Two Cheers for the Virtual Office

Thomas H. Davenport • Keri Pearlson

Successful virtual offices require radical new approaches to evaluating, educating, organizing, and informing workers.

Thomas H. Davenport is a professor of information systems at Boston University School of Management. Keri Pearlson is an assistant professor at the University of Texas Graduate School of Business.

What's happening to the office? Technology has made it possible to redefine where work is done. The traditional notion of an office as the place where someone goes to work seems to be going the way of the buggy whip, the eight-track tape, and the stenographer.

Companies such as Procter & Gamble, IBM, Hewlett-Packard, AT&T, and Compaq have partially or fully eliminated traditional offices for field sales and customer service. Other companies have eliminated offices for workers including researchers, real estate managers, and accountants. For these businesses, work is becoming something you do, not a place where you go. They are successfully replacing offices with technology: portable computers, cellular phones, and fax machines all enable remote or mobile work.

The "virtual" office appeals to many different corporate stakeholders. Mobile or remote workers value the freedom and autonomy that it provides. Senior managers like the reduction in real estate costs. As one Bell Atlantic manager noted, "This is not a perk for employees if you can cut half a billion off the bottom line." Senior managers also value the opportunities that new technologies make possible for increased interaction between salespeople and customers.
However, some managers, particularly middle managers, are troubled by the virtual office. They may find it difficult to do their jobs because the employees they supervise are out of sight; also they may lose their traditional office perquisites. Some workers resist the virtual office as well; those who have too little space at home to set up an office, or distracting family or home environments, are at a disadvantage. While many companies express enthusiasm about virtual offices, a small but growing backlash to the concept is emerging. After implementing or experimenting with the virtual office, a few firms have abandoned it.

While work mobility and flexibility have value, so do the face-to-face encounters with coworkers that are lost under the new arrangements.

While we believe that the flexibility and opportunities for increased productivity offered by virtual offices are real benefits, we give them only moderate praise because of the things that are lost. In this article, we discuss how firms can maximize the benefits while minimizing the losses of these alternative work arrangements.

How Are Some Companies Adapting to Virtuality?
In undertaking research on virtual offices, our purpose was to assess what is gained and what is lost in substituting technology for a physical office. We wanted to understand the range of approaches being used in different parts of companies and the implications of each approach. We saw a need to observe and document "best practices" in moving to and managing virtual offices. We also tried to identify problems that companies had after adopting these alternative work arrangements.

Our research involved two complementary methods. First, we surveyed 100 firms of the Fortune 500 Industrials, seeking to understand how prevalent virtual offices are, where they are found in companies, and how managers react to them (see the sidebar "How Common Is the Virtual Office?" for an overview of our findings). Second, we interviewed managers and workers at ten firms where virtual offices had become well established. The interviews explored how the company had adapted to virtual work.

We found a number of companies that have successfully integrated the virtual office into their organizations and have benefited from it. It is important for managers to recognize, however, that substituting technology for offices yields costs as well as benefits. For example, while work mobility and flexibility have value, so do the face-to-face encounters with coworkers that are lost under the new arrangements. To reap the rewards of the virtual office, managers must decide when, where, and for whom it is appropriate. They should harvest its potential benefits, while at the same time addressing and compensating for its deficiencies.

We believe that effective management of virtual work demands far more than providing remote workers with a powerful computer, an extra phone line, and a comfortable chair. Successful virtual offices require

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**How Are Some Companies Adapting to Virtuality?**

**Summary of a Survey of Fortune 500 Companies**
(Note: 100 of the Fortune 500 companies were surveyed during the summer of 1995.)

- Offer alternative work arrangements on a formal basis 29%
- Do not have any formal programs 71%
- Within firms adopting virtual work, as many as 10 percent of workers may be mobile at some time. AT&T, for example, estimates that it has 7,500 fully mobile workers of 240,000 and that 10 percent of employees work at home at least one day per month.

**Plans for the Future**
(Note: This sample consists of the 71 firms that do not have a formal program.)

- Considering a program today 15%
- No plans for a program 48%
- No idea if any plans exist 31%
- Would not say if plans exist 6%

**Most Prevalent Industries for Virtual Work**

- Information technology (e.g., IBM, Digital Equipment, AT&T, Pacific Bell, Hewlett-Packard, Compaq, Xerox)
- Consumer products (Frito-Lay, Procter & Gamble)
- Professional services (most Big Six firms, Chiat/Day, Gemini Consulting)

**Most Popular Business Functions for Virtual Work (in order of popularity)**

- Field sales and service
- Technical support staff functions (MIS, human resources, procurement, legal)
- Product development, engineering, and research
- General management

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radical new approaches to evaluating, educating, organizing, and informing workers. The changes in store for managers of remote workers are perhaps more profound than those for the remote workers themselves.

In our research, we found that only a few companies have developed the management approaches that make virtual work effective. These companies made sure that mobile workers were well connected with the rest of the business. They took steps to ensure that workers in the office were trained in how to work with remote workers and vice versa. How have these successful companies inculcated the new management and work skills required for the virtual format? How can managers interested in implementing or improving their own virtual offices develop these new skills? To address these questions, we will examine three key topics:

- What is the virtual office, and what are the problems and opportunities involved in each type of virtual arrangement?
- What benefits can be achieved through virtual offices, and how are firms attempting to realize the benefits?
- How should managers manage virtual workers in the key domains of human resources, information, teams, processes, and facilities?

What Is a Virtual Office?
The term “virtual office” covers a variety of mobile and remote work environments. Any company considering a move in this direction must be clear about company objectives and needs, the type of virtual office that best addresses those needs, and the particular issues that each type of virtual office situation poses.

We have located the different virtual office environments on a continuum (see Figure 1). “Telecommuting,” the most stationary arrangement, usually refers to situations in which workers with fixed offices occasionally work at home. Telecommuting was the most common arrangement we found in our research; almost all the firms in which we conducted interviews that offered any program offered this type of work arrangement. Its primary benefits are flexibility and potentially increased productivity. Because no office space is freed up, cost savings are few; because the virtual work is only occasional, there is little need for new management approaches. Supervisors of telecommuters need only ensure continued productivity and coverage of tasks involving physical presence. In short, it is a low-risk, low-reward option.

“Hoteling” is another type of virtual work. Hotel-based workers come into the office frequently, but because they are not always physically present they are not given a fixed office space. Instead, they can reserve a “hotel room” (more likely a cubicle), where they can receive and make telephone calls and link their laptop computers to the network. The hotel space may be a regular downtown office previously used for traditional offices, or it may be a suburban location specifically selected for mobile work. Hoteling is popular with professional services firms because personnel frequently work at client sites.

Hoteling presents problems, however. Workers find that it is often just as easy to work at home rather than come into the hotel because the cubicle offers few advantages over home offices. Workers do not get the same cubicle each time they visit the office, negating many advantages of an office, such as knowing where to find people and work tools. Furthermore, the hotel arrangement may not provide a desired sense of belonging. Certainly, if workers are not using the hotel, they are not receiving and transferring valuable knowledge in the informal meetings that so often take place in traditional offices. In the firms we studied, we found hotels mostly used by junior workers, which can create divisiveness by emphasizing hierarchical distinctions. Managers interested in hoteling should make sure that expectations
about working at home versus working at the hotel are clear, that all levels of the organization use the hotel, and that the offices are attractive with high levels of amenities, so that workers see clear benefits from working there.

Further along the continuum is the "tethered" worker, who has some mobility but is expected to report to an office on a regular basis. At Chiat Day's New York and Los Angeles offices, for example, workers at the advertising agency check in in the morning and receive a cellular phone and portable computer. They are then free to wander around the office or nearby. One supposed benefit of the arrangement is creativity; it is presumably stimulating to move among different work areas in the same day.

**Home offices accomplish the cost-savings objective by replacing company real estate with the employees', raising questions of fairness.**

This type of work arrangement is not common enough to yield generalizations about its success, but it has led to problems even at Chiat Day. Some workers found it difficult to be creative and work with their teams in tethered mode; they preferred to keep their work-in-progress in one location and return to it daily. And when Chiat Day was bought by another agency, new managers were concerned that workers who could not find productive spaces in which to work were simply staying home. As one manager put it, "We didn't want people thinking that they didn't have to come to the office anymore." Some employees complained that they couldn't concentrate well, and that it was difficult to find other employees. Some of the space in the merged firm was redesigned, and more private spaces were added.

"Home" workers have no office at all other than a room, or possibly the kitchen table, in their homes. They may visit customer sites on some days. AT&T has equipped these workers with furniture, computing equipment, and high-speed phone lines. The work (e.g., customer service or telemarketing) is largely performed on the computer or the telephone.

The benefits of the arrangement for workers are flexibility and commuting avoidance and for employers, reduced office-space costs. While the arrangement works well for those with space and privacy in their homes, it is not an easy solution for others who face obstacles posed by children, at-home spouses, and small dwellings lacking adequate space for a computer, fax machine, extra phone, desk, and files. Home offices accomplish the cost-savings objective by replacing company real estate with the employees', raising questions of fairness. And as we describe below, home offices are popular with workers for a year or two, but often fall from favor after that. Managers speculate that after that time, home workers become disconnected from their jobs and coworkers. Any long-term home office program must therefore incorporate mechanisms for ensuring frequent face-to-face contact among home workers and their colleagues and managers.

Finally, "fully mobile" workers do not even have home offices. They are expected to be on the road or at customer sites at all times during the workday. Typical fully mobile workers include field sales and customer service employees. For example, pharmaceutical representatives, such as those at Marion Merrell Dow and Pfizer, view their offices as the portable computers and files they keep in their cars.

The virtues of this approach include the ability of mobile workers to spend more time with customers and the flexibility in dispatching workers to customer locations. Inexpensive portable technologies have solved many problems of communicating with these workers, but they have created new problems at the same time. Many mobile workers feel that companies use technologies to control them. From truck drivers to elevator repair workers, we have found examples of attempts to outwit or sabotage systems that connect workers to their firms and monitor their productivity and location. Firms that implement these systems should go easy on the monitoring and control capabilities and instead try to use technologies to enhance workers' flexibility.

While most of the companies we surveyed used only one or two types of virtual work, it is conceivable that a large corporation might eventually employ all the types. In our survey, we found the most common combination beyond casual telecommuting was a home program coupled with a hoteling arrangement. Again, to assess what type of virtual work is best
suited to a company, the company must be clear about its objectives.

Objectives for Virtual Work Arrangements

We found that the leading driver of virtual-office adoption in the companies we surveyed was cost reduction. Companies do not typically adopt virtual offices to improve organizational functioning.¹ In more than 50 percent of the firms in which we conducted interviews, managers told us that the primary reason they adopted alternative work arrangements was to reduce real estate, recruiting, and training costs. Other motivations included a desire for productivity increases and reengineered processes. A different study also found both these motivations but concluded that managers of cost-oriented virtual office projects were less satisfied with the results than those with business change objectives.²

Fewer real estate requirements are the primary source of reduced costs for firms making the move to virtual offices.

Fewer real estate requirements are the primary source of reduced costs for firms making the move to virtual offices. Since U.S. firms spend more than $240 billion on office space, it is easy to see the opportunity for reductions. Some firms cited reductions in office space of 25 percent to 67 percent; a large firm might save between $50 million and $100 million per year, according to AT&T. These savings were offset in some cases, however, by higher costs for technology and home office furnishings and by the inability to renegotiate leases quickly. One estimate suggests that the cost of supporting a virtual worker is $10,000 a year. And while virtual offices may save money in visible cost areas such as real estate, more subtle “virtual” costs often go unmeasured. A Kodak MIS manager, for example, boasted about the money saved in reduced printing costs when sales personnel began working from their homes. When asked whether salespeople bought paper for printing at home, he replied, “Probably, but it’s not in my budget.”

Many firms adopted virtual offices to enhance productivity, although this advantage was seldom measured. An analyst with whom we spoke said that she advises employees to bring home three or four times the amount of work they expect to complete because they will work much faster at home.” In a pilot program, Consolidated Edison, a New York utility firm, found that its home workers achieved double the in-office productivity in handling customer calls. However, many virtual office workers are professionals or managers whose productivity is assessed only subjectively. Further, when workers leave the office, they are often given new tools (computers, phones, and so on) that could influence productivity. Of course, much of the difficulty posed by calculating productivity benefits is caused by widely varying virtual work arrangements. Variations include the type and percentage of virtual work; the home or remote work environment of particular workers; and even the family situation of the worker. A Cornell study of IBM virtual workers found that workers with school-age or no children were most satisfied with virtual work; workers with preschool children or other stay-at-home family members presumably found working at home more difficult.

Firms also adopted virtual offices because of reengineered processes. Many firms were redesigning order-management processes by, for example, having salespeople make a commitment to a product configuration, a price, and a delivery schedule while sitting in the customer’s office. This procedure reduces the need for physical contact between the salesperson and the manufacturing, finance, or logistics people back at the office. Other firms have reengineered customer service to improve the efficiency of dispatching service workers or to improve productivity in call centers (as in the Consolidated Edison example).

Some firms adopted virtual offices to keep valued employees. Accommodating a single high-performing individual was sometimes just the motivation a company needed to make virtual office arrangements more widely available. For example, a law firm in California faced the loss of a key specialist who was unwilling to continue a long daily commute to the firm’s headquarters. This specialist negotiated a virtual office in which she worked from home most of the time. In another company we studied, the human resources manager described the demands of new, actively recruited workers for alternative work arrangements: “Three individuals were highly desired by our company because of their training and their backgrounds. But they questioned why they couldn’t work from home. They were unwilling to relocate

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Davenport • Pearlson

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from the mountains to the city. When we looked at their requests, we realized we had few reasons to compel them to work in the office, and since we really wanted to hire them, we devised a remote work arrangement. All of these workers have been with the company several years now, working remotely the whole time.

Although some companies begin virtual work arrangements on a voluntary or informal basis, the move is increasingly being mandated by necessity. For example, senior managers at IBM offices in the midwest began a “work from home” program as an alternative to layoffs. Faced with growing pressures to cut expenses, a creative manager suggested reducing real estate costs by offering alternative office arrangements. When the vice president announced the new program, he surprised his staff by giving up his corner suite beginning that day. The organization then arranged to move others home over the following ninety days. Today these workers are still working from home and come into the office on average twice a week to handle specific tasks from a hotel cubicle or a suburban center.

Although it is evident that many office functions no longer require an office, offices serve other functions that benefit employees, customers, and the company as a whole.

It is preferable, of course, to make needed changes without the provocation of a business crisis. In Hewlett-Packard’s case, the move to virtual offices was driven by large numbers of requests from highly mobile employees. More than 2,500 personnel now work in one or more alternative work arrangements. The goal was not to reduce real estate costs, but as projects and guidelines are autonomously developed by the local business units, to give employees more work flexibility.

**Managing Virtual Work**

However a firm arrives at virtual offices, it will soon find itself in a new world. Perhaps the most effective strategy for managers to implement when making the transition from physical to virtual office is to acknowledge what physical offices offer. Only by taking this first step can managers make informed decisions about how to compensate for losses while capitalizing on the strengths of the virtual office. Although it is evident that many office functions no longer require an office, offices serve other functions that benefit employees, customers, and the company as a whole. So far, no technology has replaced them. Among these functions are:

- **Corporate culture.** Offices are a place to socialize and be socialized into the culture of the organization. New workers in virtual settings have little opportunity to learn the “HP Way” or the “AT&T ethos” by example from others, which is the best way to receive tacit knowledge.
- **Loyalty.** Offices create identification with the company. During an era in which corporate allegiance appears to be at an all-time low, the absence of a place to go to work further weakens loyalty.
- **Communication.** Offices make possible frequent, unplanned communications. Face-to-face conversations convey not only information content but also attitudes and concerns relevant to the work.
- **Access to people.** Offices are a place where people can find one another when they have a question or problem to resolve. While technology is making it easier to reach people, it is still hard to communicate effectively with colleagues when they are not in the office.
- **Managerial control.** A person’s presence in the office tells the world that he or she is working. Many managers are comfortable only if they can observe their subordinates at work.
- **Access to materials.** Offices are normally situated near the physical artifacts of work. Computers and phones are now portable, but file cabinets, books and other documents, and large, expensive examples of product — all key sources of learning and information — are less so.
- **Corporate structure.** Offices signify status to the organization. Senior managers may scoff at office status symbols, but we have noticed that most of them keep their nonvirtual enclaves.

While technology can replace some office functions, it cannot supersede them all: The need for socialization, loyalty, and informal communications has not gone away in business environments; in fact, it may have increased. Furthermore, for many of the benefits of virtual offices, there is a corresponding detriment.
Money saved on reduced office space costs, for example, is spent on increased technology costs. Flexibility gained by an alternative work arrangement requires a level of self-discipline often lacking in the very workers who want to embrace the new style of work. And the freedom to work at any time during the day and night is often offset by the stress of never being able to “leave the job.”

The benefits of the virtual office, then, are not obtained simply by arming workers with portable information systems and sending them out of the office. If virtual work is to pay off, managers must adopt different approaches to managing and leading in five key areas: managing people, managing information, managing teams, managing processes, and managing facilities.

Managing People
To work well virtually requires new skills and attitudes on the parts of both managers and workers. To manage mobile and remote workers effectively, managers must develop and adopt virtual-specific supervision techniques and address specific issues.

Workers must be trained to adapt to the new virtual environment and must learn skills for coping with the challenges that it poses.

Only a few firms that we studied addressed virtual management skills. An example of a company that did was Hewlett-Packard. HP’s Americas Education group realized that the company’s industry-focused sales teams, which were scattered around the country and around the world, had created a need for better virtual management and a better work-life balance for managers and workers. The group began by observing effective managers of remote workers to assess systematically what skills were important for the management of virtual work. With the objective of fostering these skills, the group created an assessment and development program for managers on “Managing Remotely,” which incorporates training and development techniques including evaluation, simulation programs, team meetings, written materials, and forums.

HP’s program begins by having remote workers evaluate their manager’s effectiveness. Then the managers are assessed in a simulated team meeting over the telephone. Psychologists who design difficult situations and assess how well the manager responds play the team member roles. The manager then receives an evaluation of his or her remote management capabilities. Thereafter, psychologists will listen in on real team meetings to note the degree of improvement in the manager’s skills or will participate in a face-to-face meeting with the team to evaluate and improve team dynamics.

HP also offers other means to improve the management of remote workers. A “Remote Management Strategies Guide” contains best practices and successful strategies for managing remotely. Quarterly Remote Management forums allow managers to share experiences and learning face to face. At a recent forum, more than sixty managers addressed such topics as team leadership, work-life balance, communication processes, orienting new HP employees to the culture, and managing performance. While these programs are not panaceas, they give managers an opportunity to learn about and avoid potential problems.

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When people no longer see one another, everyday socialization or relationship-building communications can be lost.

A critical training issue to address is communication. When people no longer see one another, everyday socialization or relationship-building communications can be lost. It is easy for managers to slip into communications patterns that are almost entirely task-oriented and to miss verbal cues indicating that these patterns are demotivating for remote workers. Thus a key skill for managers of these workers is the ability to maintain a balance between task-oriented communications and relationship-building communications. HP’s “Managing Remotely” program addresses this aspect of remote management. In addition, IBM instructs managers on appropriate communications media and effective approaches for interacting with remote workers.

To teach employees how to work effectively in a virtual office, several firms offer courses that provide training in working at home without interruptions, planning ahead to determine the optimal work location on particular days, and maintaining good communications with coworkers and supervisors.

Successful virtual office arrangements include training in issues once thought to be outside the bounds of
the professional environment. When people work at home, personal issues assume greater importance during the workday. For the individual whose social life is primarily based on interactions in the office, the move to a virtual office is of serious concern. IBM, which has been a leader in handling this new area of management, conducted a survey on how IBM telecommuters had adjusted to the virtual work environment. The telecommuters indicated that satisfaction with their personal-relationship interactions increased significantly during the first twelve months of their new work arrangement. But at the twelve-month mark, IBM found that unless virtual workers were able to balance their personal and professional lives, their satisfaction with their work arrangement fell significantly. IBM management addressed the issue and told employees in telecommuting training classes that if their social lives were mainly tied to the office, they would need to find a new network outside of the IBM environment, such as a charity, school board, church, neighborhood association, or club.

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IBM went further in its virtual-office training to suggest methods and guidelines for managing families when working at home. One IBM manager explained, “We tell our employees to teach their children that the parent is at work when he or she is sitting at the desk or in the office. When the parents are at work, they are not to be disturbed, but when they come out of that room, it is okay to play.” In some cases, parents are encouraged to tell their older children that if they need to speak with the parent, to go to the house phone and call the office number, even if the parent is just in the next room. “While it may seem silly from the outside, it reinforces the separation of the personal and professional time, even when the physical separation is minimal,” according to the IBM manager. Personal training at IBM teaches virtual office workers that they will inevitably run into problems. But the training covers many strategies to lessen, and in some cases avoid, the more common problems. At the beginning of its virtual office program, IBM set up an external counseling network to help employees deal with personal problems arising from virtual work. But after the first year, there was enough experience within the company that managers and human resource personnel felt that they could handle the calls themselves.

In summary, firms adopting virtual offices should offer programs such as:

- Assessments of virtual worker management and training programs to improve skills.
- Training on personal work strategies in a virtual office environment.
- Dialogue and education on how to deal with changed family relationships.

**Managing Information**

Many forces act to pull the virtual worker away from the company. One way to bring the worker back into the fold is to share information. Information (as opposed to data) conveys the significance of particular facts and data, enabling workers to make decisions to improve their work.

One of the most difficult trade-offs in virtual offices involves communication with customers and with coworkers. Virtual offices may, if well-managed, increase communications volume and effectiveness with customers. However, if sales and service personnel are out of the office most of the time, their communications with coworkers will suffer. In the Cornell survey of IBM virtual office participants, 77 percent of the respondents reported that “professional communication at work” was somewhat or much worse; 88 percent said that their ability to socialize with coworkers was worse or much worse.

Despite e-mail, fax machines, cell phones, and pagers, workers do not communicate as well with one another in virtual environments as they do in the traditional office. For example, managers should not assume that their virtual sales force will pass along customer feedback about a new product. Without physical and social contact, information about maintenance problems with a new model will not flow as readily between virtual customer service and virtual product development. In principle, these remote workers can exchange information electronically. But firms will have to go to extraordinary measures to motivate field workers to sit at their computers each
right and key this valuable information into discussion databases or e-mail. The technology may make it easier to record or communicate some information, but simply deploying technology is insufficient. The technology must be implemented in a way to fit with the organization.

Several firms have designed ways to improve communication and information flow in the virtual area. Verifone, a leading manufacturer of credit card transaction verification devices, is as close as any firm comes to being fully virtual. Its personnel are scattered around the world, and many live in areas where there is no office. Verifone senior managers have decided that it is more important to be physically close to customers than to coworkers. Yet, they also believe that virtual workers need to know what is going on in the company. Verifone therefore takes the lead in making information the glue that binds virtual workers to their fellow employees and the company as a whole.

Verifone managers recognize that building virtual information environments is not synonymous with giving all workers portable computers and modems: the nature of the information itself must change. Often interaction with coworkers turns data into information and gives it meaning. With no water fountain to gather around, it is more difficult to turn last quarter’s SG&A number into meaningful information with implications for action. It is the job of information providers to contribute some of the value normally added through face-to-face interpretation.

To achieve this, Verifone’s chief information officer, Will Pape, writes a daily information summary of key events, financial achievements, and corporate developments, which he sends to Verifone employees by e-mail. Pape tries to ensure that the daily messages provide not only the facts but also the implications of the facts for the company. Whenever possible, he uses simple graphics to convey comparisons to earlier periods, objectives, or competitors. Pape’s background as a journalist allows him to write a narrative that summarizes the company’s business situation, identifies problem areas, and suggests recommendations for change—all in a one-page document.

The effective use of information in a virtual environment also means that employees must know how to access and use the information. Verifone insists that employees have mastery of more than 160 "information tools," which range from e-mail to various financial and operational databases and which even include an on-line guide to the itineraries of traveling employees. Pape has also developed a rating system of various communications channels that assesses their level of psychological interaction. Physical or "snail" mail ranks lowest on the list; a standard telephone call is near the middle, and a face-to-face meeting is highest. Employees are urged to use the appropriate channel for the task at hand. In this advanced information environment, Verifone usually succeeds in communicating as well internally as with customers.

A much larger company, IBM, took a different approach to restoring communication flow. The company’s managers were worried, for example, that virtual field employees who had contact with customers would be less likely to pass on customer comments to researchers, product developers, and marketers. Therefore, each functional area started programs in which previously office-bound workers are expected to spend time directly with customers. In effect, field sales and service personnel are no longer expected to be information intermediaries.

The lessons from Verifone’s and IBM’s approaches to virtual information management are:

- Institute new information flows to replace those that are lost when workers leave offices and no longer have physical contact.
- Ensure that workers understand the strengths and weaknesses of the various technologies for communicating in specific circumstances.
- Educate workers on how to be more effective providers and consumers of information.

Managing Teams

When geographical dispersion is added to the other problems of virtual offices, it is a challenge to create a successful team environment. Something intangible is lost when the individuals comprising a group do not have the opportunity to meet face-to-face to work on their tasks. Many organizations have attempted to meet these challenges by using groupware tools that assist teams with a full range of tasks, from meeting-time coordination to idea sharing. Many newer applications focus on the collaboration that makes groups such an important organizational tool. For example, one professional services organization uses Lotus Notes as an organizing and collaboration tool; workers connect to electronic discussions to
learn about and contribute to the building of company policies, business strategies, and expertise. But groupware is unlikely to address all of the interpersonal issues involved in managing teams.¹⁰

NCR has addressed virtual team cohesion issues through nontechnical means. Teams are organized with a coach to facilitate team dynamics and to be responsible for team objectives. Each team member has individual objectives that involve project completion, performance, customer satisfaction, and financial issues. For example, if two teams are involved with real estate management, they will post savings targets as part of their financial objectives. The coach ensures that the work plan is followed, keeps the team on track, sets up conference calls, and, when necessary, holds face-to-face meetings. To handle issues that require face-to-face contact at NCR, these teams meet at least once a week at a specified time.

Managing problems that arise in virtual work teams is different from managing those that arise in other teams. It is difficult, for example, to develop the necessary trust to resolve issues when working in the virtual office.¹¹ At NCR and IBM, team members are trained in methods for handling conflict and are encouraged to seek out either a teammate or the coach, as appropriate, to resolve problems as soon as possible. Since it is impossible in the virtual environment to address issues through casual face-to-face contact, extensive measures may have to be taken to arrange team meetings. In some cases, however, according to a team manager at NCR, it is not possible to resolve a problem quickly, and team members have to just learn to trust each other to do what is right so they can proceed.

Key management lessons regarding managing teams in a virtual environment are:

- Provide explicit training on the use and benefits of groupware tools. Set reasonable expectations.
- Encourage and train coaches rather than supervisors.
- Build processes to handle conflict resolution among remote workers.

Managing Processes

Changing the location of work and, in many cases, the tools with which work is done necessitates changes in the business processes performed by workers in alternative work arrangements.¹² The virtual office has implications for two types of business processes: operational and administrative support. To migrate successfully to a virtual office setting, managers must have a two-pronged approach: they must rethink the design of their business processes, and they must examine their control, measurement, and evaluation techniques for these new processes.²⁰

Companies implementing virtual offices often need to redesign operational processes that deal with customers. For example, at Xerox, salespeople used to come to the office to gain access to a series of information systems designed to support the order-design and order-entry processes. In the virtual environment, employees can access much of that information from a laptop computer connected to a telephone line. But sales processes and associated information systems first had to be redesigned to accommodate access from outside the office. New interfaces were designed to make access easier. Employees were trained in new procedures to support the sales process and in new techniques for selling with real-time information. Support staff, who traditionally did the data entry, no longer were needed for mundane tasks. In fact, Xerox first seriously considered virtual offices in the context of an ambitious order-management reengineering project, and it financed computers for the sales force through office-space reductions.

In some cases, companies adjust worker processes to match the virtual environment. Virtual office work is particularly well-suited to processes performed by autonomous knowledge workers.²¹ For example, a pharmaceutical company in New England gave researchers home-based offices to replace their company-based offices. This move allowed the scientists to significantly change the way they did their research. Traditionally, they went to the company-based office to write up experiments, conduct data searches, and record creative ideas. Now, they continue to access the laboratory when needed, but do writing and administrative work at home at their discretion. Reference materials, proposals, report formats, and other support tools are available electronically, so that the scientists can access them from any place at any time. The result is that the research support processes are carried out in a way that matches the scientists' own personal styles. A researcher waking up late at night with a creative idea can now work on that idea at home rather than risk losing it by waiting until getting to work later that day.
Further, report and grant writing takes place in an environment much more suited to the creative process -- scientists who prefer to write early in the morning, for example, can now do so.

The introduction of new technologies into virtual work can also lead to new processes. At Otis Elevator, for almost a decade, field-service personnel have been dispatched centrally with the aid of Orsine, a service information system. Workers were already virtual, though they had no portable computers and had to clean up their jobs, find a phone, and call headquarters when paged. When they were given personal computers, the virtual work process changed. They had immediate access to parts ordering, service forms, and service information at the job site. They could respond more quickly to dispatches, and their productivity increased.

**A process in which a manager must see a subordinate to evaluate his or her work will be difficult to implement in a virtual office.**

Virtual offices require redesigned administrative processes. Because communication among workers in a virtual environment is usually electronically based (instead of paper based), many of the traditional workflow procedures in an organization no longer work. For example, leaving a telephone message in a mobile employee’s in-box means the message will not be retrieved until that worker returns to the office. Expecting a remote employee to file paper forms for expenses, sick leave, or other administrative tasks when that employee works in an alternative work arrangement is not feasible. Many organizations have invested in voice-mail systems; in one company we studied, a receptionist answers the telephone and types the messages into the e-mail system. Furthermore, all forms are available over the network, making them accessible to remote workers.

The control, measurement, and evaluation of processes also change in the virtual environment. When the workers performing a business process are no longer physically located near the supervisor, traditional controls are inadequate. A process in which a manager must see a subordinate to evaluate his or her work will be difficult to implement in a virtual office. So what is an appropriate control mechanism? Some companies use a team-based, peer-evaluated control system. We have already described one company whose team leaders became “coaches,” taking over many control activities. In these teams, measurement and evaluation processes were also changed to adapt to the virtual environment. But since some work occurs outside a team, managers must devise new measurement and control systems for their remote workers. Individually executed business processes, control, measurement, and evaluation activities must be aligned with the work environment.

Another key issue in the control of administrative processes is that of forms and approvals. Firms should ask the question, “Who really needs to see (or sign) this form?” or even, “Do we really need a form at all?” Electronically filed forms can be designed to bypass supervisors and go directly to the administrative offices that process and record them. For example, an expense report whose expenses are under a certain amount may require only the employee’s electronic signature for processing. Managers receive a monthly report summarizing all charges against their department budgets as a control mechanism, but their signatures are not required for daily decisions.

Virtual work also requires a more explicit objectives-setting process between managers and employees. At AT&T, for example, managers meet with virtual workers to set objectives. Workers are consistently measured on their progress toward the objectives. According to one manager, “Everyone felt better about working away from his supervisor because he knew what he had to do and how it would be measured. These had been laid out in the objectives-setting meeting before the telecommuting began.” The responsibility for monitoring the day-to-day progress of the employee in this company has been shifted from the supervisor to the employee. One remote worker at AT&T commented, “The supervisor is there to guide you, not to structure your workday. It is up to me to keep my supervisor informed of what I do. I send periodic e-mails to him with an update of my activities. I leave voice mail if there is a particular issue on which I need assistance. And I request a meeting every few months to specifically discuss my progress.”

Companies that have been the most successful at implementing virtual offices have found ways to build a new culture that supports the new work envi-
environment. At Shell Oil, for example, a pilot program exploring alternative work arrangements showed that supervisors could have many more direct reports and still manage them effectively by building a culture based on results. According to a manager involved in the pilot, “My supervisor has eighty direct reports and could not possibly be involved in everyone’s day-to-day activities. We developed a culture based on results, not activities. My supervisor does not normally know or care where I am or what I am doing, as long as my customers are happy. And both he and I hear about it when my customers are dissatisfied.”

Customer satisfaction is a frequently used indicator of the success of the virtual office worker. At IBM, customers are asked to rank their satisfaction level with sales and service processes. IBM found that customers were at least as satisfied with the IBM service when the relevant account executive was in a virtual office as when the executive was based in a traditional office.

Key management actions, then, for business processes in the virtual environment include:

- Examine key operational processes to understand possible improvements if virtual offices were implemented.
- Assess whether knowledge workers can work autonomously at home.
- Change controls and supervision processes to work virtually.
- Survey customers regularly to monitor their satisfaction with customer-facing processes.

Managing Facilities

All the companies in which we conducted interviews have used information technology in creative ways to establish alternative work arrangements. It should come as no surprise that advances in information technology have helped fuel the increasing interest in virtual offices (see the sidebar on enabling technologies).

Managing the facilities associated with the virtual office involves deploying new technologies, furniture, and whatever else is needed by the remote worker, providing support activities to remote workers, and managing the office space left behind. Deploying remote offices is usually done in a partnership between the employee who will work in the remote office and the company’s MIS and facilities organizations. At AT&T, for example, the company orders, delivers, and installs the furniture and computer systems needed by home workers. Mobile workers are allowed to choose among some selections offered by the company, ensuring compatibility and standards in

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**Enabling Technologies**

<table>
<thead>
<tr>
<th>Technology</th>
<th>Enabled Work</th>
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</thead>
<tbody>
<tr>
<td>Laptop Computers</td>
<td>Flexibility in where work is performed.</td>
</tr>
<tr>
<td>High-Speed Modems</td>
<td>Remote computers become as fast as office-bound computers in retrieving documents.</td>
</tr>
<tr>
<td>Fax Machines</td>
<td>Paper documents can be sent anywhere.</td>
</tr>
<tr>
<td>Voice Mail</td>
<td>Voice communications with others even when the receiving parties are unavailable at the time of the call.</td>
</tr>
<tr>
<td>Cellular Data Networks</td>
<td>Flexibility in where data communications take place.</td>
</tr>
<tr>
<td>E-mail</td>
<td>Send short notes and documents without knowing the physical location of the recipient.</td>
</tr>
<tr>
<td>ISDN (integrated services digital network)</td>
<td>Allows voice and data conversations over the same telephone line at the same time. For example, one could view a customer record while talking to that customer on the phone.</td>
</tr>
<tr>
<td>Cellular Phones</td>
<td>Make real-time voice conversations possible without knowing the physical location of the recipient.</td>
</tr>
<tr>
<td>Pagers</td>
<td>Enable instantaneous contact for low cost.</td>
</tr>
<tr>
<td>PCS (personal communications systems)</td>
<td>Make it possible to roam around a building or campus with a low-cost phone.</td>
</tr>
<tr>
<td>VSAT (very small aperture satellites)</td>
<td>Enables low-cost, wireless data transfer between geographically distant locations.</td>
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</table>
office capabilities. In addition, the company had two telephone lines installed in virtual workers' homes, one as a voice business line and another as a computer line and back-up voice line. In organizations with hoteling arrangements, the company typically supplies workers with laptop computers that they use at home or at the hotel office. In the hotel or suburban office, the office space includes cubicles with docking stations and telephones.

Providing technical support to remote workers is a key concern to organizations adopting alternative work arrangements. Offering twenty-four-hour-a-day support, seven days a week, can become expensive. Managers must decide what types of support to provide, where to provide it, and whether to provide it internally or outsource it. Information technology companies such as IBM offer employees technical service through the customer service organization, which already supplies round-the-clock support. According to one manager, "IBM treats employees just like customers when providing service. They have a local number to call if they experience a problem, and that number is answered by the very same organization that supports our external customers. We had an infrastructure already set up." When the infrastructure is not already part of the company's support offerings, however, it is often more cost-effective to let an outside company offer technical support to remote workers.

Managing the office space after the remote workers move out is another facilities management issue. For those corporations seeking financial benefits from the freed-up office space, leaving the workers' offices intact is not an attractive option. Instead, architects, human resource personnel, and information technology experts must work together to design the new space. Typical arrangements include a few private office spaces and conference rooms, available on a first-come, first-served basis or appointment schedule; some cubicule spaces where workers can have a "place" to work for a short period of time; and some social space that is conducive to impromptu meetings.

There are facilities for either plugging in a laptop or accessing a desktop computer while in the office. Telephone systems are configured so that the receptionist can route calls to the appropriate physical location when the worker is in the office. In some cases, the telephone system is designed so that the worker logs into the phone system when he or she takes over a cubicle or office, and the log-in procedure automatically routes incoming calls to that location. Most firms will need increased capabilities for dial-up computer access to accommodate the remote worker using servers. A seemingly obvious point is that there is little financial value in virtual offices unless office space can be relinquished; we found several instances in our research in which space that was no longer occupied was still being leased!

At Xerox, for example, some sales managers have moved back into their offices after deciding that the virtual office was not a workable arrangement for them.

Ideally, by incorporating these activities, firms can achieve their technology goals. However, managing a virtual office infrastructure is no small feat. Solutions are often extensive and demand careful engineering. At Chiat Day, for example, an MIS director described the firm's technology goals as providing improved communications and collaboration to facilitate sharing of information; mobility, consistency for workers to work anywhere and anytime without perceiving any differences in machines or access; and corporate intelligence and security to keep information centralized and secure. Another goal was to reduce paper because there was nowhere to put it. One aspect of Chiat Day's solution was to take the word "personal" out of personal computers by allowing the sharing of machines with standard application sets that are closely managed to ensure integrity.

Although most of these technologies have been around for a while, the costs have typically outweighed the benefits. Only recently have costs decreased to the point where widespread use of many of these technologies has become feasible. We believe that innovations such as videoconferencing on the desktop and the increased use of the Internet will only add to the number of workers who will choose to work in an alternative work arrangement. Similarly, existing technologies will become better integrated. IBM's goal, for example, is to have one telephone number at which an employee can be reached, regardless of work location.

In summary, facilities management of alternative
Summary of Lessons Learned

Learned from Successes:
- Institute new information flows to replace those lost when workers leave offices and no longer have physical contact.
- Educate workers on how to be more effective providers and consumers of information.
- Assess, and train for, virtual worker management skills.
- Provide training on personal work strategies in a virtual office environment.
- Create dialogue and education on how to deal with changed family relationships.
- Start with a pilot, but eventually move to a critical mass for benefit realization.

Learned from Failures:
- Don’t put new employees in virtual offices.
- Set examples with senior managers; move them to the virtual office first.
- Manage the office space left behind in the traditional office.
- Make it possible to be exempt from virtual offices with a valid rationale.
- Allow a return to physical office space.

Appropriate Virtuality

While many companies are just now considering the move to alternative work arrangements, some leading-edge companies are wondering whether they should continue or expand their initiatives. Some managers wonder how to keep up the momentum. Others are finding it much more difficult to manage in the virtual environment than they had originally thought. At Xerox, for example, some sales managers have moved back into their offices after deciding that the virtual office was not a workable arrangement for them. They felt they lacked control of their employees and of the sales process. Even sales representatives have given a choice to work virtually or have a permanent office. In some offices, the expected savings in real estate costs have not materialized because of the return of some managers and employees.

At a large consumer products firm, virtual offices were adopted for the entire sales force. But managers quickly realized that new workers were not happy with working virtually and that they could not learn the culture of the organization without being exposed to veteran employees. So the firm adopted a policy in which new employees were strongly discouraged from working virtually for the first year of their employment.

If companies address the drawbacks of the virtual office with new management approaches, they can profit from the benefits of portability and mobility while minimizing the costs. Institutionalizing enlightened policies for alternative work arrangements means mixing virtual and nonvirtual offices. In fact, we would argue that no firm should have completely virtual offices — or completely physical offices, for that matter. Instead, companies should analyze the continuum of approaches in Figure 1 and their particular circumstances to determine just how much virtuality is appropriate. Now that technology can substitute for physical proximity, we need to decide when and where such substitutions are appropriate. Should a certain business function be closer to customers or to colleagues in the office? Have one-year company veterans sufficiently assimilated the organizational culture so that they can become virtual? If certain employees seem to need proximity to offices, can the company at least offer a day or two a week for telecommuting? The factors and options involved are too complex to allow for an algorithmic determination of when to go virtual, and life was easier when such choices did not exist. But the possibility of the virtual office offers many benefits to counteract the complexity.

Virtual offices are here to stay, but so is our need for face-to-face interaction with other humans. The best information environments will take advantage of the ability of information technology to overcome geography but will acknowledge that the highest bandwidth network of all is found between the water fountain and the coffee machine, across the conference table, and in the cafeteria line. There are times when no other type of communication will suffice.

References

- Virtual offices are those in which technology has supported physical office space. They are not to be confused with virtual organizations, in which firms outsource many of their operations or build an organization using multiple suppliers for traditionally internal functions. For an overview of the latter concept, see:
- Early work on telecommuting, substituting technology for commuting, was done in 1974, when J.M. Niles coined the term. For a more recent discussion of the topic, see:

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