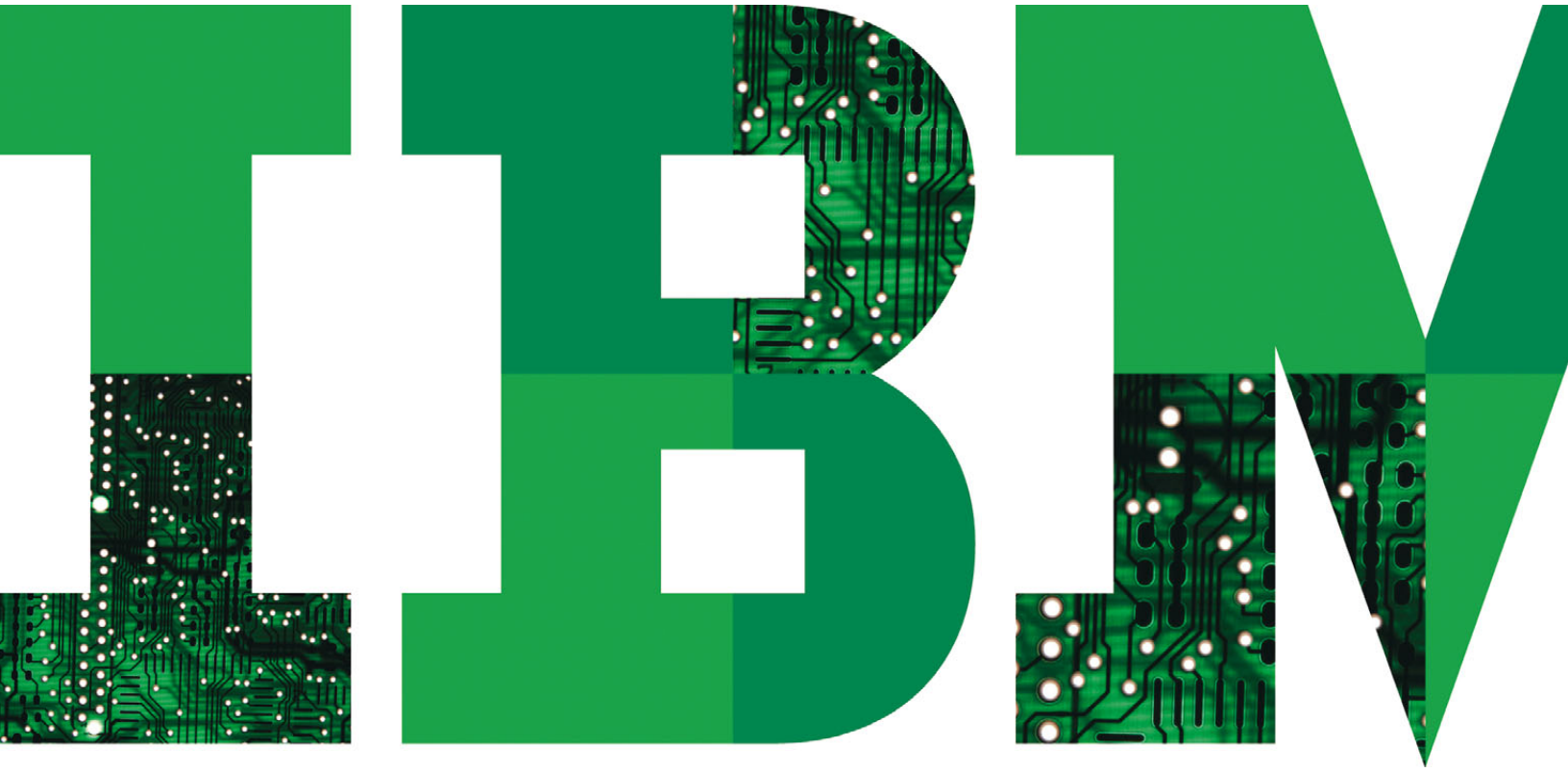
Defining a blueprint for a smarter data center for flexibility and cost-effectiveness

Analytics-based services provide insight for action



IBM

Introduction

Change is accelerating for data center and IT managers. We project that US$1.5 trillion is being spent every year on IT—hardware, software and IT services. Furthermore, 70 percent to 80 percent of every IT dollar may still be spent on just managing the current data center environment. But IBM global studies of CEOs and CIOs show clearly that executive management teams expect IT to make greater and more contributions to the business.

IT managers are caught between addressing today's challenges and finding ways to leverage IT infrastructure to transform spending by putting more dollars to work to solve new problems, including the development of new products, gaining insights on clients or moving into new market segments. There are proven ways to design and manage data center infrastructures so they can provide greater flexibility in responding to change and do so more cost-effectively to transform spending. These new approaches leverage analytics-based services to provide insight into your infrastructure to help your teams unleash greater business value. They help you implement a smarter data center.

How we define smarter data centers

The hallmarks of a smarter data center include flexibility, cost-effectiveness, and the capability to actively monitor and manage operations for continual improvement. Working together, they help transform the impact of data center investments and unlock new value for the enterprise.

Flexibility—Data centers need to be able to respond to future unknowns in business requirements, technology and computing models. It is hard for any company to accurately forecast those needs over the expected 10- to 20-year life of a data center. Building for flexibility is one of the only practical ways to be able to address those unpredictable demands.

Cost-effectiveness—A data center infrastructure needs to adapt to be more cost-effective, for both capital and operating costs. Both IT and facilities assets—people, processes and equipment—need to be used more effectively, while new capacity needs to be deferred until it is required.

Active monitoring and management—More software management tools need to be employed to infuse automation and intelligence into the day-to-day operations of the data center to actively monitor and manage the environment. This helps you focus on providing the availability, capacity planning and energy efficiency needed to address business growth.

Four simple ways to help IT managers make their data centers smarter

The goals of more flexibility, greater cost-effectiveness, and a better use of active monitoring and management software in the data center are within reach. The actions needed to achieve them are, in fact, quite simple to implement, and completing several projects can combine to provide better business outcomes and immediate payback. The four ways are:

- Extending the life of the existing data center infrastructure
- Rationalizing the data center infrastructure across the company
- Implementing flexible design to be responsive to change
- Providing integrated management of IT and data center operations

Extend the life of the existing data center infrastructure

*Double IT capacity or reduce operational expenses by 50 percent**

Rationalize the data center infrastructure across the company

*Improve operational efficiencies while reducing operational expenses by 50 percent**

Flexible design to be responsive to change

*Pay as you grow by deferring 40–50 percent of capital and operational costs**

Integrated management of IT and data center operations

*Lower operational costs up to 20 percent**

*Based on IBM or IBM client experience.

Figure 1: These four simple techniques can help you create a smarter data center.

Analytics transform insights into action to drive more value

A smarter data center requires a better way of analyzing the challenges involved in transforming IT infrastructure and spending. Using sophisticated analytics and tools can help you better understand your infrastructure in order to construct specific, fact-based financial and business models for IT operations to provide the foundation for making improved decisions and taking the next big step to unlock your infrastructure to provide increased business value. Traditionally, companies have had to make decisions about their IT operations without the benefit of tools that could help interpret data and model outcomes. Now, planning future investments for data center capacity or adopting emerging technologies such as cloud computing can be more predictable, resulting in savings of up to 40 percent of technology infrastructure expenses through balancing IT capacity with business growth, in our experience.

Analytics-based services apply relevant facts to optimize current IT investments but also provide insights needed to make the best use of limited resources. This broad array of new analytical capabilities applied to data centers takes data generated from your IT operations and turns it into a set of facts to make smarter business decisions in four specific ways:

Assess with speed and rigor—Discovery tools help you rapidly gain insights to prioritize your actions and determine what to focus on next.

Model outcomes with precision—After you determine the critical areas that you need to focus on, you need to accurately evaluate alternatives to predict outcomes and reduce risk.

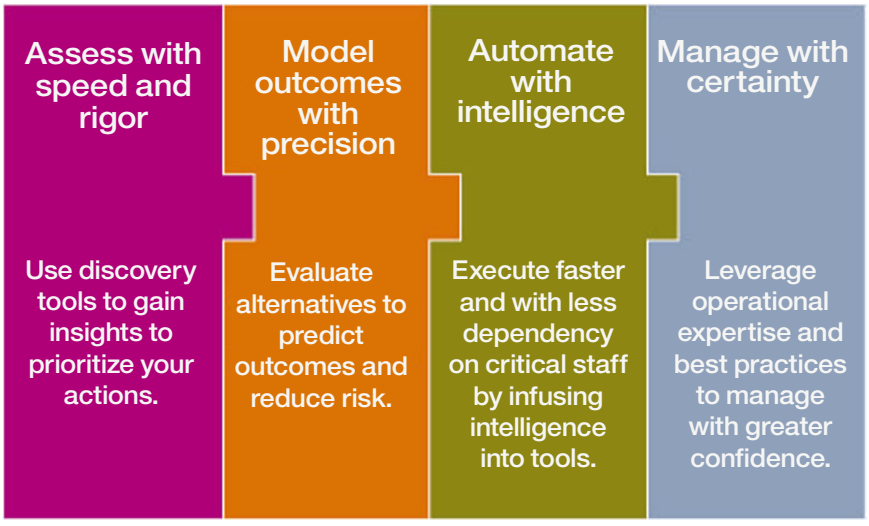


Figure 2: Analytics help turn insight into action to transform spending.

Automate with intelligence—Analytics can help you execute faster and with less dependency on critical staff by infusing intelligence into automation, helping you free up your skilled resources to do those things that are more valuable for the organization.

Manage with certainty—Analytics can also help you manage your infrastructure with greater confidence by leveraging operational expertise and best practices.

By helping you assess, model, automate and manage, we can help you find and unlock new areas of business value from your existing and planned infrastructure investments. IBM analytical services—combined with the insights and experience of your IT staff—have helped many of our clients create smarter data centers.

Extend the life of existing data center structures

First, recognize that you have a series of data center assets today—servers, storage, networks and data centers—that are running your current IT operations. And these assets may already be paid for, so anything you can do to extend their life enables you to defer the need to make significant capital expenditures on new IT technology or additional data center capacity. When we look at industry trends, we can see that a huge number of servers—perhaps as many as 80 million—will be needed in the next few years. And yet distributed server utilization appears to be low—somewhere around 15 percent—while virtualization maturity is trending upward to 20 or 30 percent. So there's obviously a lot of opportunity to improve asset utilization. In our experience, extending the life of a data center can double IT capacity or reduce operational expenses by 50 percent.

Case study: expand capacity with virtualization and right-size the facility

We extended the life of the IBM strategic outsourcing data center in Lexington, Kentucky, where we host approximately 20 clients. First, our analysis found that 60 percent of the 1,500 UNIX® servers installed were at 5 percent utilization or less. With 20 times more servers than we needed, we began a virtualization program. We have improved our 3 percent to 5 percent server utilization rate to 30 percent to 50 percent and were able to virtualize 70 percent of the base workloads. After completing the virtualization, we rightsized the data center facilities to optimize the cooling environment and reduce energy consumption by 10 percent. Using energy management software, we achieved an additional 15 percent to 20 percent energy savings by determining the actual power used in the data center. The result was that we spent a few million dollars to improve asset utilization and deferred US$50 million of capital costs.

The IBM Lexington case study initially focused on server virtualization. We are also working on storage optimization to deal with the projected 650 percent explosion in storage growth with utilization rates remaining low at 20 percent to 30 percent.

One of the best ways to start improving your storage performance is with a fact-based analysis. We helped a large North American telecommunications client analyze its 1 petabyte of storage and identified how to save the company US$16 million

over three years. Our analysis included a comprehensive set of recommendations to rationalize and reclaim, virtualize and tier, and deduplicate and archive data as well as on how to govern and improve the client's storage management process.

When consolidating your infrastructure, don't overlook middleware optimization. One of our global automobile manufacturing clients consolidated its middleware infrastructure and gained significant cost savings of 71 percent. Simplifying and standardizing its environment on just one application—its customer relationship management system—reduced its cost from US$28 million a year to US$8 million a year. Because the environment is much more standardized now, the company significantly increased both availability and its responsiveness to new customer demands.

Analytics: assess with speed to virtualize more complex workloads

Virtualization remains one of the top priorities for CIOs because it is a well-known way to improve the cost-effectiveness of resources. Yet virtualization maturity trails off after the easy workloads—the file and print workloads, the application development workloads, and so on—have been virtualized. To drive more virtualization, we've developed analytics-based capabilities in our server optimization services to help with virtualization for more complex Microsoft® Windows® and Intel® workloads. Using industry-standard tools, we determine which of the 20,000 variables in server environments matter. Our experience doing thousands of engagements provides insights on which 10 variables allow us to sort workloads into six scenarios to virtualize them. We can tackle more complex workloads and provide the expected 6–18 month virtualization return on investment (ROI) while implementing them with 50 percent reduced transformation costs.

Analytics: automate with intelligence to handle the data explosion

A 6.5-times storage growth every year can't be addressed by relying only on storage architects. You need to automate with intelligence to allow processes, not people, to provision storage. So we helped the architects of a Canadian telecommunications company define a set of policies one time so they can be used every time a user requests storage. We defined 15 to 20 standard data types and defined the key performance indicators that were mapped to their specific storage infrastructure. The client was able to reduce 80 percent of the senior architect's time using the intelligent storage services catalog service from IBM. In addition, the client saved approximately US$1.5 million over three years in just hardware costs by increasing its storage utilization to 50 percent and reducing the amount of Tier 1 storage requested.

Rationalize the data center infrastructure across the company

After improving one data center, looking across the data center portfolio can yield significant operational savings and efficiencies. Our experience is that more than 50 percent of clients have more than three data centers, including backup sites, remote locations, wiring closets and server rooms. Data center portfolios have grown significantly through mergers, acquisitions and geographic expansion. Data center consolidation is designed to provide strategic cost savings, reducing high infrastructure costs by relocating away from expensive data center leases or ineffective locations. Tactically, consolidation can improve operational efficiencies, reduce the assets managed and improve resource utilization. There is a significant opportunity to improve operational efficiencies while reducing operational expenses—perhaps by as much as 50 percent.

IBM's own data center consolidation experience bears this out. In the 10 years from 1997 to 2007, IBM consolidated the total number of data centers used to manage our own business from 235 to 12 in all geographies. We consolidated from 31 different networks to one globally managed network and reduced the number of deployed applications from more than 15,000 to just 4,700. The operational cost savings has totaled US$1,500,000,000 over the past five years.

A data center strategy provides objective analysis to help you rationalize the complexities in your data center portfolio to address increasing application availability and capacity requirements and to improve operational efficiency.

After you've made the decision to consolidate a data center, you realize that a move is more complex than simply physically relocating a few servers from one location to the next. You have to think about the risks to the availability of data and applications during the move. Depending on the industry, the revenue cost of a single application outage could run from hundreds of thousands of dollars to millions of dollars—per hour. You have to be confident that your migration strategy can anticipate and avoid these crippling unplanned outages.

Analytics: model outcomes to rationalize data centers to transform operational costs

Working with IBM Research, we've infused mathematical modeling into our data center strategy services and the tools used to help bring the future into the present so you can take action today. The analytics are designed to reveal your existing data center state in both financial and operational terms and to model alternative scenarios based on your business data.

A global hospitality and services organization needed to reduce operational expenses, improve security and redundancy, and consolidate its environments based on merger activity. Working with our data center strategy analytic tools, the company was able to build a consolidation plan to reduce 13 data centers to two. The analytics helped them examine a wide range of implementation options, performed objective analysis and created an implementation path to start the transformation process to accommodate future business growth.

Analytics: assess with speed to seamlessly relocate users

Our experience has shown that manual inventories made by clients are generally 70 to 90 percent accurate, but planning a major relocation requires a more accurate inventory. Working with IBM Research, we have applied mathematics to create analytics for a logical dependency mapping tool that maps application and server dependencies to plan for relocations. This can help us identify up to 100 percent of the server, storage and application assets that need to be moved.

A large financial services institution was planning a move and needed to better understand its environment—especially the 700 Windows and Intel technology–based servers and more than 400 critical applications deployed on all the platforms. The organization was able to reduce the time to understand the dependencies between applications and servers by 50 percent as compared to manual methods using the analytics for logical dependency mapping. Analytics also helped the company reduce risk and costs by identifying areas of the IT environment that needed to be remediated before the move—such as unsupported environments or operating systems. Through more insightful understanding of the logical dependencies, planners were able to move equipment and applications without disruptions as well as identify and fix a key single point of failure in a critical application.

Use a flexible design to be responsive to change

As demand for IT services increases, so does the need to increase the data center capacity to house the IT equipment. Ideally, you would want to design a data center with the flexibility that you would need (and at the lowest capital and the lowest operating cost that you can achieve) over the 10- or 20-year life cycle of the data center. Moving from large, monolithic designs to modular data center designs can deliver significant benefits to fuel business growth, adapt to change, provide flexibility, match short-term capacity requirements with long-term growth and do so in a cost-effective manner—and more quickly.

Modular data center design is not about containerization; it's about using smaller increments of standardized components to enable you to match your business requirements to your IT requirements and add data center capacity when needed. A modular approach can allow you to pay as you grow and buy only what you need, when you need it, to defer capital and operational cost by perhaps 40 percent to 50 percent.

Case studies: flexible design helps scale critical services

We have worked with midsize and large enterprises to provide cost-effective and flexible modular data centers—implementing more than 500 modular data centers for clients from Boston to Bangalore. A midsize government organization needed to support an increase in demand for its services—many of which were available on the Internet. The scalable modular data center was able to double the IT capacity with virtually no increase in energy usage. Modular designs work for large companies as well. We designed an enterprise modular data center for another client to reduce both costs and complexity while improving quality and speeding the deployment of services—using half the energy required of a similar facility.

Analytics: model outcomes with precision to select the right option

Because data centers have to be viable for decades, one of the best investments you can make before you build a data center is to invest in creating a statement of requirements. Data center strategy services—including a physical threshold capacity analysis—help forecast capacity requirements many years into the future, allowing clients to know how long their data centers will remain viable and when they will need to be upgraded. A new approach developed by IBM Research uses patent-pending computational algorithms and modeling to determine how to address changing demands on data center capacity.

A major bank input its expected application growth, IT strategy and current data center capabilities into the tool, which provided an objective analysis on data center capacity thresholds to predict energy and space capacity requirements. It showed the need to plan to support IT over a 10-year period, resulting in the need to support three to five times the IT power. This led to a flexible design, including a dual zone strategy that is estimated to save the bank US$1 million a year.

Capital costs often get 100 percent of management's focus, but they may only account for 15 percent of the total cost. Potentially 60 percent of capital costs and 75 percent of a data center facility's operating costs may result from the major electrical and mechanical equipment. Our experts use data center design life-cycle cost analytics to help clarify trade-offs between capital and operating costs over the life of a data center facility. For example, by evaluating in a vendor-agnostic fashion approximately 20 options for computer room air conditioners, we found that capital costs can vary by a factor of five. When we took the best of each group, the operational cost still varied by 140 percent. This type of cost analysis can help you make more-informed decisions.

Integrate management of IT and data center operations

Availability is at the heart of what any data center must provide, with increasing application availability requirements and decreasing tolerance for downtime. Application outage windows are getting shorter and shorter, so mitigating outage risks is critical to your company. Yet application availability must also be maintained in a cost-effective manner.

As IT departments continue to be asked to take on more functions with limited resources and expertise, businesses need to use managed and outsourced services to allow them to focus on more business-critical and strategic functions. Businesses are taking advantage of a variety of options to address their management needs, such as moderating the level of support from staff augmentation or "flexible labor," hosting and managing the infrastructure, and transferring personnel and assets to the provider. Finally, integrating the management of your IT and facilities operations can lower your operational costs by up to 20 percent, in our experience.

Case studies: integrate IT and data center management for efficiency

We helped a government agency with operational support for three data center locations. Altogether, we provided 71 staff members to oversee the government agency's IT systems, providing around-the-clock coverage through a single, unified workforce. We provide direct operations support for the client's mainframe, midrange systems, peripheral equipment and print environment. To encourage a high level of operation and usability for the managed data center environments, we offer first- and second-level operational support to the client's three data centers, resolving issues related to various factors including batch processing schedules, database administration, data transfers and script executions.

In another example, a French auto supplier needed to improve its storage management. The supplier contracted with IBM to manage the storage environment, resulting in operational cost savings of at least 20 percent through storage optimization by using flexible sharing options.

Analytics: manage with certainty to reduce alerts and improve availability

We're finding that our midsize clients are seeing the average cost of outages increasing to more than US$70,000 an hour. This requires them to determine how they can get better insight into ways to improve the management of their IT infrastructure to address availability, capacity and energy efficiency.

A food manufacturer had a rapidly growing IT environment but was facing escalating costs, recurring downtimes and lost productivity, requiring significant technical talent to solve its operational problems. Using IBM Tivoli® Live – monitoring services, we were able to drastically reduce the time to isolate and diagnose critical system problems. By applying automation with intelligence, we implemented policies that reduced 88 percent of the alerts presented to operators. This allowed the manufacturer's IT staff to focus on problems affecting its business performance and resulted in a 30 percent reduction in Severity 1 incidents and a 17 percent improvement in application availability.

Get started with an individual project that can provide immediate payback

You can undertake a number of individual projects right now to create a smarter data center—and leverage analytics-based services to achieve greater value. In our experience, each of them can provide immediate payback, and their cumulative benefits can be even greater.

- *Server and storage consolidation and optimization*—double your IT capacity or halve your operational costs, or go one step further and tackle the more complex workloads and automate your storage provisioning to free up your critical architects
- *Middleware optimization*—gain 20 percent to 30 percent savings in your middleware costs by including application rationalization in your projects
- *Data center strategy*—model your alternatives and determine your optimal portfolio to gain up to 50 percent improvement in operational costs and significant operational efficiencies
- *Data center consolidation*—map application and server dependencies to provide a seamless transition to your users
- *Data center design*—leverage life-cycle cost analytics to identify how to defer capital and operating costs by 40 percent to 50 percent
- *Integrated management*—lower your operational costs by 20 percent

Why IBM?

Leading-edge but tested analytical methods provide the foundation to leverage your existing IT infrastructure and identify how to transform IT spending to unlock business value as never before. Analytics-based services provide additional insights on your operations to turn them into actions. Taking a comprehensive approach in implementing steps toward a smarter data center may be the best and fastest way to start receiving their highest value.

IBM has proven capabilities in smarter data centers that help our clients achieve their desired outcomes and deliver value. You can leverage the experience of a service provider that invests in developing innovative tools based on thousands of implementations on a global basis to help your team gain insights and benefits faster. We can help you flip that 70 percent you may currently spend on maintaining your current environment to fund new IT capabilities and innovations. Further, you can leverage IBM Research innovations, including advanced mathematical modeling and patent-pending capabilities, to analyze your data center and take action to make it smarter, more flexible and more cost-effective today.

For more information

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