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With digital technology increasingly embedded into the systems and processes that comprise our world, everyday entities—roads, buildings, store shelves, even oil wells—now have the ability to monitor their environments and generate intelligence that can be used to do things better, smarter. These capabilities are laying the groundwork for a smarter enterprise, but also a smarter planet. And in this fiercely competitive and difficult economy, becoming smarter is imperative for any business that expects to survive and any CIO who expects to lead.

**Four routes to a smarter enterprise**

With problems that run the gamut from rising cost pressures and resource shortages to higher service expectations, there are many opportunities to become a smarter enterprise. Companies will need to rethink their systems and operations for greater efficiency. They’ll need to radically simplify and speed how services are delivered, connections are made and information is mined, in short, how business gets done.

Four business priorities currently topping executive agendas point to the need for a smarter way.

**Information explosion.** The volume and variety of information being generated by a proliferation of end-user devices, systems and people are exploding. However, much of it is trapped in siloed databases and inaccessible to the users who need it to solve problems and make critical business decisions. The answer lies in intelligent systems that can cut through the clutter, extract critical insights and transform them into actionable knowledge before competitors do. Innovations in business analytics—including information visualization, simulation software and stream computing enabled by powerful computers and real-time analysis—can deliver this kind of predictive intelligence, speeding the time-to-value for information and enabling better decision-making with higher returns and lower risk.

**Rigid processes.** A rapidly changing world demands flexibility. Companies must have the ability to accommodate a quick shift in direction or complete reinvention as economics and markets change. But many are hampered by business and IT processes that are too complex, fragmented or rigid to enable change. Service oriented architecture (SOA) and business process management (BPM) simplify business processes and the underlying applications, facilitating adaptation and optimizing processes for new situations. Collaboration technologies like Web 2.0 can increase workforce productivity and innovation, while serving the rising expectations of an increasingly interconnected, informed and influential user community.

**Inflexible infrastructure.** Many of the systems comprising traditional IT infrastructures are inflexible and obsolete, having been stretched well beyond their original designs. The resulting complexity often limits IT’s ability to meet the changing needs of the business. These days, the IT infrastructure needs to be in sync with the business and
operate just as dynamically. A dynamic infrastructure breaks down the barriers between business and IT, integrating systems and other assets to drive operational efficiency, better risk management and improved service. It employs disciplines like service management and techniques like virtualization, standardization and process automation to reduce infrastructure cost and complexity.

**Green initiatives.** Energy and the environment have become hallmarks for the social conscience of the corporation. Under mounting pressure from clients, employees, regulators and other stakeholders, the enterprise is being called on to do its part to find more socially responsible, environmentally friendly ways of doing business. The good news is that the fundamental technologies involved in working smarter—a dynamic infrastructure, workforce collaboration and better intelligence—can also drive sustainability by increasing resource efficiency and eliminating waste.

**Taking on the smarter enterprise: guidance for CIOs**

Becoming smarter is an evolutionary process, with as many points of entry as potential results. Where companies begin and how they proceed depends on their strategic needs and objectives. As the technology leader responsible for driving business change, CIOs are in the best position to enable the smarter enterprise. They can bring together stakeholders from across the organization to establish a tactical roadmap for transforming the enterprise. They can deploy an infrastructure capable of delivering actionable, real-time intelligence, increasing energy efficiency and facilitating collaboration on a global scale. And they can spearhead the implementation of technologies like virtualization, master data management and process automation that make transformative change possible.

CIOs’ horizontal view of the business enables them to see how siloed assets and a lack of standards can fragment the business operation, and how integration, collaboration and services can be most beneficial to the business. Their ability to see the synergies between business and IT and to provide enterprisewide governance helps ensure that every smart initiative is in alignment with the company’s overall business strategy.

IBM’s own journey to become smarter can provide CIOs with indispensable guidance. Lessons learned, backed by IBM’s technology know-how, depth of experience and vision, can facilitate the transformation for other companies en route to a smarter enterprise.

For more information

For more information on the smarter planet and the implications for CIOs, please call your IBM representative or IBM Business Partner, or visit:

- [ibm.com/think](http://ibm.com/think)
- [ibm.com/cio](http://ibm.com/cio)
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Introduction

The world is becoming a much smaller place with unprecedented global integration, increasingly smart, networked technologies and the explosion of bandwidth. Evolving social networking technologies are connecting the workplace and the marketplace, enabling collaboration at new levels. New digital devices, generating streams of data shared across a global information ecosystem, are enabling new business opportunities and business models. This information and collaborative energy is being applied in fields like health care, transportation, distribution and the environment to solve problems and to improve the way business operates, governments lead and people interact—in short, the way the world works.

At a more fundamental level, these advances are enabling individuals and businesses to do things smarter, to improve the quality of their lives and deliver more value using the skills, capabilities and resources they have. Critical and regulated activities like financial processing and human resources management are increasingly becoming automated for greater control and reduced risk. Customer information is being turned into intelligence that can drive sales through improved marketing strategies, service plans, fulfillment and delivery.

But this smarter way of doing things is not a given. Change is constant and inevitable. History tells us that change can be a catalyst for doing things better, but it can also complicate things for companies whose systems and processes aren’t flexible enough to adapt. How companies respond is critical. Those that see change not as a threat but as an opportunity for improvement stand to make the greatest gains.¹

Sitting squarely at the center of this volatile business environment and technology storm is the CIO, increasingly called upon to lead by incorporating the latest technological advances into the enterprise’s business strategy. Today’s CIO must turn the company’s strategic priorities into a blueprint for action.

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¹ See note at end of chapter.
The ability to build the IT-enabled enterprise of the future via a platform of digitally-powered, integrated business services is an essential discipline in today’s smarter, globally connected business environment. Moreover, service management activities for constructing and managing this digital business platform are increasingly being recognized as a strategic asset. The integrated digital platform is the new business infrastructure, and it offers even greater potential for value than the old physical infrastructure.

Faced with the dual demands of business strategy and IT execution, CIOs are in a remarkably unique position to innovate and transform the enterprise to deliver greater business value. The visionary thinking and technologies that will enable organizations to realize the promise of a smarter enterprise—and a smarter planet—begins with them.

The key, however, is not the unilateral implementation of new technology. The smarter enterprise requires smarter leadership, especially in IT. CIOs should look to develop infrastructures based on flexible enterprise architectures that are capable of responding to new business opportunities and enabling, rather than inhibiting, rapidly changing business strategies. Because these infrastructures provide the greatest value when they are tightly integrated with business objectives, CIOs need to understand and influence how the enterprise will leverage technology to achieve its goals. This means helping to achieve efficiency in all business operations, including IT, in order to free up capital to invest in new opportunities. It means applying the most effective technology to new IT-enabled business initiatives. And it means helping design a more flexible enterprise, both organizationally and culturally, to allow for more effective collaboration and to maximize the impact of new technologies and business processes.

But with IT budgets constrained, CIOs must be certain their IT investments deliver maximum business value. The ability to build the IT-enabled enterprise of the future via a platform of digitally-powered, integrated business services is an essential discipline in today’s smarter, globally connected business environment.
Why become smarter?

- It is estimated that the world’s data centers produce more carbon in a year than the total electricity usage of 36 million homes.
- In a world where 820 million people are undernourished, U.S. grocers and consumers throw away $48 billion worth of food every year.
- Global agriculture wastes an estimated 60 percent of the 2,500 trillion liters of water it uses each year, leaving one in every five people without access to clean, safe drinking water.
- U.S. retailers lose about $40 billion annually, or 3.5 percent of their sales, due to supply chain inefficiencies.

Becoming smarter

The smarter enterprise doesn’t just happen. With digital technology permeating almost every object, system and process, our world is becoming increasingly instrumented, interconnected and intelligent. But digital capabilities only lay the groundwork for the smarter enterprise. They can provide the computational power and automation to enable it, but not the business acumen or human cognition to steer it. Current business process and supply chain inefficiencies, excessive energy consumption and waste, and the meltdown of global financial markets are all indicative of the enterprise not functioning as smartly as it should or could (see sidebar).

Smart solutions demand convergence between business strategy and IT strategy. This strategic union is increasingly characteristic of today’s most successful enterprises. These organizations are increasingly tapping their CIOs to take ownership of business processes due to the vital role they play in planning, manufacturing and maintaining the digitally-enabled enterprise.

Certainly there is a tremendous need—and opportunity—for a smarter, better way of doing things. And with so much cutting-edge technology and networking now abundantly available and affordable, the age-old barriers to smart systems are fast disappearing. Sensors, meters and digital controls can be embedded into just about everything: into shipping containers to trace the flow of goods from loading docks to store shelves, into oil fields to increase pump performance and well productivity, into bridges to monitor corrosion and traffic overload, and into end user devices to monitor and adjust billing rates based on user demand.

What’s more, computing power now exists to capture and analyze all the resulting data in real time, enabling companies to capitalize on changing conditions as they happen—and before problems occur. This is the new business reality driving
In this fiercely difficult economy, becoming smarter is a mandate for any business that expects to survive and any CIO who expects to lead.

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the smart enterprise. It is made possible by computing models grounded in open standards, networked for global collaboration and built on powerful, highly virtualized backend systems capable of extraordinary processing speeds, advanced business analytics and autonomic response.

These new and emerging technologies are enabling companies and institutions to rethink their systems and operations for a smarter world. Radically simplifying how services are delivered, connections are made and information is mined is essential to speeding time-to-value and appealing to increasingly informed and socially aware customers. In this fiercely difficult economy, becoming smarter isn’t just an option. It’s a mandate for any business that expects to survive and any CIO who expects to lead.

Four business priorities offering substantial opportunity for a smarter way are discussed in the remainder of this paper:

- The need for **new intelligence** to manage the mountain of information generated daily by increasingly connected systems, devices and people, while gaining richer insights and making faster, better decisions
- The need for **smart work** to improve the agility of enterprise business processes and the organization’s ability to benefit from and enhance the expertise and creativity of its people
- The need for a **dynamic infrastructure** with the operational efficiency to drive down costs and the flexibility to assimilate change and drive competitive advantage
- The need to support **green and beyond** initiatives in response to escalating energy, environment and sustainability concerns, and stakeholder requirements for social responsibility.
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**Armed with the intelligence to fight crime**

Today the New York City Police Department’s (NYPD) Crime Information Warehouse provides over 37,000 officers with a single point of access to real-time data on virtually all crimes committed in NY’s five boroughs. With information no longer trapped in department silos, officers can see the big picture and share information that is critical to solving current crimes and preventing future incidents.

Using analytical, global mapping and visualization tools to compile and build intelligence from various strands of crime-related data (911 calls, crime statistics, dispatcher and officer reports), NYPD officers and analysts are able to identify crime patterns as they form. They are better able to predict crime and take proactive measures to stop it before it ever happens.

**New intelligence: gaining control of the information explosion**

CIOs have long been charged with ensuring the delivery of accurate, trusted information, but today it can be a daunting task to accommodate the enormous amount of data flooding the enterprise. Without a doubt, the escalating volume and variety of data streaming across enterprise networks, and the velocity with which decisions must be made, are driving the need for a new kind of intelligence.

Every day, information generated by a proliferation of end user devices, systems and people is exploding—at a rate eight times the volume housed in all U.S. libraries. To keep up with the speed of transactions today, systems must be capable of rapidly assimilating all types of structured and unstructured data from a variety of sources. Extracting critical insights and transforming those insights into actionable knowledge before competitors do is vital to business advantage. However, much of the enterprise’s intellectual capital is unavailable for real-time correlation or analysis, buried in databases tied to specific applications or business units. In many cases, the enterprise has not fully built out or integrated the digital platform of its business. The result: employees spend countless hours each week searching for and reformatting information which decreases in competitive value with each passing moment.

The missed opportunity associated with inaccessible or invalid data or the inability to make sense of it can be considerable, in some cases, astounding. Moreover, deploying new products or business models on the basis of flawed information can have costly consequences. IBM’s Global CFO Study 2008 found that finance executives who faced issues like these reported significantly smaller revenue and stock price growth compared to their better informed peers. Furthermore, without a consolidated, consistent base of trusted information, these CFOs found it increasingly difficult to make good investment decisions and
Deploying an information infrastructure for petabyte-sized growth

As a major environmental arm of the Australian government, Geoscience Australia maintains an enormous archive of offshore seismic data and satellite remote sensing data collected over decades. With growth expected to reach 2.7 petabytes in 10 years, the archive began to pose real challenges for the government agency.

By moving its data to a robotic storage and retrieval system using media that consumes considerably less floor space, provides more storage flexibility and has the capability to accommodate future growth, Geoscience Australia has been able to improve operational efficiencies. Labor-intensive and error-prone information management tasks have been replaced with automated processes. More importantly, the new information infrastructure has dramatically reduced access time from a month or more to as little as a day, with some data available for immediate download from the agency’s Web site.

“Illuminate the future direction of the enterprise.” Their companies were also more susceptible to risks because they did not have the necessary information to prepare for or manage threats. To be sure, risk mitigation tactics developed and executed without sufficient, quality information can spell disaster for a company.

Gaining control of all the information that is available to the enterprise is key to unlocking its business value. CIOs’ horizontal view of the business puts them in the best position to see how siloed information and the lack of enterprisewide standards can fragment the business operation, slow management reporting and limit the quality of decisions. Alternatively, they understand how technologies like master data management, information integration and data warehousing can provide an enterprisewide information platform that is the basis for enhanced visibility, control and insight. They know what it will take to aggregate the data locked up in departmental silos and convert it to meaningful intelligence. But laying out a plan is critical.

CIOs are instrumental in bringing together stakeholders from across the enterprise to establish an information agenda that identifies what data is important to the organization; how, when and to whom it should be made available; the technology required to support and access it; and the business processes and governance practices required to manage it over its lifetime. An information agenda enables business and IT to work together to build a best-in-class information management strategy for the organization and create a detailed roadmap to realize it. Of course, the solution involves more than just adding capacity to manage the growing volume of data. A robust and resilient information infrastructure is essential to supporting the changing needs of the business, enabling more effective information management by improving core capabilities like information compliance, availability, retention, and security. The goal is to deliver trusted, accurate information to optimize business performance and to unlock the underlying business insight and intelligence to enable competitive advantage.
Extracting real-time business insight for better market decisions

In the financial markets business, volatile trading conditions necessitate rapid decision making. With the ability to analyze live streaming data from a near-infinite number of sources, IBM Stream Computing is giving financial services firms up-to-the-minute intelligence to make more profitable stock market decisions.

Advanced software algorithms analyze data as it streams in, looking for correlations that satisfy traders’ queries, even pulling in new data streams as they become available. This means that traders can act on real-time information, rather than querying a fixed snapshot of data.

In the case of an impending hurricane, for example, streaming data from government agencies, weather stations, world markets and news feeds could project the hurricane’s movement and its potential impact on oil production and consumption. Traders could use these real-time insights to identify market opportunities and capitalize on them before conditions change—and before competitors do.

Understandably, companies that can quickly pull together real-time information from across the value chain to respond to market opportunities have an advantage over slower competitors. What’s required are the analytical resources to extract new, actionable intelligence from legacy systems, information networks and a near infinite array of online sources—and do it in seconds and minutes, rather than hours and days. Innovations like stream computing are making this kind of intelligence available, tracking and analyzing live streaming data from thousands of sources simultaneously. This combination of massive computing power and real-time analytics can be especially beneficial in the financial services, governmental and scientific fields, which would otherwise get bogged down by the large volumes of complex data and instantaneous analysis that modern business demands (see sidebar).

Advances in data visualization, situational awareness, predictive modeling and simulation software are also accelerating time-to-value. These technologies provide greater visibility into the current operation, but also a window to the future. That translates to smarter, more fact-based decision making and business forecasting with bigger returns and reduced risk. CIOs who can leverage these kinds of business analytics and optimization technologies to bring predictive intelligence to the enterprise can improve productivity, decision outcomes and the organization’s ability to work smarter.

Smart work: enabling the business for a rapidly changing world

Information empowers the enterprise to act, but the ongoing success of those actions depends in large part on the enterprise’s business process flexibility and its ability to unlock the potential of its people.

In a world driven by rapid change, the enterprise must be prepared to respond quickly and proactively. Process flexibility enables the enterprise to embrace change and, more importantly, to make necessary business adjustments to move
Eliminating gridlock through fee-based traffic management

Looking to reduce traffic congestion and lessen the strain on the environment, the leaders of a major European city implemented roadside cameras and radio frequency identification (RFID) readers to monitor traffic flow and assess road usage fees. Control points were located at city entrances and exits to identify and charge vehicles a fee based on the time of day—higher during peak times, lower during off-peak hours. Wireless transponders installed inside each vehicle triggered automatic payment.

At the end of the trial period, traffic was down nearly 25 percent and public transportation use was up by 40,000 passengers each day. That led to an 8 to 14 percent drop in emissions and a 40 percent drop in greenhouse gases in the city. What's more, the €84 million generated annually by the innovative traffic management system is now being reinvested to strengthen other city services.

Process flexibility is essential to working smarter. It enables a company’s business model and supporting processes to accommodate a quick shift in direction—or complete reinvention—as economic and market realities change. But many organizations are hampered by business and IT processes that are too complex or rigid to facilitate change.

Rigid business processes can limit a company’s ability to respond rapidly to unexpected events, such as supply chain disruptions, regulatory compliance announcements or natural disasters. With so many legacy, packaged and custom applications spread across the enterprise, business logic is often fragmented and embedded in multiple locations, making process changes difficult and time consuming. This can delay the delivery of new products and services and hinder business model innovation, seen as a major differentiator in today’s ultra-competitive global economy.

Interestingly, the average IT organization is not immune to process rigidity either. Like the business, IT organizations often have a diverse collection of tools and siloed information which make it difficult to correlate events across the enterprise infrastructure. Moreover, IT processes have traditionally been designed to avoid risk rather than manage it, making adapting to change inherently more difficult.

A survey of IT and business leaders from a September 2008 study conducted by Forrester Consulting and commissioned by IBM concluded that “the existing base of business applications is frequently inadequate to support dynamic processes and represents a serious barrier to improved operational efficiency and business innovation.” Adopting a service oriented architecture (SOA) strategy is...
SOA and BPM make it possible for business processes to adapt dynamically and proactively to emerging business events, without human intervention.

key because it supports the creation of dynamic business applications as a digital business platform for more flexible processes. Further, the addition of business process management (BPM) can enable the enterprise to reduce both applications and business processes to a series of policy-driven, reusable components that can be reassembled, based on changing business and user priorities.

The two strategies help companies break down the barriers between their business units, allowing horizontal process integration and a more fluid flow of work. They make it possible for business processes to adapt dynamically and proactively, without human intervention. Embedded logic enables business activities to be modified automatically in real time and optimized in response to specific business events. Analytics and process monitoring capabilities provide the enterprise with visibility into business process performance, while driving more timely and effective business decisions. Clearly, this is a smarter way of working for all business operations, including IT. Process automation can free the company’s scarce resources to concentrate on initiatives that truly add value to the business. CIOs play a crucial role in determining the right balance between process automation and human involvement, implementing automation technology where it will be most effective.

Leveraging the inherent expertise and creativity of people is also central to working smarter. Collaboration does just that, increasing employee productivity and opportunities for new insight and ideas, while enabling the enterprise to serve the rising expectations of an increasingly interconnected and Internet-savvy user community. But satisfying the broad information, service and quality demands of these more informed and influential customers, employees and business partners necessitates collaboration on a whole new level—integrated into the fabric of the business and enabled anytime, anywhere on a worldwide scale.
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Improving the efficiency of the value chain via real-time collaboration

Understanding the lack of efficiency inherent in the auto-leasing business, leasing solutions provider UBench International used wireless telemetry to streamline collaboration between leasing companies and the partners they are in constant contact with, namely insurance providers and repair shops. Today, devices embedded in each leased vehicle detect problematic changes in mileage, brake performance, engine temperature, etc., and automatically contact designated service facilities and the vehicle’s driver to schedule repairs.

The solution has dramatically improved the efficiency of the value chain. Problems can be solved while they’re still minor, lowering the cost of fleet maintenance and slowing vehicle depreciation. Leasing companies’ administrative costs have dropped by 35 percent per vehicle and insurance adjustment costs have dropped by 50 percent.

Web 2.0 technologies are revolutionizing enterprise relationships, enabling businesses to collaborate in more productive and innovative ways, filling in knowledge gaps and allowing geographically dispersed employees to brainstorm on business solutions and make coordinated decisions in real time. These technologies can drive the business forward, cultivating deeper relationships with clients and partners and delivering a personalized, richer user experience that builds loyalty.

CIOs have a major role to play in improving the way the organization works by putting in place the technology strategy to allow people and processes to work together naturally in pursuit of business goals. They can empower the workforce by incorporating social networking, wikis, blogs and virtual worlds into their companies’ marketing, development, sales and recruiting efforts. Moreover, they can create a stronger, more participatory business culture that fosters quick thinking and new ideas, while improving operational efficiency and talent levels across the company. This culture will prove inordinately valuable in attracting and retaining Generation Y employees, whose affinity for technology-enabled collaboration and Web 2.0 technologies is sure to be a springboard for next-generation innovation.

It’s important to recognize that as people are provided with the means to work smarter, it is possible to drive down the cost of their work. CIOs have an opportunity—and obligation—to establish an open, low-cost foundation for people to work. Self-service portals, automation capabilities and desktop virtualization increase efficiency and lower cost by optimizing workspaces and reducing the need for help desk and desk-side support. Open standards policies can reduce end user system and software licensing costs across the enterprise. CIOs are a driving force for changes like these.

Dynamic infrastructure: powering the business for tomorrow’s challenges

As information technology filters into every aspect of the physical world, from rail systems and parking garages to store shelves and household thermostats, it’s clear that there is a convergence occurring between business and IT. Today the IT infrastructure is an enabling force for the business, connecting value chains,
Virtualizing the data center to drive innovation

After years of server sprawl, a leading U.S. property and casualty insurer found itself without enough power and floor space for continued growth. Faced with a large number of underutilized servers and costly provisioning delays, the company chose not to build a new data center, instead electing to virtualize its existing infrastructure.

By consolidating workloads onto a virtualized infrastructure, the company was able to replace hundreds of standalone servers and avoid purchasing hundreds of new servers to handle growth. The company expects these changes will save US$15 million in the first three years, due in large part to an 80 percent reduction in environmental costs and a 50 percent reduction in hosting costs.

Besides the cost benefits, the virtualized environment is also driving a more innovative mindset across the company. With the ability to provision servers and capacity in a matter of minutes, developers are experimenting more, which is enabling the company to bring new services to market more quickly.

This poses a real challenge for CIOs, now charged with overseeing the traditional data center infrastructure while simultaneously building and managing a digitally connected business infrastructure that may reside literally anywhere. Further, much of the hardware and software comprising the traditional infrastructure is too splintered, inflexible and obsolete to keep up with rapidly escalating business demands and regulatory requirements. In many cases, systems are being stretched beyond their original design, driving operational cost and complexity to unsustainable levels and inhibiting the enterprise's ability to respond to a changing business environment. To meet the evolving needs of the business, the infrastructure needs to be in sync with the business and operate just as dynamically. A dynamic infrastructure is the essential prerequisite for a smarter planet, making aforementioned business enablers like predictive intelligence, collaborative integration and business process flexibility possible.

As a business leader driving change and the IT leader dealing with the reality of the legacy environment, CIOs understand the value of a dynamic infrastructure. A dynamic infrastructure breaks down the barriers between business and IT, enabling faster, better management of a wider range of assets than ever before. In essence, it liberates business and IT assets from their respective silos and transforms them into higher value services. It drives operational efficiencies, while providing seamless, enterprisewide access to intelligence, services and computing resources. And it enables the enterprise to operate with greater speed and agility while improving the availability and quality of services, containing costs through optimization and sourcing, and managing the risks created by an increasingly connected, collaborative world.
Greening the data center for an eco-conscious world

Centrinet, a managed services provider in the U.K., recognized that its customers’ data centers lacked the energy efficiency needed to support their increasing interest in energy conservation and sustainability. The company set out to offer a green alternative, building a data center powered entirely by renewable energy and locating it in a former nuclear bunker to keep physical security levels high.

The new data center, aptly called Smartbunker, enables Centrinet to take an innovative proposal to the marketplace: high-performance, highly resilient managed hosting services delivered in a socially responsible, environmentally sound way. Since its inception, the center’s wind-based energy supply and its use of energy- and space-efficient blade servers have helped Centrinet cut data center energy use by about 60 percent.

There are many ways to move beyond traditional infrastructure models and towards a more dynamic, next-generation digital platform of integrated, IT-enabled business services. Integrating the enterprise’s business and IT infrastructures is a crucial first step, helping to ensure that the resulting dynamic infrastructure will be in alignment with the overall goals of the enterprise while helping to reduce cost, manage risk and improve service. CIOs should focus on providing reliable, secure IT services that can cost-effectively deliver the flexibility and responsiveness required to achieve evolving business objectives. Certainly, they have to be willing to turn to new approaches and technologies as they become available. They also need to develop a strategy to guide the dynamic infrastructure transformation, one that takes advantage of their unique ability to see the synergy between business and IT, and includes a plan for:

- Applying service management disciplines to speed responsiveness to change, improve service quality, and reduce administrative costs through greater business and IT alignment and more well-orchestrated service development, delivery and support
- Leveraging techniques like virtualization, consolidation, standardization and process automation to reduce infrastructure cost and complexity while increasing efficiency, responsiveness, resilience and capacity
- Deploying an integrated information infrastructure capable of securely capturing, managing and exploiting the intelligence generated across the network to improve business visibility, risk management and decision making
- Increasing energy efficiency through infrastructure consolidation and the implementation of products that reduce resource demands and costs while meeting stakeholder requirements for sustainability
- Satisfying increasingly rigorous security and resiliency objectives and policies aimed at protecting business and IT assets, while enabling a faster and more confident response to business changes and opportunities
- Utilizing alternative service delivery models like cloud computing and flexible sourcing options to provision services and resources in ways that help strike the best balance between service quality and cost.
A dynamic infrastructure transformation should aim for incremental gains as even the smallest infrastructure improvements have the potential to improve the overall operation.

While all of these are critical elements of building a dynamic business and IT infrastructure, CIOs do not need to address all of them at once or with the same level of intensity. The infrastructure transformation can begin anywhere, and it should aim for incremental gains. The key is having a strategy and finding the right place to start. Even the smallest infrastructure improvements have the potential to improve the overall operation. However, they can achieve the greatest impact as part of an enterprise-level optimization program aimed at implementing a digital platform of IT-enabled business services across the enterprise. By taking an integrated, holistic approach to executing the enterprise’s dynamic infrastructure strategy, CIOs can maximize business value and the opportunities for savings reinvestment in other smart enterprise initiatives.

Green and beyond: doing well by doing good

While the quality of an organization’s products and services has always been a top priority, today’s eco-conscious world has seen the rise of another: social responsibility. For today’s business leaders, energy and the environment are not only urgent concerns, they have become hallmarks for the social conscience of the corporation. Under mounting pressure from stakeholders—clients, partners, regulators, stockholders, employees and watch groups—the enterprise is being called on to do its part to find more socially responsible, sustainable and environmentally friendly ways of doing business.

These days green initiatives are not just good public relations, they’re becoming a standard element of good business. A study from Goldman Sachs found that companies leading in environment, social and governance (ESG) policies are also leading in market performance by an average of 25 percent. Even in a recessionary economy, where the primary motivation for pursuing any initiative is cost reduction, there’s a realization that conservation initiatives focused on consuming less may, in fact, enable the enterprise to accomplish more. In some cases, these
Empowering customers to adjust their own energy consumption

With Germany’s growing reliance on wind power and the fluctuating wind supply, it became increasingly difficult for the country’s utility companies to efficiently balance supply and demand across the nation’s power grid.

Energie Baden-Württemberg (EnBW), one of Germany’s largest utilities, determined that the best way to deal with the variable supply was to charge variable rates. The company would charge higher rates when demand was highest to encourage customers to adjust their energy use.

Using an in-home device which displays the price of electricity as it changes throughout the day, EnBW customers can regulate their own energy use. They are empowered to lessen their energy use and cost at peak times when capacity is limited and most expensive.

Initiatives can transform the business, significantly increasing efficiency and cost savings. Case in point: intelligent utility grids, which are enabling continuous automated monitoring of a utility’s assets, operations and electricity consumption down to individual appliances. Grids have driven down energy costs by as much as 25 percent per household, but they are also generating performance data that is enabling utility companies to forecast consumers’ energy needs and allocate resources more efficiently.

Clearly, technology is making the sustainable enterprise possible. In fact, the fundamental technologies involved in working smarter can also drive sustainability:

- A consolidated, virtualized dynamic infrastructure consumes less floor space and requires fewer resources for power and cooling.
- Workforce collaboration reduces carbon emissions by limiting the need for business travel and enabling more employees to work at home.
- Real-time, actionable intelligence enables companies to manage their environmental performance autonomically to make better use of scarce resources.

CIOs have an integral part to play in bringing the green enterprise to life. With U.S. data center energy use doubling every five years according to Environmental Protection Agency estimates, controlling IT’s energy consumption is surely an opportunity worth seizing. CIOs can begin by evaluating current IT power consumption, increasing utilization and eliminating waste where possible in order to deploy a more energy-efficient infrastructure—with better controls, lower cost and less impact.

But CIOs also need to look beyond the IT infrastructure and weave sustainability practices into the business operation as well. RFID and predictive modeling technologies are enabling companies to track and curb waste in the supply chain, dramatically improving productivity and speed-to-market, especially for
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IBM’s transformation to smart

After years of growth and server proliferation, IBM was faced with an overprovisioned and inefficient IT environment. Our transformation, which began over 10 years ago, has:

- Reduced IBM’s data centers from 155 to 5
- Consolidated and virtualized workloads, moving the work of thousands of servers to 30 IBM System z™ mainframes
- Reduced applications from 16,000 to 4,700.

The return for these and other data center efficiencies has been significant—about US$4 billion. But the transformation extends well beyond the data center and includes everything from IBM service delivery and support to workforce enablement and education.

Today we are truly a globally integrated, collaborative and innovative enterprise. We have transformed our business model, processes and culture to drive greater productivity, customer satisfaction and growth. By establishing a consistent set of global processes, controls and governance for our services, for example, we have reduced spending by US$3 billion and saved US$3-5 billion via a more productive supply chain.

Companies that manage a large number of suppliers. Sensors and advanced analytics are enabling companies to add intelligence to existing business systems, creating smart systems that monitor resource usage and prevent exploitation. With years of experience using embedded sensors and event management techniques, many IT organizations are very adept at recognizing opportunities to leverage these capabilities elsewhere in the business. And today these capabilities are transforming whole industries, enabling the enterprise to design more eco-friendly offerings and tap into new markets, which in turn drive higher brand value and profitability.

CIOs need to take the lead in setting the enterprise’s sustainability agenda, establishing a vision for the green enterprise and an IT roadmap for getting there. A green strategy should be incorporated into the larger business strategy and focus on the broad environmental impact of the organization, from people and physical assets to information and products. Perhaps, most important, it should help the enterprise see the business value in going green—especially in a turbulent economy—by highlighting opportunities for cost savings and return on investment.

Leveraging our lessons learned

Becoming smarter is an evolutionary process, with as many points of entry as potential results. Where companies begin and how they proceed should be determined by their strategic needs and objectives, whether they revolve around rising cost pressures, higher service expectations or global integration. We know this because at IBM we are on this transformational journey too (see sidebar).

The observations and lessons we’ve learned on the road to smart are now enabling clients to achieve their own results. We’ve realized, for example, that process automation has to begin with good processes. There’s no point in automating business processes that are complex and inefficient. Automating bad
processes only accelerates receipt of the same old results and almost inevitably leads to higher support costs. Instead, fix processes, then automate. We also discovered that the enterprisewide implementation of Lotus® collaboration technologies resulted in staggering and immediate cost savings: tens of millions in avoided phone calls and travel. We expected collaboration to speed the progression from idea to prototype to product, but we learned that by providing an outlet to share innovative ideas, called Innovation Jam, we were also creating a way to serve new generations of IBM customers, develop new skills and manage global talent. And by actively engaging customers in this and other Jams, we have been able to gain enormous insight from beyond our own company.

IBM Research has always focused on enabling new capabilities and advancing the way business gets done. For us, becoming smarter is not just an academic exercise, it’s about solving real business problems beyond IBM’s walls: across industry supply chains, corporate ecosystems and world economies. Our ability to bring together a comprehensive range of hardware, software and services, along with proven methodologies, enables us to deliver trusted, integrated and secure solutions for business and IT. This is our history. It’s what we do. Now we’re applying that same blend of technology know-how, depth of experience and vision to help the enterprise—and the world—do things smarter.

**Conclusion**

Current inefficiencies in the way business gets done point to systems and processes not smart enough to drive growth or even survive the current economy. In this era of unrelenting change and uncertainty, neither size nor history can protect an enterprise that is too rigid to adapt. Even great ideas cannot sustain an enterprise that lacks the ability to quickly and effectively act upon them. With fundamental shifts occurring on so many fronts, business advantage and differentiation require an uncompromising responsiveness to change and an aggressive desire to do things better and smarter.
CIOs are uniquely positioned to recognize and take advantage of the opportunities posed by these new challenges. By taking the bold and innovative steps needed to build a smarter enterprise, they can clear the path for their organization’s success. In the globally interconnected, digitally powered world, becoming smarter isn’t a choice. It’s a necessity for a thriving enterprise and a potential game-changer for CIOs who choose to engage.

For more information
For more information on the smarter planet and the implications for CIOs, please call your IBM representative or IBM Business Partner, or visit:

- ibm.com/think
- ibm.com/cio

Additionally, IBM Global Financing can tailor financing solutions to your specific IT needs. For more information on great rates, flexible payment plans and loans, and asset buyback and disposal, visit: ibm.com/financing