Harvard Business Review
www.hbr.org

Studies of corporate performance reveal a growing link between certain kinds of technology investments and intensifying competitiveness.

Investing in the IT That Makes a Competitive Difference

by Andrew McAfee and Erik Brynjolfsson

Included with this full-text Harvard Business Review article:

Reprint R0807J

Investing in the IT That Makes a Competitive Difference

The Idea in Brief

It's not just you. It really *is* getting harder to outpace the other guys. Since the mid-1990s, competition in the U.S. economy has accelerated to unprecedented levels. The engine behind this hypercompetition: IT. Thanks to powerful tools like ERP and CRM, backed by cheap networks, companies are swiftly replicating business-process innovations throughout their organizations. The firm with the best processes (order fulfillment, field installation, job closing) wins, but not for long. Rivals are striking back with their own IT-based process innovations.

To gain—and keep—a competitive edge in this environment, McAfee and Brynjolfsson recommend a three-step strategy:

- **Deploy** a consistent technology platform, rather than stitching together a jumble of legacy systems.
- **Innovate** better ways of working.
- **Propagate** those process innovations widely throughout your company.

By taking these steps, elevator-systems maker Otis realized not only dramatically shorter sales-cycle times but higher revenues and operating profit.

The Idea in Practice

The authors recommend these steps for staying ahead of rivals through IT-enabled process innovation:

Deploy. Adopt a uniform technology platform to be used throughout your company.

▶ Example:
Before deploying a consistent platform, Cisco's various units had nine different tools for checking an order's status. Each pulled information from different repositories and defined key terms differently, leading to circulation of conflicting order-status reports around the company. The company reconfigured its IT systems for consistent execution of key business processes including market to sell, lead to order, quote to cash, issue to resolution, forecast to build, idea to product, and hire to retire. The payoff? Strong performance over the past few years.

Innovate. Design better ways of doing work in your company. The best candidates for innovation are processes that:

- Apply across a large swatch of your company (such as all your stores, factories, or delivery teams)
- Produce results as soon as your new IT system goes live
- Require precise instructions (such as order taking or delivery)
- Can be executed the same way everywhere and every time in your organization
- Can be tracked in real time so you can immediately spot and address any backsliding to older versions of the process

▶ Example:
U.K. grocery chain Tesco has long used customer-rewards cards to collect detailed data on individual purchases, to categorize customers, and to tailor offers. But it went one step further: tracking redemption rates for direct-marketing initiatives and tweaking its processes to get better responses from customers. Its process innovation drove its redemption rate to 20%—far above the industry's average of 2%.

Propagate. Use IT to replicate process innovations throughout your company.

▶ Example:
At CVS pharmacies, customer satisfaction was declining. The reason: Prescription orders were delayed during the insurance check, which was performed after customers had left the store. So customers weren't immediately available to answer common questions such as "Have you changed jobs?" The company decided to move the insurance check forward in the prescription-fulfillment process, before the drug-safety review, so customers would still be around to answer questions.

The process change was embedded in the information systems that supported operations at all 4,000 CVS pharmacies in the United States. Performance improved across all the pharmacies, and customer satisfaction scores rose from 86% to 91%—a dramatic difference in the aggressive pharmacy market.

Studies of corporate performance reveal a growing link between certain kinds of technology investments and intensifying competitiveness.

Investing in the IT That Makes a Competitive Difference

by Andrew McAfee and Erik Brynjolfsson

It's not just you. It really *is* getting harder to outpace the other guys. Our recent research finds that since the middle of the 1990s, which marked the mainstream adoption of the internet and commercial enterprise software, competition within the U.S. economy has accelerated to unprecedented levels. There are a number of possible reasons for this quickening, including M&A activity, the opening up of global markets, and companies' continuing R&D efforts. However, we found that a central catalyst in this shift is the massive increase in the power of IT investments.

To better understand when and where IT confers competitive advantage in today's economy, we studied all publicly traded U.S. companies in all industries from the 1960s through 2005, looking at relevant performance indicators from each (including sales, earnings, profitability, and market capitalization) and found some striking patterns: Since the mid-1990s, a new competitive dynamic has emerged—greater gaps between the leaders and laggards in an industry, more concentrated and winner-take-all markets, and more churn among rivals in a sector. Strikingly, this pattern closely matches the turbulent "creative destruction" mode of capitalism that was first predicted over 60 years ago by economist Joseph Schumpeter. This accelerated competition has coincided with a sharp increase in the quantity and quality of IT investments, as more organizations have moved to bolster (or altogether replace) their existing operating models using the internet and enterprise software. Tellingly, the changes in competitive dynamics are most apparent in precisely those sectors that have spent the most on information technology, even when we controlled for other factors.

This pattern is a familiar one in markets for digitized products like computer software and music. Those industries have long been dominated by both a winner-take-all dynamic and high turbulence, as each group of dominant innovators is threatened by succeeding waves of innovation. Consider how quickly Google supplanted Yahoo, which

supplanted AltaVista and others that created the search engine market from nothing. Or the relative speed with which new recording artists can dominate sales in a category.

Most industries have historically been fairly immune from this kind of Schumpeterian competition. However, our findings show that the internet and enterprise IT are now accelerating competition within traditional industries in the broader U.S. economy. Why? Not because more *products* are becoming digital but because more *processes* are: Just as a digital photo or a web-search algorithm can be endlessly replicated quickly and accurately by copying the underlying bits, a company's unique business processes can now be propagated with much higher fidelity across the organization by embedding it in enterprise information technology. As a result, an innovator with a better way of doing things can scale up with unprecedented speed to dominate an industry. In response, a rival can roll out further process innovations throughout its product lines and geographic markets to recapture market share. Winners can win big and fast, but not necessarily for very long.

CVS, Cisco, and Otis Elevator are among the many companies we've observed gaining a market edge by competing on technology-enabled processes—carefully examining their working methods, revamping them in interesting ways, and using readily available enterprise software and networking technologies to spread these process changes to far-flung locations so they're executed the same way every time.

In the following pages, we'll explore why the link between technology and competition has become much stronger and tighter since the mid-1990s, and we'll clarify the roles that business leaders and enterprise technologies should play in this new environment. Competing at such high speeds isn't easy, and not everyone will be able to keep up. The senior executives who do may realize not only greatly improved business processes but also higher market share and increased market value.

How Technology Has Changed Competition

The mid-1990s marked a clear discontinuity in competitive dynamics and the start of a period of innovation in corporate IT, when the internet and enterprise software applications—like enterprise resource planning (ERP), customer relationship management (CRM), and enterprise content management (ECM)—became practical tools for business. Corporate investments in IT surged during this time—from about $3,500 spent per worker in 1994 to about $8,000 in 2005, according the U.S. Bureau of Economic Analysis (BEA). (See the exhibit "The IT Surge.") At the same time, annual productivity growth in U.S. companies roughly doubled, after plodding along at about 1.4% for nearly 20 years. Much attention has been paid to the connection between productivity growth and the increase in IT investment. But hardly any has been directed to the nature of the link between IT and competitiveness. That's why, with help from Harvard Business School researcher Michael Sorell and Feng Zhu, who's now an assistant professor at USC, we set out two years ago to compare the increase in IT spending with various measures of competition, focusing on three quantifiable indicators: concentration, turbulence, and performance spread.

In a *concentrated* or winner-take-all industry, just a few companies account for the bulk of the market share. For our study, we focused on the degree to which each industry became more or less concentrated over time. A sector is *turbulent* if the sales leaders in it are frequently leapfrogging one another in rank order. And finally the *performance spread* in an industry is large when the leaders and laggards differ greatly on standard performance measures such as return on assets, profit margins, and market capitalization per dollar of revenue—the kinds of numbers that matter a lot to senior managers and investors.

Were there economywide changes in these three measures after the mid-1990s, when IT spending accelerated? If so, were the changes more pronounced in industries that were more IT intensive—that is, where IT made up a larger share of all fixed assets within an industry? In a word, yes.

We analyzed industry data from the BEA, as well as from annual company reports, and found that average turbulence within U.S. industries rose sharply starting in the mid-1990s. Furthermore, after declining in previous decades, industry concentration reversed course and began increasing around the same time. Finally, the spread between the highest

Andrew McAfee (amcafee@hbs.edu) is an associate professor at Harvard Business School in Boston. He is the author of "Mastering the Three Worlds of Information Technology" (HBR November 2006) and has a blog at andrewmcafee.org/blog.

Erik Brynjolfsson (erikb@mit.edu) is the Schussel Family Professor at the MIT Sloan School of Management and the director of MIT's Center for Digital Business in Cambridge, Massachusetts. More of the author's research is available at digital.mit.edu/erik.

and lowest performers also increased. These changes coincided with the surge in IT investment and the concurrent productivity rise, suggesting a fundamental change in the underlying economics of competition. (See the exhibit "Competitive Dynamics: Several Ways to Slice IT.")

Looking more closely at the data, we found that the changes in dynamics were indeed greatest in those industries that were more IT intensive—for instance, consumer electronics and auto parts manufacturers. Further, we considered the role of M&A activity, globalization, and R&D spending in our analysis of the competitive landscape and found some minor correlations—but none strong enough to override our measures (see the sidebar "Is IT the Only Factor That Matters?").

One interpretation of our findings might be that IT is, indeed, inducing the intensified competition we've documented—but that the change in dynamics is only temporary. According to this argument, the years since the mid-1990s have seen a onetime burst of innovation from IT producers, and it's simply taking IT-consuming companies a while to absorb them all. Businesses will eventually figure out how to internalize all the new tools, proponents of this theory say, and then all industries will revert to their previous competitive patterns.

While it's true that the tool kit of corporate IT has expanded a great deal in recent years, we believe that an overabundance of new technologies is not the fundamental driver of the change in dynamics we've documented. Instead, our field research suggests that businesses entered a new era of increased competitiveness in the mid-1990s not because they had so many IT innovations to choose from but because some of these new technologies enabled improvements to companies' operating models and then made it possible to replicate those improvements much more widely.

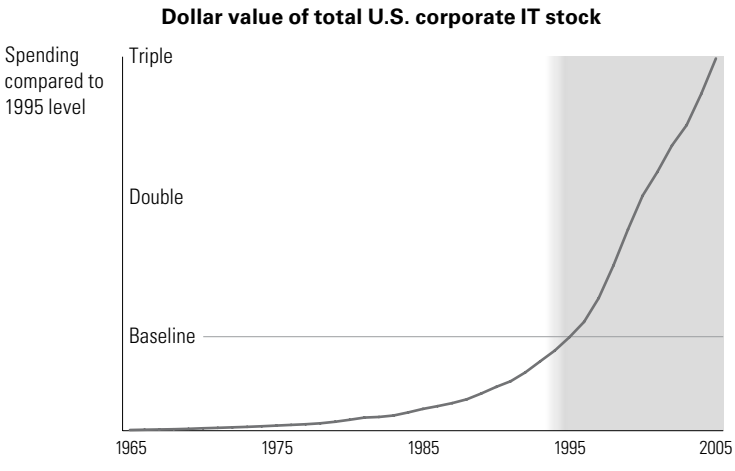
CVS offers a great example. There's no shortage of people looking to fill prescriptions—or of outlets ready to handle those orders. So CVS works hard to maintain a high level of customer service. Imagine senior management's concern, then, when surveys conducted in 2002 revealed that customer satisfaction was declining. Further analysis uncovered a key problem: Some 17% of the prescription orders were being delayed during the insurance check, which was often performed after customers had already left the store. The team decided to move the insurance check forward in the prescription fulfillment process, before the drug safety review, so all customers would still be around to answer common questions such as, "Have you changed jobs?"

This two-step process change was embedded in the information systems that supported pharmacy operations, thereby ensuring 100% compliance. The transaction screen for the drug safety review now appeared on pharmacists' computers only after all the fields in the insurance-check screen had been completed; it was simply no longer possible to do the safety review first. The redesigned protocol helped boost customer satisfaction scores without compromising safety—and not just in one store but in all of them. CVS used its enterprise information technology to replicate the new process throughout its 4,000-plus retail pharmacies nationwide within a year. Performance increased sharply, and overall customer satisfaction scores rose from 86% to 91%—a dramatic difference within the aggressive pharmacy market.

The enterprise IT underlying this initiative served two key roles. It helped the process changes stick: Clerks and pharmacists couldn't fall back on their old habits once the new

The IT Surge

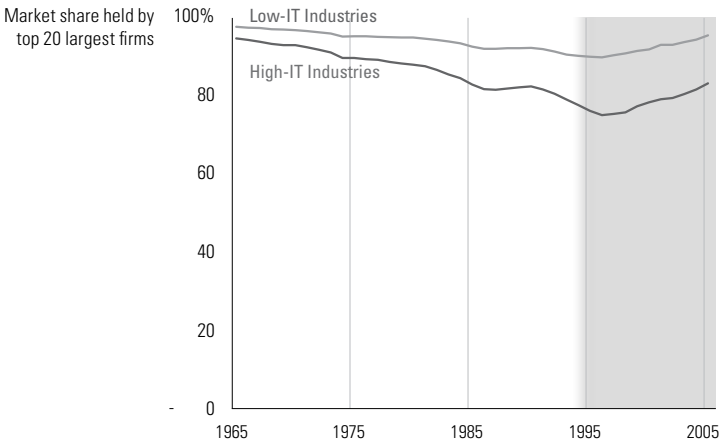
The total real stock of IT hardware and software in the United States began to rise dramatically in the mid-1990s.



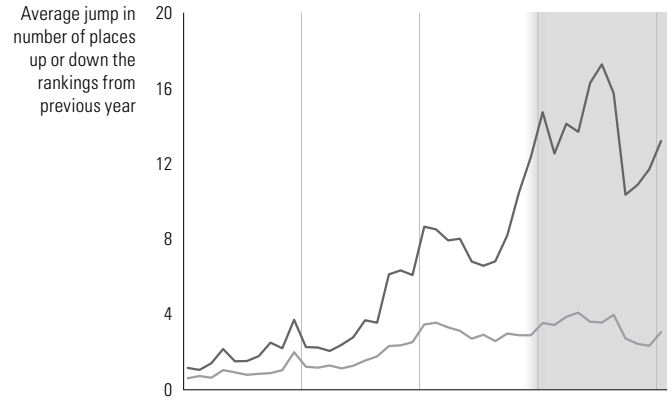
Source: U.S. Bureau of Economic Analysis

Competitive Dynamics: Several Ways to Slice IT

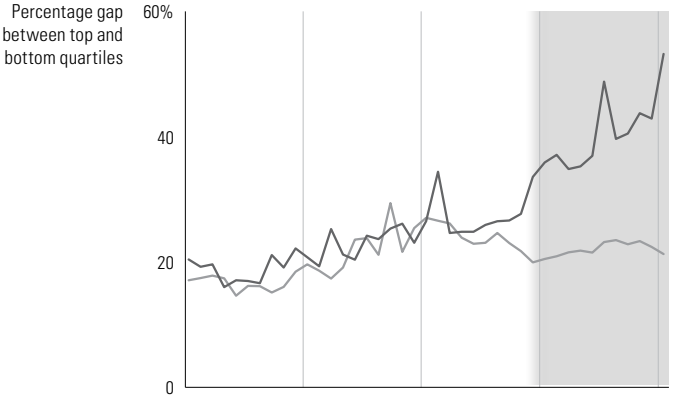
How does IT spending affect the nature of competition and the relative performance of companies within an industry? To answer those questions, we focused on three indicators—industry concentration, turbulence, and performance spread. When we aggregated data from all companies in all industries between 1965 and 2005, we noticed a consistent pattern: All indicators rose markedly in the mid-1990s for high-IT industries (those in which IT accounts for a comparatively large percentage of all fixed assets), coinciding with the surge in IT spending.



Industry Concentration: After decades of decline in all industries, industry concentration began to rise in the mid-1990s. Though the absolute level is lower, the rate of rise is faster in high-IT industries than it is for low-IT industries.



Turbulence: In turbulent markets, the top-selling company one year may not dominate the next. Today's 10th place company, for instance, might catapult to number one the following year. In less turbulent markets the same companies dominate year after year and there's very little movement up and down in rank order. By this measure, we found consistently more sales turbulence in high-IT industries—and a marked increase in the mid-1990s.



Performance Spread: The spread in gross profit margin between the company performing at the 25th percentile in its industry and the company performing at the 75th percentile—an indication of the spread between winners and losers—has grown dramatically in high-IT industries since the mid-1990s.

protocol was embedded in the company's information systems. More important, it also allowed for quick and easy propagation of the new process to all 4,000 sites—radically amplifying the economic value of the initial innovation. Without enterprise IT, CVS could still have tried to implement this process innovation, but it would have been much more cumbersome. Updated procedure manuals might have been sent to all CVS locations, or managers may have been rotated in for training sessions and then periodically surveyed to monitor compliance. But propagating the new process digitally accelerated and magnified its competitive impact by vastly increasing the consistency of its execution throughout the organization.

Although modern commercial enterprise systems are relatively recent—SAP's ERP platform, for example, was introduced in 1992—by now, companies in virtually every industry have adopted them. According to one estimate, spending on these complex platforms already accounted for 75% of all U.S. corporate IT investment in 2001. More recently, IT consultancy Gartner Group projected that worldwide enterprise software revenue would approach $190 billion in 2008.

To understand how this profusion of enterprise IT is changing the broader competitive landscape, imagine that a drugstore chain like CVS has a number of rivals, most of which also have multiple stores. Before the advent of enterprise IT, a successful innovation by a manager at one store could lead to dominance in that manager's local market. But because no firm had a monopoly on good managers, other firms might win the competitive battle in other local markets, reflecting the relative talent at these other locations. Sharing and replication of innovations (via analog technologies like corporate memos, procedures manuals, and training sessions) would be relatively slow and imperfect, and overall market share would change little from year to year.

With the advent of enterprise IT, however, not just CVS, but its competitors have the option to deploy technology to improve their processes. Some may not exercise this option because they don't believe in the power of IT. Others will try and fail. Some will succeed, and effective innovations will spread rapidly. The firm with the best processes will win in most or all markets. At the same time, competitors will be able to strike back much more quickly: Instead of simply copying the first mover, they will introduce further IT-based innovations, perhaps instituting digitally mediated outsourcing or CRM software that identifies cross- and up-selling opportunities. These innovations will also propagate widely, rapidly, and accurately because they are embedded in the IT system. Success will prompt these companies to make bolder and more frequent competitive moves, and customers will switch from one company to another in response to them.

As a result, performance spread will rise, as the most successful IT exploiters pull away from the pack. Concentration will increase, as the losers fall by the wayside. And yet turbulence will actually intensify, as the remaining rivals use successive IT-enabled operating-model changes to leapfrog one another over time. Thus, despite the shakeout, rivalry in the industry will continue to become more fast-paced, intense, and dynamic than it was prior to the advent of enterprise technology. These are exactly the changes we see reflected in the data.

In this Schumpeterian environment, the value of process innovations greatly multiplies. This puts the onus on managers to be strategic about innovating and then propagating new ways of working.

Is IT the Only Factor That Matters?

Previous research suggests that the changes we've observed in the competitive environment are not primarily driven by shifts in M&A activity, globalization, or R&D spending. New York University's Lawrence White, in a paper published in the *Journal of Economic Perspectives* in 2002, contended that M&A activity explained neither the decline in concentration in the first half of the 1990s nor its rise in the second half. In a 2006 research paper published in *Industrial and Corporate Change*, Harvard Business School's Pankaj Ghemawat and his colleagues found that industry concentration tends to decrease as globalization rises, implying that concentration has increased since the mid-1990s not because of more global competition but despite it.

On the other hand, Harvard professor Diego Comin and his colleagues, in their 2005 working paper, "The Rise in Firm-Level Volatility," did find a correlation between companies' spending on R&D and changes in industry turbulence. So we reexamined our findings, including R&D spending in our assessments, and found that it does not detract from the significance of our IT measures. In fact, IT appears to be much more strongly correlated with the changes in competitive dynamics than R&D does.

Competing on Digital Processes

To survive, or better yet thrive, in this more competitive environment, the mantra for any CEO should be, "Deploy, innovate, and propagate": First, deploy a consistent technology platform. Then separate yourself from the pack by coming up with better ways of working. Finally, use the platform to propagate these business innovations widely and reliably. In this regard, deploying IT serves two distinct roles—as a catalyst for innovative ideas and as an engine for delivering them. Each of the three steps in the mantra presents different and critical management challenges, not least of which have to do with questions of centralization and autonomy.

Deployment: the management challenge. Since the mid-1990s, the commercial availability of enterprise software packages has added a new item to the list of senior management's responsibilities: Determining which aspects of their companies' operating models should be globally (or at least widely) consistent, then using technology to replicate them with high fidelity. Some top teams have pounced on the opportunity. Many more, however, have embraced this responsibility only reluctantly, unwilling to tackle two formidable barriers to deployment: *fragmentation* and *autonomy*.

Historically, regional, product, and function managers have been given a great deal of leeway to purchase, install, and customize IT systems as they see fit. But bitter experience has shown that it's prohibitively time-consuming and expensive to stitch together a jumble of legacy systems so they can all use common data, and support and enforce standardized processes. Even if a company invests heavily in standardized enterprise software for the entire organization, it may not remain standard for long, as the software is deployed in ways other than it was originally intended in dozens, or even hundreds, of separate instances. When that happens, it's almost certain that data, processes, customer interfaces, and operating models will become inconsistent—thus defeating the whole competitive purpose of purchasing the package in the first place.

That's what initially happened at networking giant Cisco. In the mid-1990s, Cisco successfully implemented a single ERP platform throughout the company. Managers were then given the green light to purchase and install as many applications as they wanted, to sit on that platform. Cisco's IT department

The Elements of a Successful IT-Enabled Process

Given the costs of enterprise IT and the risks inherent in deploying it poorly, it's especially important that the change projects you select capitalize on IT's strengths. Consider the following hypothetical example of a company that did just that.

A U.S. furniture maker sells both standard and custom pieces out of its 100 showrooms nationwide. Because salespeople in each of the showrooms have very little direct interaction with or information about the company's three factories, they all quote long lead times for custom furniture, just to be on the safe side.

To rectify this situation, the company develops software to integrate the activities of manufacturing and sales, and tests it at one location. Now salespeople can enter the specifications of a custom order and instantly receive an accurate delivery date.

The company also decides to use the software to manage customer deliveries. The delivery team for the test showroom is required to call back to the dispatch center immediately after leaving a customer's house. That enables the center to contact the customer to verify his or her satisfaction and address any concerns. The software tracks delivery times and satisfaction levels and finds the former is decreasing while the latter ticks upward.

Recognizing its success, the company quickly embeds the new process in its enterprise software and rolls it out to the other 99 locations. Because customers value these process innovations, the company's market share grows nationwide.

Successful IT-enabled business process improvements like this one generally have a number of important characteristics:

They cover a wide span. The new ways of working apply across a very large swath of a company—in this case, all stores, factories, and delivery teams.

They produce results immediately. As soon as the new enterprise system goes live, so do the process changes it enables.

They are precise, rather than general guidelines, suggesting highly scripted instructions for business activities (furniture order taking and delivery).

They are consistent—executed the same way everywhere, every time. Every furniture store uses the same method to quote lead times, and deliveries are closed out the same way day after day.

They make monitoring easy. Activities and events can be observed and tracked in real time, providing unprecedented opportunities for testing and feedback.

They build in enforceability. The designers of a new process that's embedded in IT can have great confidence that it will be executed as intended. It is often simply impossible to execute the process the old way, and even when backsliding is possible it can be recognized and addressed. The furniture company could easily use the data collected during the delivery process to determine if all teams were calling in properly.

helped the various functions, technology groups, and product lines throughout the world get their desired programs up and running without attempting to constrain or second-guess their decisions.

When newly arrived CIO Brad Boston assessed Cisco's IT environment in 2001, he found that system, data, and process fragmentation was an unintended consequence of the company's enthusiasm for technology. There were, for example, nine different tools for checking the status of a customer order. Each pulled information from different repositories and defined key terms in different ways. The multiple databases and fuzzy terms resulted in the circulation of conflicting order-status reports around the company. Boston's assessment also revealed that there were over 50 different customer-survey tools, 15 different business-intelligence applications, and more than 200 additional IT projects in progress.

Deployment efforts heighten the tensions—present in every sizable company—between global consistency and local autonomy. As the Cisco example shows, however, this conflict often exists by default rather than by design. Ultimately, the top team's focused efforts to manage this tension reaped tremendous benefits.

Responding to the CIO's assessment, senior managers decided to upgrade Cisco's original ERP system and other key applications to support standardized data and processes. The upgrade was budgeted at $200 million over three years. Cisco identified several key business processes—market to sell, lead to order, quote to cash, issue to resolution, forecast to build, idea to product, and hire to retire—and configured its systems to support the subprocesses involved in each stage. The software updates and the strategy discussions the technology engendered eventually resulted in greater consistency throughout the organization and contributed to Cisco's strong performance over the past few years.

At about the same time that Cisco was untangling its legacy spaghetti, the leader of a much older and more traditional company was also reimagining the kinds of information systems his firm would need to compete more successfully. When Ari Bousbib became president of Otis in 2002, the information systems of the 149-year-old company were not so much fragmented as virtually nonexistent. As Harvard Business School's F. Warren McFarlan and Brian J. DeLacey recounted in a 2005 case study, the software applications in place were largely antiquated for implementing the critical processes of gathering customer requests to install a new elevator system, specifying the exact configuration of the order, and creating a final proposal. In many regions, in fact, the processes were still being done entirely on paper.

Like Cisco, Otis took a hard look at its core processes and ended up replacing old software with a new enterprise technology platform the company called e*Logistics. It was designed to connect sales, factory, and field operations worldwide through the internet. Otis defined four processes—sales, order fulfillment, field installation, and job closing—and designed e*Logistics to ensure that improvements in the way each process was carried out occurred uniformly, every time, everywhere. Eventually, Otis realized not only significantly shorter sales-cycle times but higher revenues and operating profit.

Innovation: IT-enabled opportunities. Data analytics drawn from enterprise IT applications, along with collective intelligence and other Web 2.0 technologies, can be important aides not just in propagating ideas but also in generating them. They are certainly no replacement for brilliant insights from a line manager or a eureka moment during a meeting, but they can complement and speed the search for business process innovations.

UK grocery chain Tesco is one company that employs enterprise IT's aggregation and analysis capabilities in this way. Like many retailers around the world, it uses customer-rewards cards to collect detailed data about individuals' purchases, to categorize customers, and to tailor offers accordingly. But the grocer goes a step further, tracking redemption rates in great detail and performing experiments to tweak its processes to get a better response from customers. In an industry where the average redemption rate for direct-marketing initiatives is about 2%, Babson professor Tom Davenport has noted, Tesco's data analytics help drive its rate to approximately 20%.

Web 2.0 applications that bring collective wisdom to the fore can also uncover potential business innovations. Jim Lavoie, CEO of the technology firm Rite-Solutions, built some-

thing called a "Mutual Fun" market within the company's intranet that has three indices employees can invest in—Savings Bonds for ideas on saving costs, Bow Jones for ideas on extending existing products, and Spazdaq for new product concepts. Any Rite-Solutions employee can suggest a new idea in any of these markets. Workers can also view the "prospectus of ideas," invest play money in them, and even sign up to complete any tasks necessary to make those concepts reality. As Lavoie said in a recent online interview with the nonprofit Business Innovation Factory: "We believe the next brilliant idea is going to come from somebody other than senior management, and unless you're trying to harvest those ideas, you're not going to get them....That's why we give everybody an equal voice, and a game to provoke their intellectual curiosity."

Propagation: top down and bottom up. Part of the attraction of enterprise systems has been the opportunity for management to impose best practices and standardized procedures universally, as CVS did to great advantage, and so eliminate the chaos of inconsistent homegrown practices. There's really no competitive advantage in having each department develop and use its own idiosyncratic process for inventory control, for instance, especially when best practices already exist.

While an ERP system is an obvious tool for propagation, other technologies are also important, and they show that innovations do not necessarily emanate from headquarters. For instance, Web 2.0 applications can help process changes emerge organically from lower levels in an organization. Within Cisco, for instance, a community of about 10,000 Macintosh users was dissatisfied with the level of support they were receiving from the company's central IT group. But instead of complaining, they created a wiki to share ideas about how to use their Macs more effectively. They posted information, files, links, and applications that could be edited by any user—tips and tricks that ultimately became huge productivity enhancers. In this case, process innovations flowed through the company to its great benefit without central management direction.

The role of decision rights. At first glance, the Cisco and Otis examples seem to support the view that propagating processes using enterprise IT necessarily leads to more centralized companies—ones in which most of the important decisions are made at the top and the rest of the business exists only to execute them. Many of the choices about core business processes and the systems that support them were taken out of the hands of business-unit leaders and regional managers, and the companies' change efforts appeared to lead to higher levels of centralization than had previously existed. But the reality is more complicated.

Even as some decisions become centralized and standardized, others are pushed outward from headquarters. Senior executives do play a primary role in identifying and propagating critical business processes, but line managers and employees often end up with more discretion within these processes to serve customer needs and to apply tacit, idiosyncratic, or relationship-specific information that only they have. To appreciate how important this distinction is, consider an analogy from government. The process of writing a constitution is inherently a highly centralized activity—a small group of framers makes decisions on behalf of an entire population. It's perfectly possible, and in fact common, however, for that constitution to define a highly decentralized government.

At both Cisco and Otis, local managers and frontline employees retained critical responsibilities in their companies' IT-enabled operating models—and often gained new ones. After e*Logistics was put in place at Otis, for example, field installation supervisors became responsible for the first time for certifying that a site was ready to install an elevator before it would be shipped. (In the old operating model, the equipment was simply shipped as soon as it was manufactured.) The new business practice was standardized throughout the world, but it was not centralized. It actually placed more responsibility in the hands of frontline employees.

Consider, too, the Spanish clothing company Zara. It has more than 1,000 stores worldwide, and they all order clothes exactly the same way, using the same digital form, following a rigid weekly timetable for placing orders. Most other large apparel retailers rely on sophisticated forecasting algorithms, executed by computers at headquarters, to

determine which clothes will sell in each location and in what quantities. Headquarters pushes these clothes down to stores with virtually no input from their managers. Zara's store managers, however, have almost complete discretion over which clothes to order; they choose them based on local tastes and immediate demand.

This sharp difference between Zara's and other retailers' approaches to the same challenge highlights a critically important point: We don't expect that enterprise IT will inevitably lead to one best way to execute core processes. In fact, it can prompt a great deal of experimentation and variation, as companies try to understand who has the most relevant knowledge to make decisions and where, ultimately, to site decision rights.

Maximizing Return on Talent

As corporate IT facilitates the implementation and monitoring of processes, the value of simply carrying out rote instructions will fall while the value of inventing better methods will rise. In some cases, this may even lead to a "superstar" effect, as disproportionate rewards accrue to the very best knowledge workers. Human resource policies and corporate culture will need to evolve to support this type of worker. An effective leader and a well-designed organization will need not only to aggressively seek out and identify such individuals and the innovations they generate but also to develop and reward them appropriately.

An analysis of 400 U.S. companies that Erik Brynjolfsson published with Wharton professor Lorin Hitt in 2005, found that organizations successfully using IT were significantly more aggressive in vetting new hires: They considered more applicants. They scrutinized each one more intensively. They involved senior management (not just HR) early and often in the interview process. After identifying top talent, these firms invested substantially more time and money on both internal and external training and education. Furthermore, they gave their employees more discretion in how to do their jobs while linking their compensation and rewards—including promotions—more tightly to performance using a suite of metrics that was more detailed than competitors'. The costs of managing talent in this way may be high, but the payoff increases exponentially if you can leverage the talents of a high-performing manager at one location to maximize results in thousands of sites worldwide.

• • •

The arrival of powerful new information technologies does not render obsolete all previous assumptions and insights about how to do business, but it does open up new opportunities to executives. Our research has led us to three conclusions: First of all, the data show that IT has sharpened differences among companies instead of reducing them. This reflects the fact that while companies have always varied widely in their ability to select, adopt, and exploit innovations, technology has accelerated and amplified these differences. Second, line executives matter: Highly qualified vendors, consultants, and IT departments might be necessary for the successful implementation of enterprise technologies themselves, but the real value comes from the process innovations that can now be delivered on those platforms. Fostering the right innovations and propagating them widely are both executive responsibilities—ones that can't be delegated. Finally, the competitive shakeup brought on by IT is not nearly complete, even in the IT-intensive U.S. economy. We expect to see these altered competitive dynamics in other countries, as well, as their IT investments grow.

It is not easy for most companies to deploy enterprise IT successfully. The technologies themselves are complicated to configure and test, and changing people's behavior and attitudes toward technology is even more challenging. Enterprise IT typically changes many jobs in major ways; this is never an easy sell to either employees or line managers. As the performance spread, concentration, and churn increase, management becomes a distinctly less comfortable profession—more unforgiving of mistakes, faster to weed out low performers. Even those executives who are prepared will not necessarily survive the inevitable turbulence. But those who do can expect outsize rewards—at least until another player comes along and uses IT to propagate a business innovation that's even better.

Reprint R0807J
To order, see the next page
or call 800-988-0886 or 617-783-7500
or go to www.hbr.org

Investing in the IT That Makes a Competitive Difference

Further Reading

ARTICLES

Radically Simple IT
by David Upton and Bradley R. Staats
Harvard Business Review
March 2008
Product no. R0803J

The authors focus on the "Deploy" principle for driving IT-enabled process innovations. Their advice? Build a low-cost, efficient IT system that runs your existing business and supports new growth fueled by process innovations. Develop your system over time, using these principles: 1) **Forge your business and IT strategies together**—so your IT platform supports your strategic objectives. 2) **Strive for simplicity**—so you can reuse elements of your system and save money. 3) **Invite users' input**—so they'll quickly embrace the new system. Using these principles, Japan's Shinsei Bank created an enterprise system that supported its strategy of providing new retail services. Its customer base jumped from 50,000 in 2001 to 2+ million in 2007.

The Next Revolution in Productivity
by Ric Merrifield, Jack Calhoun, and Dennis Stevens
Harvard Business Review
June 2008
Product no. R0806D

This article sheds further light on the "Propagate" principle. The authors recommend using service-oriented architecture (SOA)—a way of designing business-process technology built on Web-based services. SOA makes it vastly easier to share processes with other units. To take advantage of SOA, identify processes that give you a strategic edge. Then automate these processes through Web-based services anyone (different business units, customers, suppliers) can access. Airlines did this by enabling passengers to check in for flights on their home computers, at airport kiosks, or through customer-service representatives.

COLLECTION

Wringing Real Value from IT, 2nd Edition
by Nicholas G. Carr, Michael E. Porter, and Diana Farrell
HBR Article Collection
October 2008
Product no. 5135

This collection provides additional insights for maximizing the value of your IT investments. In "IT Doesn't Matter," Nicholas Carr recommends ways to save money on your investments. For example, explore cheaper alternatives, such as open-source systems and barebones PCs. In "Strategy and the Internet," Michael Porter advises using IT to integrate your virtual and physical business processes. For instance, employ your Web site to attract customers *and* draw them to flesh-and-blood salespeople, who provide personalized advice and after-sales service. In "The *Real* New Economy," Diana Farrell suggests figuring out what drives productivity most in your company (labor efficiency? asset utilization? cost reduction?), and sequencing your IT investments so they build on each other.

Harvard Business Review

To Order

For *Harvard Business Review* reprints and subscriptions, call 800-988-0886 or 617-783-7500. Go to www.hbr.org

For customized and quantity orders of *Harvard Business Review* article reprints, call 617-783-7626, or e-mail customizations@hbsp.harvard.edu