. Based on the 2008 CEO Study and CIO Implications Report, the design of the IT environment needs to:

- Provide a flexible, resilient, highly scalable IT infrastructure
- Enable collaboration and help turn information into business insight
- Facilitate global integration with a shared service model
- Support evolving business models and rapid integration of acquisitions and mergers
- Provide support for broad company-wide 'green' initiatives

In parallel, the rate of technology adoption around us is moving at breakneck speed, and much of it is disrupting the infrastructure status quo. Consider some examples:

- In 2007, there were 3 billion mobile subscribers worldwide—and that number is estimated to grow to 4 billion by 2010.¹³
- Between 2003 and 2006 stock market data volumes rose by 1750 percent in financial services markets alone.¹⁴
- Data volumes and bandwidth consumed are doubling every 18 months with devices accessing data over networks doubling every 2.5 years.¹⁵

Increasing speed and availability of network bandwidth is creating new opportunities to deliver services across the web and integrate distributed IT resources. Easier access to trusted information and real-time data and analytics will soon become basic expectations. This will require systems, data, applications and networks that are always available, secure and resilient.

Further, the proliferation of data sources, RFID and mobile devices, unified communications, cloud computing, SOA, Web 2.0 and technologies like mashups and XML create opportunities for new types of business solutions.

Ultimately, all of these new innovations have a tremendous effect on improving communication and service, reducing barriers for market entry and evolving how organizations do business.

“More than 70 percent of the world’s Global 1000 organizations will have to modify their data center facilities significantly during the next five years.”¹⁶

—Gartner, September 2007

Evolving business models

The Internet has gone beyond a research, entertainment, or commerce platform. It’s now a platform for collaboration and networking, and has given rise to means of communication that we wouldn’t have thought possible just a few years ago.

Mobile devices, such as a Blackberry or an iPhone, now give us the ability to transport information—or access it online—nearly anywhere we choose.

Today, the people at the heart of this technology acceleration—Generation Y—are those who can’t imagine a world without the Internet. They are the ones entering the workforce in droves, and they are a highly attractive and sought after consumer segment. Because of this, business models are no longer limited to business-to-business or business-to-consumer. Instead, these new generations of technology—and people—have created a bi-directional business model that spreads influential content from consumer-to-consumer to communities-to-business. Consider:

- FedEx.com averages 7 million shipped packages a day. That’s 7 million tracking numbers, billing addresses, credit card numbers or account codes that need to be stored, managed, accessed and connected.
- E-ZPass IAG processes 1 billion toll transactions per year, amounting to two-thirds of all toll revenue in the US.
- YouTube needs 600 terabytes of storage to show the 100 million videos on its site. YouTube serves up to 100 million videos a day online.

What does all of this mean? Today, the power of information, and the sharing of that information, rests firmly in the hands of the end user while real time data tracking and integration will become the norm.

Cloud computing can change how IT supports business

Cloud computing can enable a dynamic computing model that enables rapid innovation for applications, services and service delivery. IBM considers cloud computing a potentially cost-efficient model for provisioning processes, applications and services while making IT management simpler and increasing business responsiveness. In a cost-benefit analysis, a properly implemented and leveraged cloud computing model can drive lower cost-of-ownership, responsive delivery of services, and higher service quality.



Many of IBM's largest customers are looking at the introduction of Web 2.0 applications and cloud computing style data centers. Numerous newer Web 2.0 enable data centers are starting to expand—and while they have some key strengths, like scalability and service delivery, they are also facing similar operational challenges as traditional data centers.

The new data centers that are leveraging some of the early cloud IT models for either acquiring or delivering services, or both, are able to be very nimble and scale very quickly. As a style of computing in which IT-enabled capabilities are delivered as a service to external customers using Internet technologies—popularized by such companies as Google and SalesForce.com—cloud computing can enable large, traditional-style enterprises to start delivering IT as a service to any end user, at any time, in a highly responsive way. Yet, data centers using these new models are facing similar issues of resiliency and security as the need increases for consistent levels of service.

Industry spotlight: Evolution in the banking industry

The banking industry is a good example of how the business model has changed. Thirty five years ago, people used human tellers at a branch location to make cash transactions.

Banking hours were highly limited—what didn't take place by 3 p.m. on a Friday had to wait to 10 a.m. the following Monday. In the late 1970s, banks introduced the automated teller machine (ATM), which revolutionized the industry. For the first time ever, money was made accessible around the clock.

Enter the 1990s and the Internet. Suddenly, instantaneous access to a host of financial services is made available from a home computer.

Now, by embracing emerging technologies, like Web 2.0 and cloud computing, the financial services industry will have the capacity to dynamically deliver even more banking services to end users in the form they choose, and reduce the back-office operational overhead that cuts into profit.



Implications for today's CIO

Cloud computing is just one example of how advances in technology—servers, storage, networking equipment and software—can make an immediate impact on the business. Across all industries, consumers are demanding that information be made available when and where it's needed and that communication take place in the blink of an eye. All this is great news for business, but it's putting a tremendous amount of pressure on IT.

CIOs that leverage a transformational approach to the data center can point to better alignment with business value through customers who are satisfied, systems that are meeting key service-level agreements and IT that is being leveraged to drive business innovation. The open, scalable and flexible nature of the new enterprise data center enables collaboration and global integration, while supporting continually changing business models.

The solution to these challenges will not come from today's distributed computing models—but from more integrated and cost efficient approaches to managing technology and aligning it with the priorities of organizations and end users. To that end, we see an evolutionary computing model emerging—one that takes into account and supports the interconnected natures of:

- The maturing role of the mobile web
- The rise of social networking
- Globalization and the availability of global resources
- The onset of real-time data streaming and access to information



Transforming to a New Enterprise Data Center model

IBM's vision for the new enterprise data center provides for a new approach to help clients transform to a business-driven IT service model, creating an evolutionary new way of efficient IT delivery. Through it, you can leverage today's best practices and technology to better manage costs, seamlessly access IT services, resources and information, improve operational performance and resiliency and quickly respond to business needs. Its goal is to deliver:

- ***New economics:*** Not just incremental improvements in savings or cost reductions—but dramatic improvements, brought about by leveraging virtualization with optimized systems and networks—across all systems resources—to drive up utilization, enhance reliability—and greatly improve the underlying cost structures
- ***Rapid deployment of services:*** The ability to deliver quality service quickly is critical to businesses of all sizes. By shifting the focus from operational management to service management and by creating highly virtualized resource pools for server platforms, storage systems, networks and applications—IT can provide efficiencies of scale, quick provisioning and improved energy efficiency.
- ***Tight alignment with the business to support innovation:*** Now equipped with a highly efficient, shared and dynamic infrastructure, along with the tools needed to free up resources from traditional operational demands, IT can more efficiently respond to new business needs. As a result, organizations can focus on trying out new innovations and aligning resources to broader strategic priorities. Decisions can now be based on real-time information. Far from the “break/fix” mentality gripping many data centers today, this new environment creates an infrastructure that provides automated, process-driven service delivery and is economical, integrated, agile and responsive.

Enabling The New Enterprise Data Center—a holistic, integrated approach

What makes IBM's approach for efficient IT service delivery so unique? As many businesses move toward a reintegration of the data center environment, a step that is often driven by economics, a holistic approach is needed. IBM captures an end-to-end view of the IT data center and its key components. IBM also recognizes service requirements, budget constraints and the needs of the business—and integrates them in such a way as to make true, demonstrative improvements in the overall model of IT.

For example, upgrading the information infrastructure to provide integrated and trusted information to users will likely require changes to security and business resiliency approaches. And, creating highly virtualized resources are most effective along with a stronger, more integrated service management approach.

As such, the strategy for the new enterprise data center needs to be holistic and integrate the key elements of:

- **Highly virtualized resources** that eliminate server, storage and network sprawl by dramatically improving utilization of IT resources. With a virtualized infrastructure new IT resources can be quickly provisioned, dynamically adjusted to changing business requirements, and provide for enhanced business resiliency.
- **Efficient, green and optimized infrastructures and facilities**, which balance and adjust the workloads across a virtualized infrastructure and align the power and cooling consumption with business processing requirements across all IT and data center facilities. The result is balanced energy demands to help avoid high peak energy use and the associated higher energy billing rates.
- **Business-driven service management**, in which a complex and difficult-to-manage environment is transformed for improved transparency—and cost-efficient, easier management. This transformation involves raising management tasks from the simple monitoring of individual resources to the orchestration of the entire environment to be more responsive and efficient. Business controls are maintained and availability and performance is maximized *across the entire enterprise*.



IBM was named ComputerWorld's No. 1 Green IT Vendor in 2008. According to ComputerWorld, "Green computing promises an enormous win for IT: a chance to save money—and the environment. Many companies are trying to go greener, but a few truly stand out."²⁵

- **Business resiliency and security** allowing an agile business to develop a solid, highly available, infrastructure and resilient enterprise; one that is based on proven solutions to help keep systems on-line, secure and recoverable. Solutions designed to meet your resiliency goals mitigate costs associated with downtime and loss of unsecured data as well as the agility to grow and change seamlessly with the business.
- **Information infrastructure** to provide a comprehensive approach to a resilient infrastructure for securely storing information and mitigating business risks—while providing a foundation for IT to help unlock the business value of information. IBM's approach to information infrastructure addresses compliance, availability, retention, and security requirements while helping businesses get the right information to the right person at the right time.

Many companies have begun to address some of these challenges head on. In fact, between 30 to 50 percent of large enterprises have consolidated or are consolidating today, and most are doing some level of virtualization.¹⁷ Those that have really advanced these efforts are seeing significant returns or savings.

Some of our clients—and IBM's own data center transformation—have shown the ability to:

- Triple asset utilization¹⁸
- Provision new resources in minutes¹⁹
- Reduce heat by up to 60 percent²⁰
- Reduce floor space by as much as 80 percent²¹
- Reduce disaster recovery time by 85 percent²²
- Cut back on system outages by 58 percent²³
- Reduce power usage by 40 percent²⁴

Is your organization seeing these types of benefits? If not, the possibilities do exist. In fact, today, IBM is working with clients who *are* seeing these kinds of improvements. And, their efforts are not only impacting the bottom line—they are freeing up the technology resources and human capital to work on new innovation projects.



The New Enterprise Data Center: the journey evolves

Most likely, many companies have already started to implement a few key components on their way to a new enterprise data center model. Some have projects in place to consolidate and virtualize servers, data silos and storage. Others are exploring new ways to optimize information availability. In reality, though, few data centers today begin with a clean slate.

To truly maximize the benefits of this new model, you must start planning your transformation—or journey—and that begins with consideration for where you and your priorities are today. You don't build a house without a blueprint. Why would it be any different with your IT infrastructure?

IBM has identified three stages of adoption along this journey: Simplified, Shared and Dynamic. Each offers a range of benefits that can be achieved as you progress along the continuum toward deploying a new enterprise data center.

Simplified: This stage is about reducing costs and maintaining control of information assets and the physical infrastructure, such as storage, servers, networks and information. Breaking down individual silos of similar resources with consolidation and virtualization, and deploying end-to-end systems and network tools, organizations can help simplify the management of the data center, and improve utilization, resiliency and security. Most enterprises begin their journey here.

Scaling back—an IT service transformation program

By consolidating, optimizing and virtualizing its servers and storage, the University of Pittsburgh Medical Center reduced its physical systems inventory by up to 60 percent. Plus, it consolidated 40 storage subsystems down to two storage area networks (SANs). Because it reduced energy, complexity and labor, the organization has been able to trim costs by nearly \$40 million.



Shared: This stage is about providing rapid service delivery by creating a shared and highly integrated IT infrastructure that can scale quickly and efficiently without being limited by facilities or energy. Here, organizations can better collaborate and share information within a secure environment. In this highly virtualized and shared environment, integrated service management takes on a primary role to help organizations:

- Understand the relationships and dependencies among physical and virtual infrastructure components.
- Monitor application, system and transaction performance across the virtual environment.
- Utilize resources more efficiently through the ability to automate critical operations, such as provisioning.

Dynamic: At this stage, an organization can achieve true flexibility. The physical tie between services delivered and the underlying infrastructure is removed, and the organization can now bring new services online rapidly, without concern over where they are going to execute. Essentially, the complexities of managing the underlying IT infrastructure are now 'automated and optimized,' allowing IT staffs to reduce tactical, operational tasks and focus on more strategic initiatives.

Dynamically manage capacity and demand

An IBM Information Infrastructure solution helped the Natural History Museum in London face backup challenges due to soaring storage demand, increased information retention requirements, and new digital data formats. Their new, improved capacity and shared storage resource pool has simplified their management and cut their backup times by more than 80 percent.

Information can be accessed, discussed and better utilized, and new business models can be created from the dynamic analysis and integration of information from across the enterprise.

In a dynamic environment:

- Virtualization is raised from the virtualization of individual systems and workgroups to the automated provisioning and allocation of resources and services that comes with the virtualization of entire environments, or “clouds.”
- There can be fully converged networking, embedded supercomputing and real-time processing and integration of trusted information to drive unprecedented levels of responsiveness and flexibility.
- Green operations are seen converging across IT and physical assets and efficiency is gained through standardization and the automation of policies and processes through service management.
- IT is delivered to the business as services, which fully integrates IT delivery with business processes in an efficient, reusable fashion, and provides real time integration of transactions, information and analytics.

IBM puts IT tools in the hands of its researchers

To support its research team, the IBM IT group developed a Research Compute Cloud (RCC), to reduce the time and management overhead required to support ever-changing IT service needs. As a highly virtualized shared infrastructure with automated service management, the RCC provides researchers the ability to obtain common application services, such as a new database, in minutes instead of days or weeks. Through this new venture the IBM IT staff has improved the research team's productivity—and satisfaction with IT.



“For IT executives looking for a single, one-stop shop for assistance in transforming their IT infrastructure and data centers—and for a company with a comprehensive vision complemented by associated products and expertise—IBM should be first-and-foremost on any enterprise data center transformation short-list.”²⁶

—Clabby Analytics, Oct 2008

IBM's commitment to evolving IT service delivery


IBM offers an approach that is built on real-world experience, embraces open standards and is supported by an ecosystem of technology partners. We continue to invest in open communities to speed the process and acceptance of new types of technologies. Our commitment is based on real-world experience and a proven track record of taming disruptive innovations such as using the internet for e-business, leveraging open source to produce enterprise Linux, and now harnessing the efficiencies of cloud computing for the new enterprise data center.

Our focus is as much on process as it is technology transformation. With thousands of highly successful customer transformation engagements over the last few years, we've been able to identify best practices for IT optimization and transformation. Our vast experience has enabled us to develop a proven and disciplined strategy, design and implementation approach incorporating consolidation, virtualization, service management, information infrastructure and 'IT as a set of services' patterns to simplify your transformation, regardless of your starting point. And as our experience grows, we continually enhance the blueprints that are needed to move to a truly efficient, dynamic service delivery environment.

Our experience is at all levels—from technology, consulting and strategy services through business processes—to collaborate with our clients and help them gain value at every stage.

IBM's own data center transformation

IBM has been on this journey toward a new enterprise data center for years. We were faced with many of the same issues as our largest customers, including server sprawl, a multitude of data centers, systems and applications all being managed by more than 125 CIOs. Our transformation efforts with consolidation and optimization have yielded a cumulative benefit of \$4.1 billion so far. Through our "Project Big Green" initiative, we are on target to double our compute capacity by 2010 with no planned increase in consumption or environmental impact. And as we move toward a fully dynamic IT model, we anticipate continued improvements of service delivery, real-time integration of data analytics and information and the true delivery of IT as a business service.



How to start on your own journey

Transformation to a new enterprise data center is an evolutionary one. Therefore, getting started requires you to identify your starting point on the continuum—aligning immediate needs with your long-term vision. For example, some organizations may have critical operational issues that need to be addressed today. Others may be improving availability and security within the infrastructure. With years of proven experience and our established reference architecture, IBM can help you define your starting point, address immediate needs and develop a detailed roadmap that offers rewards at every milestone along the way.

Conclusion

Organizations in every industry are exploiting advanced technologies to gain competitive advantage. And, infrastructure complexity and rising energy costs are driving higher operational expenses for organizations. IBM's vision for the new enterprise data center offers an evolutionary new model for efficient IT delivery—giving you the tools to overcome the minutia of daily operations to drive real business innovation. And, IBM can provide the roadmap, tools and support to help you get there.

The New Enterprise Data Center: What can it do for your business?

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For more information

To find out how IBM can help you transform your data center, contact your IBM representative or visit: ibm.com/datacenter

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