INTRODUCTION

This article explores issues of telework and IT professionals. Telework or telecommuting refers to a nontraditional work scenario where the employee works remotely from the physical organization. The telework is often supported by technologies such as phone, fax, computer, networks, and even video cameras. Employees can telecommute from their homes, a satellite office, a hotel room, or an airplane. Virtual companies even exist in which remotely located people work collaboratively to produce products and services like traditional firms. People can also choose to combine telecommuting with traditional work forms. For example, they may telecommute three days a week and work at the office on two days.

Several studies have indicated that telework is productive, satisfying, and successful (Caudron, 1992; JALA Associates, 1990; Newman, 1989). Westfall (1998) gives a comprehensive list of productivity measures yet points out that several of the statistics regarding telework are anecdotal with no rigorous measure of employee output. Benefits of telework include improved productivity, worker satisfaction, lowered absenteeism, an expanded employee pool, cost savings, and environmental benefits. Barriers to telework, also anecdotal, identified in the literature include...
loss of managerial control and a lack of ability to effectively measure employee productivity and performance (Currid, 1992; Kraut, 1987).

With technology becoming cheaper, more interactive, and greatly compatible, it is paradoxical that telecommuting percentages remain low. Jobs that may be considered typical for telework are sales, engineering, and medical transcribers. However, Web developers, graphic artists, programmers, and computer support are also examples of jobs in which people successfully telecommute.

In the age of telecommunications, it seems that many jobs are suitable for telework. A surgeon needs to be near a patient to operate, though technology even allows for remote diagnosis and consultation with specialists. What about a network manager or a Help Desk representative? Why are some organizations unwilling to transition to a new mode of operation despite potential gains? Are there jobs that require so much one-on-one or hands-on interaction that a person must be physically at the plant during working hours? What are the issues facing IT organizations which encourage or retard telework within the organization?

In the following sections, telework policy and considerations specific to IT organizations will be discussed for different IT functions. Conclusions and implications for managers will be given.

**TELEWORK POLICY**

Any organization that is contemplating telework should have a formal policy outlining who is eligible and under what conditions. This section discusses the policies or recommended policies of six organizations that support telework: two telecommunications companies, three government agencies, and one university. Pacific Bell and General Telephone and Electric (GTE) both have extensive guides on how to set up a telecommuting program. This is not surprising in that they offer services that make telework possible. Many state agencies are also exploring telework alternatives. For this article, the Department of Personnel Administration (DPA) for California, the Metropolitan Washington Council of Governments (COG), and the State of Missouri were examined. The University of New Hampshire (UNH) telecommuting policy was also used because it represented a case where telecommuting days were limited and the policy was quite flexible.

Policies regarding specific organizational issues of the above-mentioned firms are outlined in Exhibit 1. In the table, seven aspects of the policies are identified, and a description of how each policy dealt with the issue is given. Overall, selection of teleworkers, work timing, and scheduling and safety issues were well addressed. Other important issues such as family time, secure data, and equipment repairs were not well addressed. Shaded areas indicate where no policy or recommendation was stated.
## EXHIBIT 1 — Organizational Issues to Consider in Telework Policies

<table>
<thead>
<tr>
<th>Selecting which Employees Can Telework</th>
<th>Pacific Bell</th>
<th>General Telephone and Electric</th>
<th>Department of Personnel Administration (California)</th>
<th>Metropolitan Washington Council of Governments</th>
<th>State of Missouri</th>
<th>University of New Hampshire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voluntary. Employees self-select. Consideration is given on an individual basis.</td>
<td>Lengthy checklist given.</td>
<td>Based on work-related criteria established by management.</td>
<td>Voluntary. Anyone who has completed the introductory period with the approval of a supervisor. Work characteristics considered.</td>
<td>Voluntary. Employees self-select. Consideration is given on an individual basis depending upon job characteristics.</td>
<td>Based upon type of work and agreement with supervisor.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Security and Confidentiality Issues</th>
<th>Pacific Bell</th>
<th>General Telephone and Electric</th>
<th>Department of Personnel Administration (California)</th>
<th>Metropolitan Washington Council of Governments</th>
<th>State of Missouri</th>
<th>University of New Hampshire</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBO. No difference from traditional employees.</td>
<td>MBO. No difference from traditional employees.</td>
<td>MBO. Management by end results tracking milestones and deadlines.</td>
<td>MBO. Management by end results tracking milestones and deadlines.</td>
<td>MBO. Management by end results tracking milestones and deadlines.</td>
<td>MBO. Management by end results tracking milestones and deadlines.</td>
<td>MBO. Management by end results tracking milestones and deadlines.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Monitoring Productivity/Evaluation</th>
<th>Pacific Bell</th>
<th>General Telephone and Electric</th>
<th>Department of Personnel Administration (California)</th>
<th>Metropolitan Washington Council of Governments</th>
<th>State of Missouri</th>
<th>University of New Hampshire</th>
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<td>MBO.</td>
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</table>

<table>
<thead>
<tr>
<th>Flex Time/Scheduling</th>
<th>Pacific Bell</th>
<th>General Telephone and Electric</th>
<th>Department of Personnel Administration (California)</th>
<th>Metropolitan Washington Council of Governments</th>
<th>State of Missouri</th>
<th>University of New Hampshire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specifically state hours, days, breaks, etc.</td>
<td>Specifically state hours, days, breaks, etc.</td>
<td>Specifically state hours, days, breaks, etc.</td>
<td>One day per week at the central office. Overtime and flex time authorized by management on an individual basis.</td>
<td>Specifically state hours, days, breaks, etc. Bi-weekly time sheets submitted.</td>
<td>Specifically state hours, days, breaks, etc. Bi-weekly time sheets submitted.</td>
<td>Specifically state hours, days, breaks, etc. Bi-weekly time sheets submitted.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family Considerations</th>
<th>Pacific Bell</th>
<th>General Telephone and Electric</th>
<th>Department of Personnel Administration (California)</th>
<th>Metropolitan Washington Council of Governments</th>
<th>State of Missouri</th>
<th>University of New Hampshire</th>
</tr>
</thead>
<tbody>
<tr>
<td>You need child care for your small kids. &quot;...telecommuting is not a substitute for childcare.&quot;</td>
<td>Benefits to family stated.</td>
<td>Benefits to family stated.</td>
<td>Benefits to family stated.</td>
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<td>Benefits to family stated.</td>
<td>Benefits to family stated.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Benefits to Family Leave</th>
<th>Pacific Bell</th>
<th>General Telephone and Electric</th>
<th>Department of Personnel Administration (California)</th>
<th>Metropolitan Washington Council of Governments</th>
<th>State of Missouri</th>
<th>University of New Hampshire</th>
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</thead>
<tbody>
<tr>
<td>As a coordination with Family Leave.</td>
<td>As a coordination with Family Leave.</td>
<td>As a coordination with Family Leave.</td>
<td>As a coordination with Family Leave.</td>
<td>As a coordination with Family Leave.</td>
<td>As a coordination with Family Leave.</td>
<td>As a coordination with Family Leave.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Manage so that job requirements are met. Non-specific.</th>
<th>Pacific Bell</th>
<th>General Telephone and Electric</th>
<th>Department of Personnel Administration (California)</th>
<th>Metropolitan Washington Council of Governments</th>
<th>State of Missouri</th>
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<td>Manage so that job requirements are met. Non-specific.</td>
</tr>
</tbody>
</table>
**EXHIBIT 1 — Organizational Issues to Consider in Telework Policies (Continued)**

<table>
<thead>
<tr>
<th></th>
<th>Pacific Bell</th>
<th>General Telephone and Electric</th>
<th>Department of Personnel Administration (California)</th>
<th>Metropolitan Washington Council of Governments</th>
<th>State of Missouri</th>
<th>University of New Hampshire</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Safety</strong></td>
<td>Ergonomic statement recommended.</td>
<td>Inspection and safety guide or course recommended.</td>
<td>Home must adhere to existing safety requirements. Work-related injuries during telecommute will be covered by worker’s compensation.</td>
<td>Work-related injuries during telecommute will be covered by worker’s compensation. Employer is responsible during telework hours. Worksite inspection with day’s notice.</td>
<td>Clean, safe workspace required. Workspace subject to inspection.</td>
<td>Clean, safe workspace required. Workspace subject to inspection.</td>
</tr>
<tr>
<td><strong>Repairs</strong></td>
<td></td>
<td>State equipment repaired by state. Employee equipment repaired by employee.</td>
<td></td>
<td>State is not responsible for employee property. Office of administration will provide hardware and software.</td>
<td></td>
<td>Responsibility of teleworker.</td>
</tr>
<tr>
<td><strong>Disaster Recovery</strong></td>
<td>Telecommuting can help rapid disaster recovery.</td>
<td></td>
<td>Mentioned in light of being able to work...</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Training Program</strong></td>
<td>Recommend training employees how to telework and manage telework.</td>
<td></td>
<td>Existing telecommuting training program in place.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Selecting Teleworkers
The telecommuting literature tells us that employees well suited to telework will be self-motivated and self-managed, be able to make their own decisions, and have a proven work record within the organization. While the literature is focused on these worker characteristics, the company policy statements are focused on functional opportunity. Policies state that telecommuting should be voluntary and that anyone can apply, subject to approval from their supervisor.

Productivity Measures
In areas where productivity was mentioned, management by objectives was the key to measuring teleworker productivity. Evaluation was described as being no different from the evaluation of a traditional employee. UNH required loose reporting of objectives by employees. This may be because the policy allowed for only one or two days of telecommuting per week. Presumably, the in-plant days would allow for an adequate evaluation of employee progress.

Flex Time and Scheduling
Most policies in the sample required that the employee clearly state hours and days for telecommuting, including scheduled breaks. Overtime and flex time need to be authorized by the teleworker’s supervisor.

Security and Confidentiality Issues
Data security and confidentiality were given cursory attention in the studied policies. Pacific Bell provides a checklist of security considerations such as access control, auditing, and security administration. GTE mentions security briefly and DPA solves the issue by referring to already existing corporate policy.

Family Considerations
Pacific Bell clearly states that “telecommuting is not a substitute for childcare.” Suggestions for in-home care of small children and for working out arrangements with children and spouse are suggested. No other firm listed in this study was as direct. Benefits of telecommuting for the family were touted by GTE and how to telework during family leave was covered in the the COG policy. Academic literature concurs that telework has many issues regarding work and family conflict (Druxbury and Mills, 1989; Druxbury and Higgins, 1991).

Safety
Issues of telework place safety or ergonomics were mentioned by all policies with the exception of UNH. Several firms expressed the right to in-
spect the telework office to confirm workplace safety. The issue of
teleworker privacy was never directly identified in any policy. Defining
specific work hours seemed to be the only protection an employee had
to invasive demands from the office.

Repairs
The DPA policy states that employee-owned equipment was the respon-
sibility of the employee to maintain and company-owned equipment was
the responsibility of the corporation to maintain. The State of Missouri
and UNH policies were very explicit in identifying the responsibility for
maintenance as belonging to the employee.

Other Issues
Disaster recovery, training, benefits, and support were other concerns
that were rarely addressed by the six firms in this study. Simple actions
like training people what to expect from telework or teaching people to
back up their data could improve success of teleworking programs.

The policies ranged from very structured (Pacific Bell) to very flexible
(UNH, GTE). With a highly structured policy, a large firm can offer a tele-
commuting program that covers many situations. The advantage to a corpo-
ration is cost savings, improved productivity, and increased worker
satisfaction. A comprehensive policy offers economies of scale. The GTE re-
port indicates that 81 percent of people who telework work for a firm of
less than 100 employees. There is further evidence that telework is a bot-
tom-up phenomena (Ruppel and Harrington, 1995). This is partial explana-
tion for why telecommuting policies often are undefined. A more flexible
policy allows for a faster moving, more flexible, competitive workforce.

IT ORGANIZATIONS
IT organizations are headed by Chief Information Officers (CIOs) with
several smaller departments. Typically, the CIO reports to a company’s
Chief Executive Officer or Chief Financial Officer. The departments are
often divided along operational objectives of IT in the firm. Typical de-
partments are shown in Exhibit 2. A networking department has network
administrators and managers who manage the telecommunications infra-
structure within and external to the firm. A customer service department
is responsible for making end-user computing successful in the organiza-
tion, including training, computer Help Desk, and maintenance and re-
pair of user workstations. A systems department performs systems
administration, database management, and integration functions. Many
firms have organizational systems like payroll, financials, SAP, and MRP
that fall into a specific applications or project group. All the groups
above include vendor and user coordination and negotiation.
The IT organization typically acts as a support group to the rest of the firm and to the products and services the firm creates.

TELEWORK FOR IT PROFESSIONALS

In 1995 Ruppel and Harrington reported on a survey of 252 IT departments regarding barriers to telework. Less than half of the IT departments surveyed actively used telecommuting. Of those with telework programs, very little of the IT function is done by telework. Ruppel and Harrington suggest that the IT managers may act as “gatekeepers” that fail to introduce telecommuting for fear of the difficulty of managing employees and the need to control technical work. Their study also indicates that smaller-sized departments may be more prone to successful telecommuting because they are easier to manage and they can select projects appropriate to telework.

The technology exists to allow almost everyone to be a telecommuter. Jobs that traditionally have not lent themselves to telecommuting require face-to-face interaction, customer service, and hands-on operation. This is changing. Technology is increasingly capable of manipulating a user workstation remotely, providing interactive communication, and supporting remote network troubleshooting. Evidence of this is given by telecommunications companies and Internet service providers able to provide customer support and manipulate networks quickly and easily. IT professionals face a unique challenge in that they are savvy with cutting edge technologies, yet work in a traditionally service-oriented role. IT Professionals are the people who carry beepers and are on 24-hour call. Typically, no one needs to see them until the network is down or their hard drive crashes. It is a paradox because the IT people are well equipped to telecommute, the paradigm of remote support and repair is established, yet the management of these departments is more conservative and centralized in practice. The following subsections explore telework and different functions of the IT department.

Hardware

If a piece of hardware is broken, there has to be a physically local employee to fix it. Certainly, anyone can replace a broken workstation with an entirely new one and fault-tolerant networks can be electronically rerouted to keep a firm operational. Yet, eventually, a human must repair and maintain the equipment.

Personal Computing

Several products allow an IT person to “take control” of an end-user’s workstation. They can remotely view the problem first hand or even show the user how to perform a troublesome task. However, most firms
chose to have personal computing support as a local function. Computer Help Desks are likewise local. However, many firms offer remote Help Desk services to clients all over the world.

**Training**

Some research suggests that training is most effective when an IT trainer works one-on-one in the user’s environment on context-specific tasks and using a learning method that best suits the student (Bostrom et al., 1990). New technologies encourage the use of multimedia training programs through intranet, streaming video, and remote courses. In this sense the IT training activity may become that of producing training materials, not necessarily delivering them in person.

**Networking**

A network administrator can perform many activities as a teleworker. However, for some operation aspects, there is a physical need for someone to have access to the actual equipment. A person needs to lay the network cables and install the routers. Fault-tolerant networks can be re-routed so that problems can be delayed; however, network development, installation, and repair often require physical presence.

**Programming**

It is common to see programming jobs offered in a telework format. This is because coding is an activity that one can do fairly autonomously, and the outcome is well understood. Firms are also facing a shortage of technical talent and are willing to go to great lengths to hire programming skills. For years, the concept of hiring cheap, competent technical skills from countries such as India and China has been discussed. However, this idea has only been realized on a small scale due to the high requirement for coordination, integration, and test.

**System Administration**

Like programming, system administration is a job that is sometimes advertised as a telework position. Many systems activities, status monitoring, and maintenance can be done effectively with remote access. This again is indicative of a firm’s willingness to be flexible so that they can hire the right technical help.

**Project Support**

Many firms have massive project implementations, such as SAP or Year 2000 upgrades, that require many in-house and contract professionals to accomplish. The conversions have long timeframes, are company-critical,
and require IT employees to coordinate with each other and with different functional areas of the firm. A great deal of communication takes place in projects like these, and telework may only be an option on a limited level until people become accustomed to communicating effectively in electronic teams.

**ADDITIONAL BARRIERS TO IT PROFESSIONALS AS TELECOMMUTERS**

Aside from issues of perceived need for face-to-face contact with end-users and the necessity of coordinating projects, IT professionals face other obstacles to becoming teleworkers: customers' fear of technology, conservative departmental values, and a history of centralized, production-like management. Ironically, many of the jobs found for teleworkers involve Web development, network administration, and programming. Many of these IT telecommuting jobs are limited to contract workers, and are not made available to company employees.

Technology is intimidating to many people, and personal contact is often considered synonymous with customer service. When customers seek help, it is much more comforting to have a person physically present, whether they can solve the problem or not. This is a cultural rather than a technical barrier. The concept of a telecommuting Help Desk has already been proven. Several technology companies have online Help Desks and 800 numbers for technical support. Extranets offer customized solutions and problem-solving to their clients. However, although it may be technically possible and generally acceptable for outside companies to support products remotely, firms are reluctant to physically remove their own technical help. If a user cannot adequately describe a problem over the phone, the next comfortable solution is to have a physical visit where the IT professional can examine the problem first hand.

IT departments are accustomed to “burning-in” new technology. Often when a new innovation is adopted by a firm, the IT personnel work tirelessly to ease problems associated with it. In this sense, IT organizations are conservative. While end users may be ready to adopt Windows ’98, the IT department is more wary. Support for home offices adds a level of complexity to some IT professionals’ work. Help Desk personnel could be responsible for in-house users and anyone working at home on a personalized system. A network manager might be called upon to troubleshoot problems between people’s houses and their offices. The conservative view towards adopting technology also impacts the acceptance of telework. This is also reflected in the telecommuting policies lack of support for employee-owned computer equipment.

Lastly, IT departments have their historic roots in what was once called the Data Processing Department. Ruppel and Harrington (1995), recognizing the “gatekeeper” culture of IT managers, suggest that they
are unwilling to give up control for IT workers to telecommute. Many organizations seeking IT talent will try to solve the technical skills shortage by hiring high school students with good technical skills. An inexperienced person like this might lack the professional maturity to become a telecommuter. This further reduces the IT department’s willingness to promote telework programs.

CONCLUSIONS AND IMPLICATIONS FOR MANAGEMENT

Telecommuting remains low for IT organizations. Pressures of globalization and a limited technical talent pool may force companies to increase their adoption of telecommuting. Organizations need to weigh the potential risks and losses against the productivity gains they have yet to realize with telework. Management can mitigate risks through partial telework (e.g., two days a week), through training programs for telework candidates, and by focusing on employee goals and objectives rather than elapsed time.

Trust of employees is a critical factor with telework. Clear policy and telework guidelines can reduce misunderstandings and problems between office and home. A policy might state that the employee needs to be reachable by phone during working hours with the exception of lunch. No policy might result in the teleworker being unreachable during the day, ultimately giving the wrong impression to management and fellow workers.

In this article, elements contained in several telecommuting policies were discussed. Of the policies reviewed, there seemed to be a lack of attention given to secure data, repairing employee-owned equipment, and to issues of having a family present during work. Three additional obstacles to telework in IT organizations were identified: end-user technophobia keeps IT professionals local to handle problems with computing; IT organizations are typically conservative; and a young technical talent pool hinders selection of appropriate candidates for telework.

Currently, there is an explosion in the number of courses, conferences, and shopping one can do online. As people become more adept with electronic media and communication, telework will become less of a novelty and more a part of standard operations. Eventually, there may be IT professionals providing company and end-user support through interactive lines from remote locations anywhere in the world.

Dr. Ruth Guthrie has worked as a programmer, program manager, and consultant in the aerospace and telecommunications industry. She is currently a professor of Information Systems at California Polytechnic University of Pomona. Her research interests include electronic commerce, cyber culture, and telework. In addition to teaching, Ruth is co-owner of a small

company that specializes in the production of technical training videotapes. Ruth can be contacted at raguthrie@csupomona.edu.

References


