TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE 25, 1–14 (1984)

Home Teleworking: A Study of Its Pioneers*

JOANNE H. PRATT

ABSTRACT

Some futurists have projected that large segments of the white collar labor force will work in home offices. Trade-offs favoring working on computers in home offices have been identified from interviews of both employer/supervisors and employees. Major advantages for the employer are access to an expanded labor supply, a means of hiring part-time staff for cyclical work, and increased employee productivity. The primary advantages of home telework for the employee are the flexibility it brings to work, increased personal productivity, cost and time savings for able-bodied employees, and a job opportunity for the home-bound. Home office workers can be classified into distinct groups. The typical employees currently home teleworking are: self-disciplined full-time clerical women seeking income at reduced personal expense, managerial and professional mothers wanting to nurture young children without dropping completely behind in their careers; and male managers or professionals who value the part-time integration of work and family life more than they do competition for further advancement in their organizations. Data support a generalized model of home teleworkers as individuals who will move in and out of part- or full-time work in home offices for intermittent or longer periods of time, as personal situations change. Data suggest an evolution toward increasing home telework—with the exception of a few categories of individuals—as new work patterns slowly develop in response to technological change.

Introduction

A white collar labor force working on computer terminals in their "electronic cottages" is one vision of the future [1]. Conveying a reality to that image is the accelerating dispersal of computers[1] into society. What we don't know is to what extent our society will adopt or reject the envisioned work pattern.

The brief history of office work performed on home computers begins about 1970. A survey of women in computer work revealed only one programmer who had "at times used a computer terminal in her home. . ." [2]. The very few women who were writing programs part time in their homes returned to their employers' offices to test their work on the computer. The 1970 survey inferred that male employees worked full time on site[2] in their employers' offices.

By 1972, energy shortages focused attention on the feasibility of "telecommuting" to save on gasoline consumption. The term was coined by Nilles [3] to imply the "*total*

*This work was supported in part by the Xerox Corporation.

JOANNE H. PRATT is President of Allied Professionals Educational Consulting Services, Dallas, Texas. APECS is a not-for-profit multidisciplinary group that specializes in seeking more humane solutions to problems of a rapidly changing society.

Address reprint requests to Joanne H. Pratt, President, APECS, P.O. Box 19647, Dallas, Texas 75219.

[1]The use of the word "computer" herein includes stand-alone word processors, stand-alone information processors, and terminals communicating with mainframe computers.

[2]The terms "on-site" and "off-site" are used to mean working on or off the employer's premises, respectively. "Off-site" does not include the employer's satellite or shared neighborhood premises.

© 1982, 1983 Allied Professionals Educational Consulting Services. All rights reserved.

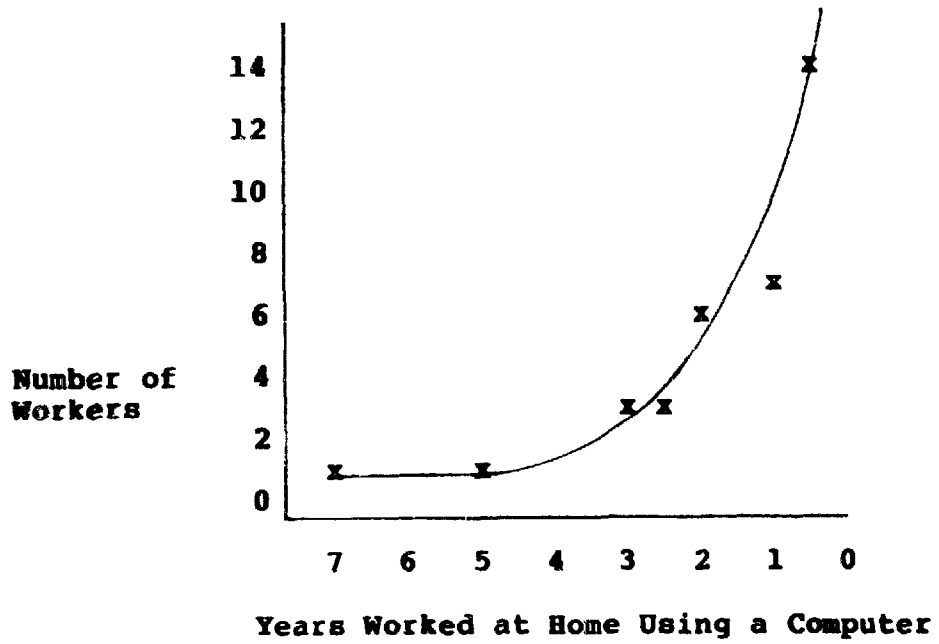

Fig. 1. Trend in home office use of computers: sample size was 35.

or partial substitution of the *daily commute*" by communication via a computer terminal. Nilles proposed satellite centers at relatively short distances from the workers' homes. Terminals located at the satellite centers would allow needed access to the central offices [4].

A 1979 article in the *Washington Post* proposed working at home—again, among the benefits was saving gasoline. Schiff [5] asked for "A new look at management practices, union rules, and government laws and regulations . . . to determine whether they unduly discourage work at home; government should fund research in this area." Apparently, little research on work in a home office was being done at that time. The 1979 *Social Sciences Citation Index Annual* did not list any references to office work being performed at home on computer terminals. The "technology assessment of the personal computer" (conducted as of February, 1979, at the University of Southern California), gave only passing attention to employees working in their homes [6].

By January, 1981, however, *Business Week* [7] identified 11 companies employing workers at home on computer terminals or word processors. The same companies, and often the same individuals, have subsequently been featured in other newspaper and magazine articles. A five-month subscription to a clipping service garnered 36 articles on "the home office" [8].

Thus, in 11 years time teleworking in home offices has drawn increasing public attention. Our interview data confirmed how recent is the use of computers in home offices. In the fall of 1981, one worker from a sample of 35 interviewees had been working in his home for seven years, but 14 had worked at home on computer terminals for less than one year (see Figure 1).

In a 1981 privately published paper, Olson [9] raised a broad range of questions on the implications of remote work and briefly described corporations' three work-at-home programs. A fourth company she interviewed had experimented for several months with locating four employees in a satellite office.[3]

[3]Details from the study prepared for the Diebold Group are proprietary.

TABLE 1
Method

46 Interviews of home office workers structured by an 86-item questionnaire
15 Interviews of employers structured by a 47-item questionnaire
28 Unstructured interviews topics included:
1. Scheduling of work and nonwork time
2. Work habits at company and at home
3. Productivity and supervision of worker
4. Cost and time benefits
5. Equipment ownership and use
6. Impetus for working at home
7. Career implications of off-site work

Research Method

Phase 1 of our study has identified many prototypes of work in home offices on computers or word processors, a work mode that is referred to as "telecommuting," "telework,"[4] or "flexiplace."[5] We began with the premise that if five to ten million white collar personnel would be working at terminals in their homes in 1990 [10] then there must be people working at home in 1981, and they could be observed as models of a future work force.

Potential interviewees were gathered from media articles. We contacted both the companies mentioned and their at-home employees. Referrals from these interviewees extended our sample pool. We called people who have written about home offices and from them we made contact with military and governmental agencies and additional corporations using home teleworkers. As the sample described is not random, the data should be treated as indicative of representative work patterns.

Interviews were conducted by telephone, structured by two questionnaires prepared for employer/supervisors and for employees (see Table 1). Supervisors who themselves worked at home were interviewed also as employees. Questions that did not pertain to that particular interviewee were not asked. One interviewer with some technical knowledge of computers and word processors conducted the survey. The composite sample included male and female employer/supervisors and employees, as well as handicapped, retired, and self-employed persons; 14 industry categories and 36 companies are represented (see Tables 2 and 3).

TABLE 2
Sample of Home Office Workers

	Professionals	Managers	Clerical	Total
Men	14	12	0	26
Women	10	6	4	20
Included in the above groups:	3			
Handicapped men and women				
Retired men and women	2			
Women with children under 6 years	5	3	1	
Men with children under 6 years	3	1	0	

[4]"Telework" refers to the use of computers as a primary communications tool in the workplace [12].

[5]"Flexiplace" was coined to mean work at alternate sites, but not necessarily work using a computer [13].

TABLE 3
Sample of Interviewees by Industry Category

Category	Professionals	Managers	Clerical	Self-Employed	Employers	Total	Companies/ Category
Academic	2					2	2
Banking	2	2	1		1	6	3
Computer manufacturers	2	2			2	6	3
Computer programming	4		1		4	9	3
Creative media				3		3	3
Freight transport	1				2	3	2
Insurance					2	2	2
Manufacturers			2		1	3	1
Professional consulting	1	3		1		5	5
Professional services		2		3		5	5
Publishing	3	1				4	3
Retail	1					1	1
Scientific research	2					2	2
Utilities	1	4	—	—	3	8	1
Totals	19	14	4	7	15	59	36

Interviews ranged in length from 20 minutes to more than an hour, most taking 45 minutes to one hour.

Categories of Home Office Workers

Home teleworkers are not a homogeneous group. The sample can be differentiated by categories according to job functions:

- Clerical women worked full time either as employees or as contract labor doing word processing or data entry.
- Managers—men and women—worked only part time or intermittently at home because their job function involved managing people. Managers included the owner or chief executive officer of companies ranging from one person upwards, and both senior and middle management employees of major corporations responsible for from four to 90 people.
- Professional men and women included computer programmers and analysts, university professors, research scientists, a physician, management consultants, and stock brokers. One-third of this group worked full time at home, the rest, part time or intermittently.

Some categories of white collar employees identified in our study (but not interviewed) were cited by supervisors as having either returned to the office full time or stopped working after rejecting home telework. Those include the following:

- single men and women whose social life stems from office contacts;
- handicapped workers who find it physically impossible to work long hours at a terminal;
- workers whose families object to their presence at home;
- individuals who are not self-disciplined enough to perform their jobs without supervision;
- workers whose off-site productivity cannot be easily measured by their supervisors.

Computer Equipment

More than 57 percent of the equipment was employer-owned terminals communicating with mainframe computers and used at home primarily to develop and maintain software. Thirty-one percent of the hardware was stand-alone computers and twelve percent was stand-alone word processors. Many of the stand-alone units had not been equipped to telecommunicate.

Feasibility of Home Telework for the Employee

COSTS AND BENEFITS

Workers reported saving one to two hours per day when they did not commute. The distances they lived from their employers' offices imply substantial savings in energy and personal expense for each day they did not drive to work (see Table 4).

Dollar savings estimated by the workers who made the fewest trips to their employers reached $200 per month on food, more than $100 per month on gas, parking fees, and insurance, and $100 per month on clothes.

The ability to communicate via computer terminals enabled several people to live an air trip away from the office. One employee in Los Angeles found no difficulty working for a company located in New York.

Although workers were very aware of commuting costs, they showed less concern about their home energy use except for a few individuals who used solar heating or wood burning stoves. No one felt a significant increase in heating or cooling bills by home teleworking.

A few employees who worked part or full time at home paid for a second phone or leased terminals.

The self-employed or workers who did "moonlighting" jobs at home paid for their furnishings and equipment but had avoided renting office space.

Some workers at home escaped day-care costs by supervising their children while they worked. Others also saved money by tax deductions of their home office.

Self-Evaluation of Productivity and Supervision

Sixty-seven percent of the 27 persons who evaluated their own performance saw an increase in their productivity as a result of working at home. For some, the quality of work was also higher. Managers, particularly, found it difficult to accomplish tasks at the office that required concentration because a large part of their time was spent dealing with people.

Two male self-employed workers felt their productivity was lowered by the presence of children or other distractions in the house. Twenty-six percent of this sample saw no change in their productivity.

Supervisors measured the productivity of the clerical home office group by pages per day (word processing), or lines per hour (data entry). They monitored the managers and professional employees who wrote proposals, reports, or computer programs by on-

TABLE 4
Commuting Distance

22 Drivers (%)	Round Trip Commute (miles)
36	0–19
23	20–39
14	40–59
27	≥60

site or telephone conferences, task completion, and product quality. Managers were also gauged on how well they handled their on-site responsibilities while working at home.

More than half of the 23 employees who commented felt the way they were supervised could not be improved; in fact, several volunteered that the supervisory arrangement was the best part about working at home. But piece-rate workers wanted better organization of their work loads by the supervisors to avoid drops in their earnings. Others would have liked more frequent meetings with supervisors, clearer instructions, better feedback on their own performance, and if they did not have it, telecommunications to increase the speed of interaction with the company.

Isolation Versus Social Contact

Interviewees were probed for feelings of isolation. One-fourth of the sample of home office workers thought of themselves as loners, antisocial, or introverts. Another fourth called themselves people-oriented or gregarious and the rest described themselves as being self-sufficient. Typically, each home office worker easily controlled the amount of time he or she spent in social contact. There were two groups whose experiences were different: women with young children and the handicapped.

Handicapped workers were a special case. Far from isolating them, home telework provided them with new social contacts. Most overcame considerable difficulties to get into the office on some regular basis, both to expedite their work and to establish social camaraderie.

Professional women with young children missed the intellectual contact with their peers, but felt they were no more house-bound than other mothers who did not have jobs.

Seventy percent of home office employees said that the number of their social contacts was "about right."[6] Working at home, they saw family members, neighbors, friends, and clients or enjoyed satisfactory social contact through the telephone or computer telecommunications. Two clerical workers who had met only twice at the office of their mutual employer maintained an active telephone friendship that extended to solving equipment problems.

Most workers periodically socialized with coworkers because they performed some job functions that could not be carried out at home. Without contact it was difficult to manage people, teach, or solve a complex programming job. One professional and one manager mentioned socializing as an incentive to go into the company office, but another pointed out that his day in the office was too crowded by attention to business matters to be considered socializing.

When we analyzed the data, we did not find any interviewees working at home who were under the age of 28 and who had never been married, but employees cited coworkers fitting that description who had gone back into the office to work because they needed the "standing around the water cooler" socialization.

Managers worked for intermittent periods in their home offices: two to three days per month to four to five hours per day at irregular hours on tasks that required uninterrupted concentration, such as writing a report. Fifty-seven percent of the 14 managers went into the office regularly 5 days per week. The time worked at home was regulated by responsibilities at the office (see Table 5).

One-third of the professionals, including the self-employed, worked full time at

[6]This quotation and all subsequent quotations not individually referenced are taken from the research interviews

TABLE 5
Distribution by Time Worked at Home: Sample of 33 Interviewees

Total Workers	Professionals (%)	Managers (%)	Clerical (%)
Full time	33	—	100
Part-time or intermittent	66	100	—
	100		

home, but most of those who were employees commuted from one to five days per week. One clerical worker never went into the office.

Work Habits

People in all categories took advantage of their 24-hour day, seven-day week to schedule their work. Only 40 percent of the interviewees started work at conventional hours between seven and nine AM. Over half of the group worked on their computers at night. Only the clerical workers who depended on materials provided during normal office hours did not work on the weekends. In order to obtain a faster response time, programmers preferred working nights and off-hours when there is less demand on the mainframe computer.

Limiting interruptions at home facilitated adherence to a self-imposed work routine. Friends learned not to call during working hours and, similarly, other distractions such as children coming home after school and household chores were fairly easily controlled. Women performed routine word processing or data entry with small children present, but women professionals or managers engaged relatives or sitters to extend their working time beyond their children's periods of sleep. By contrast, when working at the company office, 62 percent of all workers complained of interruptions from people—distractions they could not control.

Most worked in a spare room they referred to as an "office." Even workers whose office was not separated from the living quarters in the home described "going to my office to work."

Career Implications

Daily contact with supervisors was unimportant to clerical workers who did not consider their job a "career," nor was it important to several professionals and one manager. Spending sufficient time in the office was important for supervisors who themselves worked off-site. Two men changed to nonsupervisory jobs so that they could extend their working hours.

Although one professional thought daily contact was critical for career advancement, other professionals and managers were not sure. No one, however, thought that off-site work advanced his or her career by comparison to peers who worked only in the company office. Women stressed adamantly that working at home was totally detrimental to a career because they needed to be seen in the office both to be considered serious about their careers and to hear about professional opportunities.

Employees viewed the attitude of supervisors as favorable toward home telework, but several responded that the boss only tolerated it or had never commented. A vice president was said to regard home terminals as an imposition on the employees' personal time.

The attitude of coworkers ranged from unawareness that the off-site employee was working at all, to acceptance and occasional awe, envy, jealousy, or resentment. Some coworkers thought the off-premise employee was not working full time if he or she was not visible full time.

The Employer/Supervisor's View of Off-Site Employment

BENEFITS

Employer/supervisors recognized off-premise employment as a way of working that might have present and future benefits, such as enabling them to prepare for future scarcities of skilled personnel by gaining access to an untapped labor pool; to meet fluctuating needs by adding unbudgeted personnel as less expensive contract labor; and to cover a 24-hour on-call job without adding personnel.

Employers mentioned the opportunity to increase productivity, to care for the environment by decreasing energy use and pollution, and to reduce the costs of work stations or avoid leasing additional physical space. Some employers also viewed work at home as a way of creating jobs for the handicapped and to provide part-time transitional jobs for employees wanting to retire.

IMPLEMENTATION

Supervisors of data processing personnel implemented off-site employment most easily because the employees worked on relatively inexpensive terminals and telecommuted over home telephone lines. When questioned about the term used for off-premise employment, one employer laughingly said "We call it 'taking our terminals home.'"

Although data processing personnel casually borrowed terminals, full-time word processing persons were set up in their homes by formal procedures. Their employers consulted the legal department, defined work guidelines in departmental meetings with supervisors and personnel, and brought newly hired employees into the word processing center for several days training.

The existing company security practices for on-site employees, that is, access codes to mainframe computers, ethics codes, and signed nondisclosure agreements served also for workers at home.

Neither the employers nor the employees reported any occurrence of home accidents. Half of the employers interviewed had no provisions for work-related accidents in the home. Others assume that Worker's Compensation, which is handled on a case by case basis, will apply to a worker at home.

One employer had difficulty with governmental regulations that she attributed to a disgruntled contract employee. A Department of Labor inquiry stated that her lack of control on overtime in the home did not meet guidelines for fair labor practices.

Organizations implementing work in home offices for home-bound groups provide training, equipment, and jobs. *Lift, Inc.* approaches potential employers such as *Time, Inc.* and *Walgreens* on a high executive level, identifying a computer programming job for which a handicapped employee is then specifically trained. The handicapped employee is furnished a terminal and is salaried by *Lift* for one year and by the client company thereafter. Six of the forty employees trained and placed by *Lift* in its first six years have failed "generally because they weren't competent as programmers."

Wave III, Inc. trains retirees at centers in Florida and Washington, D.C. as computer programmers and then hires them as contract workers. The organization anticipates that increasing numbers of retirees, as they become more skilled, will opt to work only at home. Both a man and a woman interviewed worked at home, in part, to be companions to their spouses. Neither employer nor employee thought age was relevant to off-site employment, but both felt a self-disciplined attitude was essential.

DARCOM, the U.S. Army Material Readiness and Development Command at St. Louis, represents the extreme in overcoming resistance to off-site employment. The initial DARCOM request to place four workers off-site for 24-hour coverage of data processing

was denied by an upper-echelon manager who felt it was "too risky in terms of personnel and legal aspects." A second request was approved by a different bureaucrat who realized the potential of home telework. The government is prohibited from paying for the installation and monthly charges of a home telephone. (Nor can the government accept the gift of an employee-paid telephone.) Following an opinion that nonvoice communication did not violate any rulings, the computer terminal was tied to the workers' homes by dedicated telephone lines. A "hold harmless [agreement] to protect the army from any liability" was signed by the employees.

Worker's Compensation was deemed site-independent but only in effect while the employee was on duty in his home office. Thus, the army employees signed an agreement designating the exact time they were to work. Their actual logged time was also monitored by their supervisor.

COSTS AND SAVINGS TO EMPLOYER

Employers paid off-site employees' salaries with full benefits, or hourly or piecework rates with partial or no benefits. Costs of equipment put into employees' homes ranged from $700 for a terminal to over $16,000 for a stand-alone word processor, printer, continuous belt dictation unit, modem, and extra telephone line. In most instances, work in the home and in the company was performed on equivalent equipment.

The areas of direct or indirect savings found by employers or home office personnel were: higher retention of employees, a decrease in disability benefits paid to employees who could be put back to work in their homes, and costs of in-office work stations. Also saved were the costs of benefit packages when workers were on contract, and costs saved by not hiring additional personnel needed, for example, to ensure 24-hour coverage of the computer center. Six of thirteen employers found no direct savings with off-site employees.

MANAGEMENT OF PEOPLE

All employees working at home were volunteers, some of whom had requested work at home in order to meet family responsibilities. Employers assigned their home workers responsibilities for which performance could be readily measured by task completion or by piece-rate standards. Some employers found increased productivity as high as 59 percent. Supervisors brought employees who did not meet performance standards back into the office full time.

To help full-time off-site workers feel part of the organization, supervisors scheduled tours of the company and circulated interoffice newsletters.

STATE OF TECHNOLOGY

Seventy-one percent of employer/supervisors interviewed had their employees come into the company to obtain their working materials. Others telecommunicated with employees through a personal or second phone.

Employers seeking to extend off-site employment are looking for a decrease in equipment costs, implementation of electronic mail, and automated linkage of home and office equipment. The Continental Bank of Illinois wants to automate the steps that now require an on-site worker to distribute work to homes and to print processed dictations.

PROJECTED USE OF OFF-SITE EMPLOYEES

The employer managers and supervisors interviewed were typically unaware of any home teleworking personnel outside their own departments even when several departments were using off-site employees as company policy. Thus, supervisors interviewed were not able to say what number and types of jobs could be done at home. Neither could

most "describe any particular candidates you have in mind as additional off-premise employees."

Employers viewed their current use of off-site employees as a pilot program that they are in the process of refining. All of the employers interviewed felt the program was successful and should be continued. When asked, "What is your personal view of off-premise employment?" all 15 employers responded enthusiastically with positive comments such as:

> "I don't care whether employees are in or out of the office. I am task oriented, not time oriented." "I couldn't go back to old ways."

Trade-Offs of Home Telework

The primary benefit of working in home offices was the amount of time that was freed. Workers in all categories emphasized the substantial amounts of time gained by not having to commute, socialize at the office, or interrupt their work. They acquired a flexible 7-day, 168-hour week for leisure and work.

Underlying most workers' comments was a desire to gain more control over their own lives. Workers expressed the "ideal" way to work as having one to three days in the office and the balance at home, or "what I have now."

For 11 women and two men, the impetus for working at home was to combine work with family life. Some workers said they now had time for personal recreation interspersed with their work.

Although all of the interviewees currently working at home would recommend off-site employment to other people, some of them suggested that the type of person and job would be the determinant. But there were trade-offs.

Clerical and contract employees paid on a piece-rate basis expressed concern about their lack of guaranteed income resulting from an inability of employers to consistently supply them with a full quota of work. Those individuals chose to work at home for the dollars they could earn while simultaneously being a "good wife and mother." The money they saved by not buying gasoline, lunches, and clothes, was balanced against their fluctuating income. These women were not concerned with a lack of benefits, which in the view of women's rights groups, left them open to exploitation.

Karen Nussbaum, Executive Director of *Working Women*, predicts that off-site employment ". . . far from being a solution for women will just mean women will do two jobs at the same time. . . . The physical separation of the worker, uneven pay scales, hourly rate, all work against individual workers."

The Office and Professional Employees International Union foresees that unions will oppose work in homes outright because it is an "impossibility to check." "You could not protect the workers. . . . Under no circumstances would we allow it [for office workers] in any of our contracts."

Managers interviewed as employees used a home office to "catch up" as well as to concentrate on long-term work without interruptions. They liked to type on their terminals in a comfortable, relaxing environment with wine, milk, or coffee at hand. However, they needed to spend some time in the office to interact personally with individuals and to assist the staff's completion of its tasks.

A crucial benefit of being able to telecommunicate in some businesses was overcoming limitations of place and time. Staff could work at home, in a motel, or anywhere, and overcome the time differential between geographic areas by using electronic mail.

The managers in the study did not save dollars by working at home. Since they worked part time on-site, they were not able to save parking or vanpool costs paid by the month, or clothing costs.

Women managers felt that even part-time work at home was a stressful move, "suicidal" to a career, but viewed it as a way to avoid dropping out completely. Career women wanted to be back at the office full time or to have their own businesses once the children were old enough. For them, the home office trade-off was the opportunity to nurture their young children at the cost of falling behind in their careers.

By contrast, three of the men chose to move from managerial to nonmanagerial positions at the same salary in order to obtain a flexible work style of two to three days per week in a home office that yielded greater personal time. Competing to rise on the corporate ladder was traded for what they considered to be an enhanced lifestyle.

Professional employees stressed their increased productivity when they worked at home. Those employees on line to computers did not waste time when the computer was down. However, they noted trade-offs because company policies were not set up to accommodate distant employees. For example, employees could not have their pay checks automatically deposited because the cooperating banks were local to the company or have their equipment repaired at nearby centers that were set up to serve only customers.

Women professionals, like the managers, found that home telework was a "finger in the dam" so far as staying on a career path while rearing a family. It was a way to maintain technical expertise.

Self-employed workers experienced dollar savings that could amount to as much as $1000 per month compared with leasing space and since their office was in the home, they could work 60 hours a week if they wanted to. Self-employed workers felt the advantages of a home office outweighed any disadvantages with one exception: the possible lack of credibility of their occupation as a bona fide business.

Handicapped employees expressed gratification that finally "someone needs me." Computer programming was meaningful employment that freed them from onerous jobs such as telephone sales. For the physically handicapped, working for a corporation was a way to make friends. Company group rates could also amount to substantial savings on medical insurance.

Unused to sustained periods of work, handicapped persons found the retraining period difficult. For some handicapped workers a 40-hour week continued to be a physical strain. Although the physically handicapped workers interviewed showed great inventiveness in adapting themselves to the computer—one used a mouthstick to press the keys—minor redesign of the hardware would greatly decrease the physical strain.

Handicapped off-site professionals shared the career advancement problems of managerial employees. Being at home set limits on their advancement. An employee cited not being assigned complex (and, thus, more interesting) programming jobs that require more on-site time working in teams.

Retirees working at home were able to make a gradual transition to full-time retirement. Those who spent leisure time with a fully retired spouse stated emphatically "I can work when I feel like it." On the other hand, leasing terminals from the employer and penalties for late completion of work, combined with low pay, raised doubts that the net income was worth the effort. Additionally, the work itself was not as interesting as previous jobs.

Judged by decreased employee turnover rates noticed by the supervisors, home office work is a privilege that inspires loyalty.

Evolution to New Work Patterns

In what ways do home teleworkers differ from writers, consultants, moonlighters, typists, and others who have always worked in their homes? Some answers to the question can be found by looking at a breakdown of the sample of this study. Eight people had worked at home before acquiring word processors as upgraded typewriters. Of those, three had already added electronic mail, (or were about to) and direct communication with typesetters, or nonword processing software. Full-time authors or secretaries had not really changed work at home by purchasing a word processor. But those persons who added telecommunications to obtain data bases or to transmit information, which they originated, had changed the nature of their job. They had become job-dependent on computers.

Four of the five interviewees working at home without computers were performing functions already automated in other companies: telephone interviews to update employee records, and the writing of software. The fifth person was a film maker.

Thirty-five individuals performed computer-dependent jobs. They included programmers, usually working on dumb terminals communicating with mainframe computers; persons doing software development, word processing, or accessing data bases on stand-alone equipment that was on-line to the employer; and individuals telecommunicating on collaborative research, manuscript preparation, or decision making across the United States or abroad. In those cases, the technology created the possibility of shifting work functions to the home.

TRENDS IN HOME TELEWORK

Data from this study suggest that although substantial numbers of white collar workers will eventually work in their homes, the trend is evolutionary, not revolutionary. Institutional resistance to change can be monumental, as represented in the extreme by the DARCOM example. Some categories of white collar employees, listed above, cannot be projected as part of a future home office force.

Some employees will work in their homes because of personal circumstances in spite of their preference for on-site employment. They were represented in this study by the interviewees who disliked the lack of distinction between work and personal life and felt guilty about the ever-present work waiting to be done at home. The larger part of our sample preferred to work at home. They wanted 24 hours in which to integrate their work and personal lives. By preference, they used daylight time to swim, play golf, or walk on the beach. Parents balanced their work and family responsibilities; for example, a father supervised two children so the wife could leave the house. Mothers put the clothes in the washer, the children down for naps, and then sat at the computer to work.

Workers in all categories mentioned disadvantages to home telework, some of which may be partially overcome through new habits established if home telework becomes an increasingly common work pattern.

For interviewees who prefer to work in a home office, the drawbacks fell into two clusters:

1) *Variables the individual can control.* Interviewees spoke of the self-discipline required not to snack or be distracted by the house, which "has a life of its own." Some had to fight their compulsion to work overly lengthy hours on the terminal instead of reading or leaving the house.

2) *Variables the individual cannot easily control because they arise from pioneering nontraditional work styles.* Employees mentioned the lack of informal exchange of "what's going on" in the company and of more technical information. Some missed the feedback from team members necessary to do more complex jobs. Others listed guilt as a drawback

arising from the feeling that family, neighbors, and co-workers "think I'm not really working."

Widespread adoption of computer technology may automatically generate new work patterns that will offset shortcomings of the second type. For example, programming hints and informal comments could be exchanged through electronic mail. Society's perception of what constitutes "work" can be expected to gradually change as home offices become more common.

Regulations are being formulated to guide new work patterns. In connection with a two-month experiment [11] the General Services Administration (GSA) has begun establishing policy towards at-home work by formally requesting the IRS to rule on the deductability of home office expenses, and the General Counsel to define liability for home accidents. The IRS had not given a comprehensive response, but did qualify computer equipment in the home for depreciation.

Workers who expected to be working in their homes five years hence gave various reasons: to retain the flexibility of time, to integrate their work and home life, or to remain at home until all the children were in school. Some said that continued work in the home was contingent upon whether or not the salary made it worthwhile. Others expected to have different jobs or to be retired.

The interview data strongly suggest that the generalized model of home teleworkers will be individuals who move in and out of part- or full-time work at home, for intermittent or longer periods of time, as personal situations change.

FACTORS AFFECTING THE RATE OF ADOPTION OF OFF-SITE EMPLOYMENT

Institutional forces are pushing off-site employment and are thus causing companies to pioneer work at home. With greater long-range impact, workers are unobtrusively pulling an informal shift to part-time work at home.

- Human resource organizations are training the handicapped, homebound, and retirees and representing them to business as an untapped skilled labor pool.
- Pilot tests to date are successful and self-correcting: an employee who is not productive at home can be brought back on-site.
- Personal computers continuing to drop in price may enable substantial numbers of employees to own computers as a tool for both work and recreation, just as they now own cars.
- There is an increasing awareness of the home office as a work option. The media, by presenting human interest stories highlighting off-site employment as a current reality, appear to be stimulating the trend.
- Employees are leveraging skills that are valuable to the company to obtain the option of working at home. Changing societal values are reflected in employees' wanting the option to establish their own priorities of time for work and personal affairs. They want to gain more control over their lives.

MAJOR FORCES AFFECTING HOME TELEWORK

Several major forces may dramatically affect the trend of home telework in unpredictable ways:

- An energy shortage and rising fuel costs could stimulate work at home to lessen commuting costs and depletion of natural resources.
- Inflation may increase the number of two-worker families, in which one person needs to stay at home in order to supervise children or protect against theft.

- Inflation causing employers to cut costs by using part-time labor might increase teleworking.
- Recession may cause employers to lay off or pull off-site workers back into the office "to be counted."
- Awareness by the public of the computer as an easy-to-use tool could accelerate a home telework trend.

Summary

People who are now working for a company and use their homes as part- or full-time work-sites are individuals who:

- have leverageable skills that allow them to successfully initiate home office work
- are volunteers in an employer-initiated feasibility study
- are individuals responding to the relatively few requests for "new hires" to work in the home

They are self-disciplined people who consider the opportunity to work at home a privilege. They either do not depend on the office for socialization or find that the limited time they spend there affords them about the right amount of contact with people. As one employee commented, home telework is a "funny combination of discipline and freedom."

References

1 Toffler, A., *The Third Wave*, William Morrow and Company, New York, 1980.
2 Farnden, J. P., The Employment of Women in Computer Work in the United States, *Winston Churchill Memorial Trust Report*, London, England (May–August, 1970).
3 Nilles, J. M., private communication to the author.
4 Nilles, J. M., Carlson, F. R., Gray, P., and Hammerman, G., *Telecommunications Transportation Tradeoffs*, University of Southern California, Los Angeles, 1974.
5 Schiff, F. W., Working at Home Can Save Gasoline, *Washington Post*, c-1, c-2 (September 2, 1979).
6 Nilles, J. M. et al., Personal Computers in the Future, five correspondances. *IEEE Trans. on Systems, Man, and Cybernetics* SMC-10 (8) (1980).
7 *Business Week* 94–103 (January 6, 1981).
8 *Burrelle's* Press Clipping Service (August–December 1981).
9 Olson, M. H., Remote Office Work: Implications for Individuals and Organizations, Center for Research on Information Systems, No. 25, GBA, No. 81-36(CR), New York University, New York (1981).
10 Nilles, J. M., *Business Week* 98 (January 6, 1981).
11 Stephan, E., Work-at-Home Experiment, General Services Administration, Automated Data and Telecommunications Service, Washington, D.C. (June, 1981).
12 Nilles, J. M., *Tech. Rev.* 58 (April 1982).
13 Schiff, F. W., private communication to the author.

Received 7 March 1983