

What IBM's vision for a Dynamic Infrastructure means for CIOs

The CIO's role in creating the Enterprise of the Future



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Introduction

It's hardly news to anyone that a well-run IT organization lies at the heart of virtually every successful enterprise. And it certainly won't be news to any CIO that an effective, efficient, and resilient infrastructure is the lifeblood of a healthy IT operation. The explosive growth in computing capacity and information availability, coupled with an increasingly dynamic marketplace, has played a key role in recent business innovations. But those same forces have also begun to strain the very IT infrastructures that helped make such shining success stories possible, driving the need for a new approach.

The fact is, not all of today's data centers were built to support the kind of demands they're now facing. Huge volumes of important data reside in silos that can't easily be integrated. And the resulting server, storage and network sprawl—often across continents—means operating and managing a significantly more complex IT environment. That complexity is making it extremely difficult for IT organizations to implement changes quickly enough to address new business opportunities with new technologies and to scale their resources efficiently enough to power expanding business needs.

Nonetheless, change is here to stay—and the prognosis is that it will usher in a “new enterprise” in the very near future. That's why we believe it's time to start thinking about our vision for a dynamic infrastructure—taking a recentralized approach to IT service delivery with a computing model that's more efficient and better positioned to align IT with business goals, offering the support necessary to take advantage of new opportunities and secure a competitive edge.

Highlights

Operational issues, costs and business concerns create the “perfect storm”

Many CIOs say that the complexity of operating today's distributed infrastructures is preventing them from bringing innovation to their organizations at the speed they would like. What's more, running these distributed operations is consuming an increasing percentage of already strained IT budgets, often preventing CIOs from applying resources to the kind of development activities that can help drive innovation for the business. The result is a “perfect storm” of forces driving the need for true data center transformation.

Energy costs related to server and storage sprawl alone may rise from less than 10 percent to 30 percent of IT budgets in the coming years.

This expansive growth in both physical infrastructures and the facilities required to contain them means there's a corresponding need for more power and cooling. But with power at a premium—and in some areas capped—organizations are being forced to become more energy efficient. Energy costs related to server and storage sprawl alone may rise from less than 10 percent to 30 percent of IT budgets in the coming years, pressuring CIOs to further control costs while developing a flexible foundation from which to scale. Meanwhile, escalating real estate costs simply exacerbate the bite that facilities costs are taking out of many IT budgets.

Of course costs aren't the only concern for CIOs, many of whom are also finding it difficult to make these decentralized models secure and resilient. Add to that the profusion of business processes that are now dependent on IT applications like e-mail and instant messaging—which were formerly considered less critical than other business applications—and it's easy to see why CIOs are viewing their current data center models with serious concern.

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Medical imaging and large volumes of unstructured information are just two areas in which technology changes are driving the need for new infrastructure.

What happens when new technologies take off

The availability of powerful computing sources and dense storage devices is changing some industries faster than others.

Medical imaging is driving breakthroughs in diagnosis and treatment—and leading to exponential growth in the number and size of digital medical images. Medical images that used to be two-dimensional and 1 MB in size a few years ago are now four-dimensional and 1 TB. By 2010, it's estimated that 30 percent of the world's storage will be taken up by these medical images.¹

Financial services firms can now get a better grasp of events effecting world markets—where speed determines winners and losers. The volume of market data will soar from 5 billion messages per day in 2006 to nearly 130 billion messages per day by 2010.² The resulting increase in information shared across various systems also increases demand for real-time analytics.

In the ***communications services*** industry, the number of mobile phone subscribers worldwide is expected to grow to over 4 billion by 2010—up from approximately 1 billion in 2002.³

Since existing infrastructures are simply not suited to handle this exponential growth, modifying data center facilities to accommodate requirements for faster access to greater volumes of data will be a key IT imperative over the next five years.

Looking toward the future, this combination of growing operational issues—along with the overwhelming onslaught of advances in technology and the pressure from business to innovate—is raising serious concerns among most CIOs. Sharing similar concerns, some 1,130 CEOs recently told IBM that

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they, too, see an Enterprise of the Future characterized by accelerating, wide-ranging and uncertain change. But as the IBM Global CEO Study reports, rather than resisting this change, these CEOs are embracing it. They're setting a new enterprise agenda centered around change that encompasses innovation, global integration, evolving business models and a new focus on corporate social responsibility. And they're turning to their IT organizations to help drive this change.⁴

The situation provides forward-thinking CIOs with a unique opportunity to play an important role in creating the Enterprise of the Future—as both IT service providers to the enterprise and as the executive leaders of IT. One of their best responses to these challenges will be to transform their data centers to a business-driven IT service model. This new model will allow them to move beyond today's operational challenges of cost, complexity, resiliency and security to provide a more responsive, dynamic, agile environment that can support the Enterprise of the Future. This new model is a dynamic infrastructure.

A new approach to IT service delivery will allow CIOs to better manage costs, improve operational performance and resiliency and respond to business needs more quickly.

What is IBM's vision for a Dynamic Infrastructure?

A dynamic infrastructure allows for an evolutionary approach to efficient IT delivery, helping to provide the flexibility that can enable business transformation and drive business innovation. With a new approach to IT service delivery, CIOs will be able to better manage costs, improve operational performance and resiliency and more quickly respond to business needs—by delivering dynamic and seamless access to IT services and information, and helping to improve both productivity and satisfaction.

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The goal of a dynamic infrastructure is to help companies achieve:

- ***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—accomplished by uncoupling the applications from the underlying resources to greatly improve their portability and the underlying cost structures*
- ***Rapid deployment of services:*** *Because the ability to deliver quality service quickly is critical to businesses of all sizes, managing the underlying infrastructure and service levels is critical to ensuring quality service delivery, at any scale—requiring a very mature, robust and integrated service management strategy that leverages automation and makes it possible to see and manage information vital to the business more efficiently*
- ***Tight alignment with the business:*** *A highly efficient and shared infrastructure can allow organizations to respond rapidly to new business needs—with easy access to the real-time information necessary for making sound decisions quickly, and for anticipating challenges instead of simply reacting to them.*

Making the move toward an integrated data center environment takes a carefully considered, holistic and well-coordinated approach.

So how do you get there? Making the move toward an integrated data center environment takes a carefully considered, holistic and well-coordinated approach.

Recognizing the benefits of a Dynamic Infrastructure

Many companies have already begun implementing a dynamic infrastructure model. In fact, between 30 and 50 percent of large enterprises have consolidated or are consolidating today, and most are doing some level of virtualization. Those that have really advanced these efforts are seeing significant savings.

Some of our clients—and IBM, with our own data center transformation—have been able to:

- *Triple asset utilization*
- *Provision new resources in minutes*
- *Reduce heat by up to 60 percent*
- *Reduce floor space by as much as 80 percent.*

In fact, today IBM is working with clients whose efforts are both impacting the bottom line and freeing up the technology resources and human capital necessary to work on new innovation projects.⁵

While incremental improvements to each area of a dynamic infrastructure can improve overall operations, it's important to recognize that improvements in one area could cause strain in another. Providing integrated information to end users, for example, could stress security and business resiliency measures. Creating highly virtualized resources demands a stronger, more integrated service management approach. Consolidation, meant to optimize systems and reduce energy consumption, could drive up the density of systems and end up creating "hot spots" within the data center unless it's properly designed and implemented. These same consolidation efforts can also create higher availability requirements for the remaining servers.

Clearly, these focus areas can't be viewed as mutually exclusive concerns. Improvements in one area need to be matched with tools and techniques to support them in another. And managing the service infrastructure remains a critical challenge to data center transformation. As IT and business processes and services continue to integrate, service management takes on an increasingly important role in managing and automating IT and business services. Ultimately, knowing how one change can affect multiple aspects of the infrastructure is a key strategic element in driving delivery of services in support of business needs.

Hunger for change creates an important opportunity

While 83 percent of the CEOs who participated in the IBM Global CEO Study say that substantial change is needed within their enterprises, only 61 percent report that they've accomplished change successfully in the past.⁶ This gap between the anticipated need for change and the ability to manage it has nearly tripled since IBM's 2006 CEO study. And it represents a sizable opportunity for CIOs, who are uniquely positioned to be the major business transformation drivers for their enterprises.

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CIOs can serve as catalysts for change across the enterprise, shaping change rather than just reacting to it.

The IT strategies behind data center transformation can deliver increased business flexibility.

CIOs have visibility across the enterprise, with a unique understanding of the core processes and information that make the organization function effectively. This means CIOs can serve as catalysts for change across the enterprise, shaping change rather than just reacting to it. By moving toward a dynamic infrastructure model, CIOs can help enable the Enterprise of the Future. And in doing so, they can help decrease costs and increase flexibility by implementing a strategy which integrates the following key elements:

- ***Highly virtualized resources***, which remove the linkage between applications and data and the underlying physical resources—to better adapt to changing business needs and deliver responsive provisioning and efficient resource utilization
- ***Efficient, green and optimized infrastructures and facilities***, which balance workloads across a virtualized infrastructure and align power consumption with business processing requirements
- ***Business-driven service management***, which reduces complexities by raising management tasks from simply monitoring individual resources to orchestrating the entire environment in a way that makes it more responsive and efficient
- ***Business resilience and security*** approaches and best practices that become increasingly important with the consolidation of data centers and the recentralization of systems and data
- ***Information infrastructure***, which allows for managing information growth with an end-to-end approach that increases service levels, meets compliance requirements and reduces total costs.

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For example, the CIO of a large automotive distributorship has a dashboard that includes a meter showing how long it takes to process an online loan application. The CIO knows that when this key performance indicator drops below a certain level, the company begins to lose business. But if, prior to reaching that point, the dashboard can alert him to a potential problem, he can then investigate, diagnose and resolve any IT-related delays before they result in quality-of-service issues that can negatively impact the business.

Global integration lets CIOs help shrink the world

Businesses in virtually every category are looking to capitalize on global integration in order to tap into new marketplaces and sources of expertise. The IBM Global CEO Study indicates that outperforming companies tend to choose globally optimized business designs, partner more frequently, and pursue mergers and acquisitions more often than other study participants.⁷

CIOs can help shrink the world by breaking down operational, technological and even cultural barriers to global integration. Specifically, technology can enable globalization via the global integration of applications and common data strategies, enabling improved communications and access—from anywhere, via any device, at any time. In a globally integrated enterprise, with the right infrastructure, information—including the e-mail and instant messaging communications that have become critical to global collaboration—flows seamlessly around world. The common standards necessary to the success of a dynamic infrastructure are equally important to ensuring that happens.

For example, a large financial services institution's help desk/services organization uses a "follow the sun" approach to support. Because all its support centers use common processes and technologies, they can transfer problems from center to center, around the world, "following the sun"—and taking advantage of the fact that it's always daytime or a standard shift time somewhere in the world. So the help desk can literally work on solving problems 24/7, reducing the business impact of problems and accelerating solutions.

The common standards that are key to the tenets of a dynamic infrastructure are important to ensuring that information flows seamlessly around the world.

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The dynamic infrastructure model allows CIOs to reduce the environmental impact of IT and help increase an organization's social responsibility.

New technologies, including consolidation and virtualization, are helping companies of all sizes reduce data center energy consumption and energy costs.

Making a genuine effort, not just generous gestures

A new generation of socially minded customers, workers, shareholders and partners is placing greater emphasis on corporate social responsibility, particularly as it relates to the environment. The IBM Global CEO Study shows that nearly 70 percent of CEOs see this as a positive trend and are committing more investment into addressing these issues.⁸

CIOs are in a unique position to lead by example on green initiatives and reduce enterprise energy consumption. The dynamic infrastructure model allows CIOs to reduce the environmental impact of IT and generate significant energy savings via consolidation and virtualization. What's more, the conscientious disposal of used hardware can reduce environmental waste concerns. And by providing IT support for workforce mobility initiatives, CIOs can help to reduce the energy consumption created by long commutes.

In May 2007, IBM introduced the industry's most ambitious effort to enable green IT—both for IBM and our clients. Since then, IBM has helped more than 2,000 clients implement hardware, software and services technologies that help them reduce data center energy consumption and cut energy costs by more than 40 percent, often with innovative, creative problem solving. For example, IBM helped a Swiss IT company create a new energy-efficient, highly secure data center. However, while the new data center generated much less heat than its predecessor, heat was still a byproduct of the infrastructure. So, instead of simply allowing the heat to dissipate into the environment, the company found an innovative way to use it to heat a local public swimming pool. And while the energy savings makes for a winning return on investment for the company, knowing they're making a socially responsible IT decision creates a win-win situation for all those concerned.

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Employing standardization can address unnecessary IT complexity and help decrease risk while increasing visibility and flexibility.

Why increased standardization leads to increased flexibility

It may come as a surprise that while one of the key goals of a dynamic infrastructure is to increase flexibility, one of its key prescriptions for making that happen is to increase standardization of everything from server and storage architectures to IT management processes. Does that pose a fundamental conflict?

Actually, the more flexibility an organization needs, the more important standardization becomes. Complexity (which we know is a key feature of today's global organizational model) makes change a high-risk undertaking, where the fear of making a system-crippling mistake can significantly slow down progress. You know the drill: Fix one thing and you could end up breaking something else as a result.

But standardization—to the degree that it's feasible—reduces the number of options and scenarios to be considered before making a change to an organization's infrastructure. This is where ensembles and clouds offer real promise. And by eliminating or masking unnecessary complexity, the IT organization can move faster. For example, establishing a globally consistent enterprise architecture makes it easier to see the big picture and avoid potential pitfalls.

At the same time, standardization can help decrease risk by reducing the number of things that need to be changed and, as a result, reducing the number of things that can go wrong.

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You need to start planning your transformation by considering where you and your priorities are today.

You can get there from here

If you're like many leading CIOs today, chances are you've already begun to implement at least a few key initiatives on the way to establishing a dynamic infrastructure model. Whether you're in the process of consolidating and virtualizing servers and storage, breaking down data silos, or exploring new ways to optimize information availability, you're probably working with an IT infrastructure that's already in place. That means you need to start planning your transformation—or journey—by considering where you and your priorities are today.

IBM has identified three stages of adoption along this journey: simplified, shared and dynamic. While not mutually exclusive, each offers a range of benefits that can be achieved as you progress along the continuum toward deploying a dynamic infrastructure.

The **simplified** stage involves consolidating data centers and the physical infrastructure, such as storage, servers, networks and information. By combining pools of similar resources and deploying end-to-end systems and network tools, organizations begin to simplify the management of the data center, allowing it to become more resilient and secure. Service management takes on an increasingly important role in automating and monitoring the newly integrated IT and business services.

The **shared** stage is focused on creating a shared IT infrastructure that can scale rapidly and efficiently without being limited by facilities or energy. Here, organizations can begin to gain increased efficiency and flexibility by creating highly virtualized resource pools for server platforms, storage systems, networks, information and applications. This provides efficiencies of scale and

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Virtualizing resource pools for servers, storage, networks and even applications enables you to take advantage of economies of scale otherwise not available to individual companies.

Your data center becomes “green by design”—not just in how it uses power, but in the ability to increase capacity and scale to any level, as required.

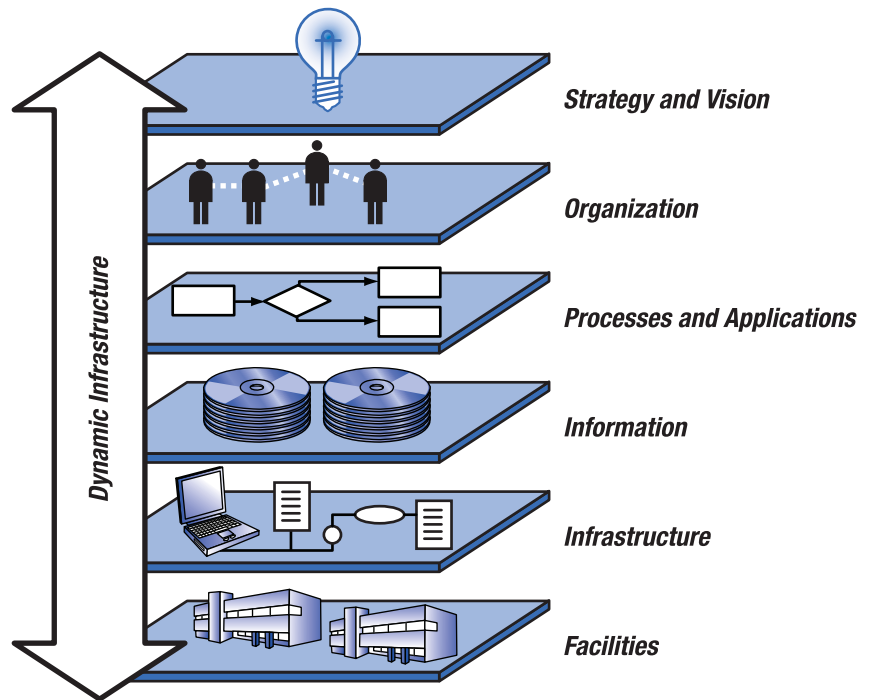
reduces overhead, because each homogeneous pool, or “ensemble” is managed as a single resource. With large pooled resources, utilization can rise, energy efficiency can improve, service delivery can become more flexible and the entire environment can be better aligned with business demand. Resources fluidly flow to where they're needed most.

And with the need for improved management becoming increasingly critical, it's important to note that this shared environment allows for quick and easy provisioning of new IT resources on an as-needed basis—whether you're responding to seasonal sales growth or the launch of a new application or business service. This dramatic increase in flexibility and responsiveness is enabled by policy-based service management, which allows these pooled assets to be easily provisioned and cohesively managed through a service catalog.

Finally, a shared infrastructure permits movement, control and balance of workloads and data. Energy management tools, which can tie into data center power and cooling systems, help further improve energy efficiency. Your data center becomes “green by design”—not just in how it uses power, but in the ability to greatly increase capacity and scale to any level, as required.

At the **dynamic** stage, you can achieve true flexibility and freedom. You've removed the physical tie between services delivered and the underlying infrastructure, creating an IT cloud. You now can bring new services online rapidly, without concern over where they're going to execute. For example, a user can simply request a new service—and a level of service quality—without having to worry about how it's built and delivered. Essentially, the

complexities of the underlying IT infrastructure are now “hidden” from the user. It’s also automated and optimized. And given that IT services are offered in terms of service levels, rather than specific technologies, you have the ability to modify resources to be as cost effective as possible without disrupting business.



The transformation to a dynamic infrastructure calls for aligning and integrating people, process and technology. To free up resources from daily IT operations, you need to adjust the skill sets of your IT staff so they can transcend the common break-fix mentality. And, labor forces need to be organized around service delivery—creating a paradigm shift toward a shared environment. These changes in human behavior are driven by process improvements. That means putting the right standards and disciplines in place to support this new level of flexibility.

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IBM's own data center transformation

The transformation to a dynamic infrastructure is not a single event, but rather a commitment to a journey that delivers value—aligning and integrating people, process and technology all along the way.

IBM has been on this journey for years. We began in the simplified stage, and through various levels of consolidation and centralization, we have seen tremendous benefits, including savings of up to \$1.5 billion in operational costs per year. In 1997, we could identify 128 IBM CIOs who managed over 150 host data centers running 15,000 applications. Today, thanks to our data center transformation, we have one CIO and seven host data centers running under 5,000 applications.

We moved into the shared phase with “Project Big Green,” which is projected to double our computing capacity by 2010 without increasing power consumption or impact. And for every dollar saved on energy, we’re projecting operational savings of \$6 to \$8. We also expect that virtualization will allow our consolidated environment to use 80 percent less energy and 85 percent less floor space, while it also lets us improve security, resiliency and inventory accuracy (including application-to-server mapping), speed provisioning, reduce complexity and increase stability and availability.

As we continue 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.

For every dollar saved on energy, IBM is projecting operational savings of \$6 to \$8.



Conclusion

CIOs in every industry are all too familiar with the operational and financial challenges that growing infrastructure complexity and rising energy costs are creating for their organizations. IBM's vision for a dynamic infrastructure offers an evolutionary new model for efficient IT delivery—giving CIOs the tools to overcome the minutia of daily operations to drive real business innovation. It's an approach that allows CIOs to:

- *Position themselves as agents of change within their organizations*
- *Help break down barriers to global integration*
- *Lead by example on green initiatives and reduce enterprise energy consumption.*

That means CIOs will be better able to align IT with business goals and help pave the way for creating the Enterprise of the Future.

For more information

For more information on making the journey toward a dynamic infrastructure, and to learn how IBM can help your organization take a centralized approach to IT service delivery—with a data center model that's more efficient and better positioned to align IT with business goals—contact your IBM representative, or visit:

ibm.com/cio

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¹ IBM's Vision for the New Enterprise Data Center. *A breakthrough approach for efficient IT service delivery*. May 2008

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⁵ IBM's Vision for the New Enterprise Data Center.

⁶ CIOs as masters of change: transforming their IT organizations and driving transformation across their enterprises.

⁷ Ibid

⁸ Ibid



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