



VII Pillars Of Productivity

Seven practices characterize highly productive companies turning them into 'digital organizations.' IT is the catalyst, but organizational capital provides the context.



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It's productivity growth, more than any other economic statistic, that determines our living standards. If productivity grows at 1% per year, living standards will double every 70 years. If productivity grows at 3% per year, living standards will double in less than 25 years. In the 1970s, '80s, and early '90s, government statistics indicated that productivity growth in the U.S. economy plodded along at barely 1% annually. Most economists thought it would stay at that level indefinitely, but remarkably, since 1995, annual productivity growth has averaged more than 3%.

What explains the soaring productivity in the United States? My research has found that IT-intensive companies tend to be more productive, and most economists now agree that growing investment in information technology has been the single most important reason for the resurgence in the past decade. However, it's also true that, since 1995, thousands of IT projects have failed to deliver on their productivity promise each year. CEOs and CFOs are justifiably disappointed at CIOs' inability to consistently document financial benefits from their IT budgets. In fact, they've been looking in the wrong place.

The key to IT productivity lies outside the CIO's office. Our most recent research suggests that whether IT improves productivity depends primarily on the complementary organizational investments that companies make in addition to their IT investments. That is, innovation in IT alone is insufficient. Companies also need innovation in organizational practices to reap the promised boost in productivity growth. Considering that up to 70% of the work done in large companies can be classified as information-processing work, it would be remarkable if the effective use of IT didn't require changes in the organization of production. Indeed, we found that the costs and benefits of IT-enabled organizational capital is typically many times larger than the direct IT investments themselves.

My research team, including David Fitoussi, Lorin Hitt, Shinkyu Yang, Michael Zhang, and others at MIT and at The Wharton School, sought to document the specific practices that constitute the organizational capital of the most effective users of IT. We identified seven broad practices and statistically found that businesses that adopted these work practices were, on average, more productive and had higher stock-market values than other companies in the same industries. In this article we describe the practices and how investments in organizational capital created the synergies associated with productivity growth. The correlations were so striking that we named this set of IT-related practices the "digital organization."

About 20% of companies in our study qualified as examples of the digital organization. Cisco Systems serves as a useful case study for better understanding the digital organization in practice (see [Methodology](#)).

Though the digital organizations in our sample had strong financial results, reaching their goals came at a cost. Just as companies invest in equipment and other capital, including computers, they must also invest in organizational capital. Our research shows that the organizational-capital investment is typically 10 times larger than the average IT investment. Thus, IT is the catalyst, but organization capital is the hidden bulk of the iceberg. Here are the seven practices digital organizations followed:

I: Move from analog to digital processes. A necessary first step to becoming a digital organization is to convert analog business processes to digital. Though printer and paper manufacturers might have us believe otherwise, computers aren't just a new way to crank out paper documents at ever greater speeds and volumes. Moving an

increasing number of processes into the paperless, digital realm is one of the keys to making productive use of IT. This practice frees the company from the physical limitations of paper and supports the remaining six practices of a digital organization.

A common approach to digital processes combines a set of core corporate IT standards with a mechanism for meeting the specialized IT needs of each business unit. The core network and key standards are the infrastructure that runs the enterprise. All business units and acquired companies use the same ERP system and database software, for example. Standardized desktop computers, laptops, networking, and key applications ensure interoperability across the company.

Digitization also makes it easier to keep track of key performance indicators. For example, Cisco created the virtual close—the ability to tally total financial positions on a daily basis. Rather than wait days or weeks after the end of each quarter to total revenue and costs, the company can look at up-to-date figures more frequently. Such information can help a company sense and respond to changes in the marketplace, though it doesn't necessarily prevent faulty forecasts.

II: Open information access. The second practice that helps convert technology to productivity is to encourage open information access. Restrictive access policies, created by overly protective or possessive managers, can impede the flow of information. Digital organizations, on the other hand, encourage the use of dispersed internal and external information sources. This openness helps both employees and managers do their jobs more productively.

At Cisco, information is empowerment, and the company provides widespread information access to employees. That means information is dispersed laterally and vertically in digital organizations in our data set. In the vertical direction, managers use digital dashboards to keep their fingers on the pulse of the company. The example of the virtual close illustrates how information about revenue and expenses can rapidly flow upward so top managers always know the financial state of the company.

Information also spreads laterally as more frontline employees gain access to information from outside their departments. A simple example is Cisco's online directory. Employees use it roughly 4 million times a month—contacting people by E-mail, instant messaging, or phone.

The other digital organizations in our data set also had much higher information flows than their competitors. You might say they had a faster information metabolism.

III: Empower the employees. A basic principle of information economics is that information has no economic value if it doesn't change a decision. Though employees might gain access to more information, this capability is wasted if they lack the authority to make decisions. Digital organizations decentralize authority—pushing decision rights to those with access to information. Digital business processes complement access and empowerment by helping to enforce business rules or constraints and then alerting appropriate personnel if an exception occurs.

At Cisco, even decision rights are delegated with the aid of technology. One of the applications in Cisco's Manager's Toolkit is Universal Proxy. When a manager is on vacation or out of the office, he or she delegates various responsibilities to the staff by using this tool, which replaces and formalizes what would be a verbal process in a traditional company. Cisco's client-funded model for IT spending reflects the company's delegation of authority. Many of the IT personnel have dual reporting—to both IT and a business unit. This isn't to say that departments are unfettered in adopting technology; Cisco insists on standardizing key systems and applications that ensure interoperability.

The impact of pushing both information and decision-making authority down to employees is a flatter hierarchy. Managers in a digital organization can supervise more people simultaneously because their workers are more self-directed. At Cisco, managers typically have 10 to 20 direct reports, in addition to operating responsibilities. This is another type of productivity afforded by IT and digital-organizational practices: cutting out the costly overhead of middle management from the bottom line. With more people doing the work and fewer people managing the workers, digital organizations enjoy greater productive output per person.

IV: Use merit-based incentives. Digital organizations provide powerful incentives to motivate employees to use the information and decision-making power they're given. Meritocratic pay structures, incentive pay for individuals and groups, and stock options are common at digital organizations. This contrasts with many traditional companies' use of seniority-based pay, which encourages a sense of paying your dues when an employee is young and enjoying perks and entitlements when he or she is older. The inability of traditional organizations to effectively measure and track the performance of individual employees sometimes forces them to use years of service as a proxy for performance.

Digital organizations tend to be fanatical about measurement, especially when it comes to performance. They use accountability and incentives to complement the open-ended freedom of other digital practices. Strong incentives tied to clear objectives are one way to cope with the threat of information overload in a digital organization. Employees need to choose between getting the job done and exploring all the tangents afforded by widespread information access. Clear objectives at all levels—from the overall corporation down to each individual employee—help ensure that everyone is applying productive efforts in the same direction. Incentives also motivate the creativity needed to drive innovation.

IT supports the practices of performance-linked incentives in several ways. For example, IT systems let Cisco track individual performance in a focused manner. Moreover, employees have broad access to performance information, such as sales and customer satisfaction, to get a sense of whether they're accomplishing the goals on which they're measured.

Badges of honor

V: Invest in corporate culture. While explicit incentives are an important part of the toolkit in digital organizations, they also try to steer employees in the right direction by reminding people regularly of their goals via a strong corporate culture. Part of making productive use of IT is to define and promote a cohesive set of high-level goals and norms that pervade the company.

Employee-identification badges are a fact of modern life. But along with the usual security badge, Cisco employees have two additional badges. The first presents the corporation's goals and objectives—the current year's objective on one side and the three- to-five-year goals on the other side. The second additional badge presents Cisco's mission and cultural values. The cards signify the individual's responsibility to help the company reach its goals and maintain its culture.

The culture-badge goals resonate with the practices we found in our statistical analysis of digital organizations. These include open communication, empowerment, quality team, and stretch goals. The badge also exhorts cultural properties particular to Cisco, such as customer success, no technology religion, and frugality.

The point is that even numbers-driven digital organizations have a softer, cultural side to them. Getting the most out of IT requires some form of cultural cohesion and strategic focus. In fact, digital organizations need a higher level of culture and strategic focus because of their greater interconnectivity and employee empowerment. While a traditional siloed business can survive a diversity of cultural norms scattered across its disconnected divisions, a digital organization needs human interoperability as much as technological interoperability. Misunderstandings and mismatched goals impede tightly run digital business processes and lateral information flows.

VI: Recruit the right people. The productivity boost provided by technology is a function of the quality of the people who use it. The fact that technology gives employees more information and authority implies that such employees need to be more capable than someone given less individual and group responsibility. For this reason, digital organizations evaluate job seekers on a variety of dimensions, including analytical skills, computer skills, and education. At Cisco, the stated goal was to hire from the top 10%.

Yet, this is more than just a smarter-is-better approach to hiring. The emphasis on culture also implies that new employees need to fit into the company's cultural style. Interpersonal skills and a subjective sense of fit are just as crucial as skills and knowledge. The digital organizations in our sample not only set higher thresholds for quantitative and verbal skills, but they also reported placing more emphasis on fit and teamwork. As a result, these companies put more effort into the hiring process. An applicant might have to pass eight or more interviews lasting as long as 2.5 hours, in addition to more formal criteria, such as educational background and skills evaluation.

VII: Invest in human capital. The preceding six practices all require substantive investment in human capital, but this isn't satisfied by hiring alone. For that reason, digital organizations provide more training than their traditional counterparts. This helps employees operate new digital processes, find information, make decisions, cope with exceptions, meet strategic goals, adhere to cultural norms, set and reach incentive goals, and hire more of the right employees. In digital organizations, much of this added training can be done online.

Many of the changes attendant with becoming a digital organization call for increased levels of thinking and ingenuity on the part of employees. Productivity growth implies that working smarter means employees must become smarter. The companies in our sample spent more money on off-site training than their competitors did. They were also more likely to use online training tools, and their employees were more likely to spend more days in formal training than employees at competitors.

At the frontiers of innovation, experience may be the only trainer. The investment in human capital in a high-

performing digital organization includes letting employees attempt risky projects. This type of experience is essential when no one knows the right answer and, therefore, traditional training isn't possible. Giving employees paid time and access to corporate resources to attempt risky projects of appropriate scope provides a valuable learning experience for both the employee and the company.

Obstacles to success

Why don't more companies adopt these practices? In the past 10 or 20 years, it's fair to say that the vast majority of companies have invested heavily in IT. However, we found that only about 20% of companies in our sample have adopted the practices of a digital organization. This is despite the fact that the adopters accounted for the vast majority of the high-productivity, high-stockholder-value companies in our sample. Several reasons explain the poor penetration of innovative digital-organization practices in businesses to date. These include interdependencies among the practices—or what economists call complementarities; the pain of change; the steep slope of technology's price-performance curve; and variations among industries.

Perhaps the most important impediment is the role of complementarities. Digital processes, open information access, distributed decision making, incentives, and the associated culture complement one another. And employees won't make the right decisions if they don't have the right incentives and corporate values. By the same token, the predigital practices of traditional companies also complement one another. High communication and coordination costs drive the use of command-and-control hierarchies and lead to cultures that are territorial about information.

Some of the seven practices create problems that are resolved only through complementary practices. For example, with instantaneous and total information access comes the risk of information overload. Cisco tries to help employees access the information that's most relevant to their jobs. A series of dashboards—for example, separate ones for managers, human-resources personnel, and employees—create a portal to relevant applications and information. Specialized applications, such as those used by customer-service personnel to access product information, aid in specific job functions. Yet, the Internet and the full resources of Cisco's intranet remain temptingly close to every employee's fingertips.

Other complementary practices, such as incentives and training, give employees the motivation and the mental means to filter out excess information. Cultural practices inculcate a sense of speed and a willingness to act quickly without complete information rather than succumb to paralysis by analysis.

The transition from traditional to digital is nontrivial. It forces either a complete replacement of many elements of a corporate structure or leads to a painful, awkward period of mismatched, noncomplementary practices. Cultural changes are especially hard because virtually every manager has a core belief about how people act, which may or may not match the principles of the digital organization. As a result, the pain of change tends to be exacerbated when multiple practices, including culture, need to simultaneously adjust before positive results are visible.

Some of the delay in adopting digital-organization practices reflects the timing of IT's price-performance curve and the ways that businesses have adopted IT. Though companies have long used IT, it was in the form of disconnected or specialized systems related to the job each group did. Often, each division or geographic outpost bought or created its own IT systems. This older style of computing complemented traditional hierarchical and siloed approaches to management.

Companies in some industries are more likely to adopt the seven practices of digital organizations than those in other industries. Companies with predominantly high-cost, knowledge-intensive, white-collar workforces are prime candidates for technology-mediated productivity improvements. Yet, these practices aren't restricted to the high-technology sector. Financial-services companies, with their white-collar workforces and heavy dependence on computers, are strong candidates for the transformation. Finally, the continued reduction in the price of IT will also push the technology into a greater number of smaller companies and a larger number of lower-value roles in every company.

IT holds the promise of high levels of productivity growth. Yet, this promise will remain unfulfilled as long as companies cling to predigital-organizational practices. While many saw IT as a panacea for competitiveness, it's no quick fix and can require far-reaching changes, much as earlier technologies led to revolutions in business practices.

Today, these changes include investing in processes and people to create the complementary changes needed to leverage the productivity improvement latent in IT. In reality, IT investment is only the top layer of a set of more far-reaching investments and changes that create a high-performance digital organization.

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eBusiness.

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Sidebar: Methodology

The findings in this article are part of a \$5 million quantitative-research project using 10 years of data from 1,167 large companies in 41 industries. We also conducted 20-minute structured interviews at roughly 400 companies with people with all levels of technological prowess.

Further analysis of the data uncovered clusters of practices that could be grouped into the seven practices described in the article. The details of this research can be found at [my Web site](#), and a case study, Networked at Cisco by Stephanie Woerner, is available at [the MIT Center for eBusiness](#).

While confidentiality agreements prevent us from revealing the identities of most of the companies in our studies, Cisco Systems provides a clear example of a company that has pioneered many of these practices. Cisco not only profited during the boom of the 1990s, but also outperformed competitors during the technology recession that followed. It earned record profits of \$5.3 billion last year. Cisco was a sponsor of the research along with the National Science Foundation and the MIT Center for eBusiness.—*E.B.*

Sidebar: Motivating People

As CIOs work to attract the best talent and motivate employees to work productively, Mark Huselid, co-author, with Brian Becker, of *The Workforce Scorecard* (Harvard Business School Publishing, 2005), says that current management and human-resource (HR) practices may actually hinder an employee's ability to contribute to strategic goals. Unfortunately, he says, many of today's businesses don't differentiate in how they invest in their workforce.

If companies were thinking strategically, they'd be investing disproportionately in core elements of their business, such as R&D or sales and marketing. But, he finds that many executives take a one-size-fits-all approach in which everyone receives the same treatment. The risks are significant. "With this approach, companies tend to overinvest in nonstrategic positions and underinvest in strategic positions, leaving firms vulnerable to companies that are more thoughtful and get it right," he says.

To maximize the power of their workforces, Huselid says, companies must meet three challenges: view their workforce in terms of contribution rather than cost; replace benchmarking metrics with measures that differentiate levels of strategic impact; and make line managers and HR professionals jointly responsible for executing workforce initiatives.—[Patricia Brown](#)