

May 14, 1999

MEMORANDUM FOR BRUCE REED

**FROM: NICOLE RABNER
RUBY SHAMIR**

SUBJECT: "WORK AT HOME" STATISTICS

You asked us to verify the following quote by the President:

"When I became President in America, there were 3 million people making a living primarily out of their own home, for example. When I was reelected, there were 12 million. Now there are 20 million, in only two years." [4/25/99]

We cannot find a match for these figures in our research in part because the methods of data collection in this area employed by the various agencies and private companies are inconsistent. Each of these entities uses different definitions for people who make their living from home, making aggregating the various sets of numbers impossible (e.g. the definition of telecommuters ranges from people who telecommute once a month, to people who telecommute once a week).

The following statistics represent a range of the figures we could quote on the total number of people who make at least a portion of their income from the home, the number of people who own and operate home-based businesses, and the number of people who telecommute.

Note: The figures in each category can overlap because households, and workers can play one or more of these roles at once (for example: a worker can be a telecommuter who owns and runs a small home-based business on the weekends).

Overall Home-Based Income Earners

The March 1998 release of "Work at Home" statistics by the Bureau of Labor Statistics (BLS) reported that 21 million people "did some work at home" in 1997 for which they were directly or indirectly compensated, a 1.5 million increase from the 1991 figure of 19.5 million. In this report BLS noted that there was a marked increase in the number of wage and salary workers who reported direct compensation for their work at home from 1.9 million in 1991 to 3.6 million in 1997. This BLS Data comes out every six years, and is from a supplement to the Current Population Survey.

The International Data Corporation (IDC), a market research company that has conducted phone surveys since 1986, reports that the total number of home office households – which includes households of corporate after-hours workers, telecommuters, owners of home-based businesses, and other self employed people – has increased from 24.6 million in 1993 to 37.3 million in 1998. IDC projects that this figure will rise to 43.2 million by 2000.

CyberDialogue, a New York based research and consulting firm that has been tracking telecommuting rates for over a decade (also by phone), cites a slightly higher number for people who make some part of their income from the home because it additionally includes less frequent telecommuters and independent contractors. This data claims that the number of "home-workers" almost doubles from 28.7 million in 1993 to 54.6 million in 1998.

Home-Based Businesses

According to the BLS, 6.5 million of the 21 million wage and salary workers who did some work at home, were self-employed and more than 4.1 million self-employed workers were working in home-based businesses.

According to IDC there were 16.9 million income generating home-office households in 1993 and 22.2 million such households in 1998, with a projected increase to 26 million in 1999. This can include people who run a home-business full time or on the side, or those who may not identify themselves as home-business owners on their tax returns (potentially, so as not to be penalized for zoning and other violations).

CyberDialogue's data shows that 12.4 million people in 1993 were self-employed people who do any type of work at home for which they are compensated (telecommuters not included) including home-based business owners. In 1998 the figure was 19.6 million.

Telecommuters

According to a study by the U.S. Department of Transportation (DOT), in 1992 approximately 2 million people telecommuted, mostly from home (99% telecommuted from home). The study projected that by 2002, 7.5-15 million workers would telecommute from home and from telework centers. The DOT defined telecommuters as people who work from home or from a satellite telework center at least one day per week.

IDC defines telecommuters as those who telecommute at least three days per month. IDC estimates that there were 6.1 million telecommuters in 1993, 8.2 million telecommuters in 1996, and 9.9 million telecommuters in 1998. IDC also projects that there will be 11.7 million telecommuters in 2000.

CyberDialogue defines telecommuters as those who telecommute at least one day per month. According to CyberDialogue, there were 7.3 million telecommuters in 1993, 8.7 million telecommuters in 1996 and 15.7 million telecommuters in 1998.

Despite the discrepancies in the data, we can reliably make the following points:

- There has been a steady increase in the number of people who make a portion of their income from the home – whether as telecommuters, home based business owners, or others – and this figure continues to rise.

- This trend is promising in that it indicates greater flexibility in the corporate workplace, and reflects the expansion of technology into many more American homes. However, it also demonstrates another trend that has been gaining momentum: that the average workweek has lengthened considerably for people in a wide-range of professions – from managers to truck drivers – who are in their child-rearing years.

We have passed this information on to Paul Glastris and June Shih.

As we develop policies to address the needs of this growing population of workers, we might consider developing a reliable, uniform way of counting them year to year. We could, for example, insert questions in the Current Population Survey, a monthly Census Department survey of approximately 50,000 households, such as: Do you make any part of your income from work you do at home? Do you telecommute to your central office three times a month from home or from a telework center? These statistics would give us a better sense of the direction our policies could go.

Overall Work at Home Statistics

Every six years the Bureau of Labor Statistics (BLS) releases "Work At Home" Statistics which apply to people who telecommute approximately once a week, home-based business owners, and other self employed people. Because the data is measured every six years, the short term trend line is more difficult to determine. According to the BLS report released in March 1998, more than 21 million people did some work at home in May 1997. The BLS figures show:

- The number of people who did some work at home only grew by 1.5 million since 1991 – however, of people specifically paid for the work they did at home (i.e. not just those who took their briefcases home) increased substantially. In 1991, only 1.9 million wage and salary workers who worked at home got paid for their work while in 1997, 3.6 million wage and salary workers got paid for their work at home.
- More than 70% of people who made a portion of their income from home were married-couple families, and over 9 million of those who did some work at home had children under 18.

Overall Work at Home Trends

The following CyberDialogue statistics show a year to year trend in people who make a living from home, however the BLS and CyberDialogue numbers cannot be aggregated because they use different definitions for people who made a portion of their income from home. The CyberDialogue count – noticeably higher than BLS's -- includes once-a-month telecommuters, people (whether self-employed or working for a company) who bring work home after hours, independent contractors, and home-based business owners.

1990:	25.3 million
1991:	27.9 million
1992:	27.3 million
1993:	28.7 million
1994:	34.9 million
1995:	40.9 million
1996:	42.2 million
1997:	52.1 million
1998:	54.6 million

Therefore, according to CyberDialogue data, the number of people who make some part of their living from the home has more than doubled in this decade alone.

Home-Based Businesses

According to BLS, of the 21 million people who did some work at home in 1997, about 6.5 million were self-employed. More than 4.1 million self-employed workers were working in home-based businesses. The vast majority of these people -- 3.8 million -- were white.

According to a study produced by the Small Business Administration Office of Advocacy, age is not a factor for men entering business, while the likelihood of women becoming home-based

business owners increases with age. The study also noted that home-based businesswomen in their 20s earn substantially less than self-employed women in their 20s who work outside of the home. However, businessmen of the same age make almost the same income, regardless of their business location.

Home-Based Business Trends

This CyberDialogue count includes self-employed people who do any type of work at home for which they are compensated (telecommuters not included) including home-based business owners. Here again, the CyberDialogue numbers appear more inflated than the BLS numbers, but they show a short term trend (the government numbers do not).

1990:	11.2 million
1991:	11.6 million
1992:	12.1 million
1993:	12.4 million
1994:	14.2 million
1995:	15.6 million
1996:	16.4 million
1997:	18.3 million
1998:	19.6 million

Therefore, according to CyberDialogue data, in the last decade the number of self employed people who do any type of work at home for which they are compensated has almost doubled.

Telecommuting

According to a study by the U.S. Department of Transportation, in 1992 approximately 2 million people telecommuted, mostly from home (99% telecommuted from home). The study projected that by 2002, 7.5-15 million workers would telecommute from home and from telework centers (a projected 50.3% would telecommute from telecommuting centers closer to home than the central office). The DOT defined telecommuting as people who work from home or from a satellite telework center at least one day a week. The study estimated that fuel emissions, time spent travelling, and gasoline costs would all sharply decline as a result of telecommuting.

Telecommuting Trends

CyberDialogue, a New York based research and consulting firm, has been tracking telecommuting rates for over a decade and has released data showing a rapid increase in telecommuters. CyberDialogue's definition of telecommuters -- which is more liberal than the DOT definition -- includes people who work for a central office from home at least once a month, independent contractors, and part-time, informal telecommuters.

1993:	7.3 million telecommuters
1996:	8.7 million telecommuters
1998:	15.7 million telecommuters

Therefore, we could reliably say that since the President took office the number of telecommuters has doubled. The rapid increase in telecommuters can be attributed in part to the decrease in cost of personal computers, and a more compelling reason to use them – the Internet. Between 1993 and 1997 the number of home-based business owners who were on-line increased roughly eight-fold.

You asked us to verify the following quote by the President:

“When I became President in America, there were 3 million people making a living primarily out of their own home, for example. When I was reelected, there were 12 million. Now there are 20 million, in only two years.” [4/25/99]

We cannot find a match for these figures anywhere in our research. Attached, please find statistics on people who make their living from home, including a more detailed look at telecommuters and owners of home-based businesses. You will notice that there is a big discrepancy between the numbers that the government uses, and those of private companies such as CyberDialogue and International Data Corporation. Each of these entities uses different definitions for people who make their living from home, making aggregating the various sets of numbers impossible (e.g. the definition of telecommuters ranges from people who telecommute once a month, to people who telecommute twice a week). In addition to a lack of consistent definitions, there has never been a uniform measuring system that has chronicled trends year to year.

Despite the difficulties with the data, we can reliably make the following points:

- There has been a steady increase in the number of people who make a portion of their income from the home – whether as telecommuters, home based business owners, or others – and this figure continues to rise.
- This trend is promising in that it indicates greater flexibility in the corporate workplace, and reflects the expansion of technology into many more American homes. However, it also demonstrates another trend that has been gaining momentum: that the average workweek has lengthened considerably for people in a wide-range of professions – from managers to truck drivers – who are in their child-rearing years.

As we develop policies to address the needs of this growing population of workers, we might consider developing a reliable, uniform way of counting them year to year. We could, for example, insert questions in the Current Population Survey, a monthly Census Department survey of approximately 50,000 households, such as: Do you make any part of your income from work you do at home? Do you telecommute to your central office three times a month from home or from a telework center? These statistics would give us a better sense of the direction our policies could go.

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 Wednesday, March 11, 1998

WORK AT HOME IN 1997

More than 21 million persons did some work at home as part of their primary job in May 1997, the Bureau of Labor Statistics of the U.S. Department of Labor reported today. The overall number of persons doing job-related work at home did not grow dramatically between 1991 and 1997, but the number of wage and salary workers doing paid work at home did.

These findings are from a special supplement to the May 1997 Current Population Survey (CPS), the monthly survey of about 50,000 households that provides data on the nation's labor force. The information presented here pertains to persons employed in nonagricultural industries who were at work during the May 1997 survey reference week and indicated that they do some job-related work at home. Similar data were last collected in the CPS in May 1991. Highlights of the 1997 survey include:

- More than half of those working at home were wage and salary workers who were not paid expressly for their time worked at home. About 17 percent, however, were wage and salary workers who were paid for the hours they put in at home. Virtually all the remainder were self-employed workers, nearly two-thirds of whom had home-based businesses.
- Nearly 9 of 10 workers doing paid work at home were in "white-collar" occupations.
- More than 4.1 million self-employed persons were working in a home-based business.
- About 6 in 10 used a computer for the work they did at home.
- Wage and salary workers who were paid for working at home averaged nearly 15 hours per week at home; those who weren't paid worked about 9 hours at home. Workers in home-based businesses worked 23 hours per week at home, on average.
- Of those who worked at a second job, 37 percent did at least some of their work at home.

Pay Status, Industry, and Occupation

While the number of persons reporting work at home grew by only 1.5 million since 1991, there was a sharp increase in the number of persons who were paid for working at home. In 1997, 3.6 million wage and salary workers--about 3.3 percent of all wage and salary workers--were paid for the work they did at home. In 1991, only 1.9 million wage and salary workers--1.9 percent of the total--were doing work at home for pay.

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Of the 3.6 million wage and salary workers doing paid work at home, 88 percent were in "white-collar" occupations. Nearly a million of these workers were in professional specialty occupations, slightly more than the number of executives and managers. Sales and administrative support occupations also had large numbers of paid home workers.

By industry, about 1.6 million wage and salary workers in the services industry were doing paid work at home--about 44 percent of the total; more

than half a million in manufacturing were paid for work at home. All of the major industry groups except mining had significant numbers of workers doing paid work at home. (See table 3.)

The number of persons who were simply "taking work home from the office"--that is, wage and salary workers who were not being officially compensated for the work they did at home--was 11.1 million. (See table 4.) This was a modest decline from 1991, when 12.2 million wage and salary workers worked at home without being paid for that work. As with those paid, persons who were not paid for the work they did at home were overwhelmingly employed in white-collar occupations. Teachers were especially likely to do unpaid work at home; 2.8 million teachers reported doing so in 1997. From an industry perspective, services had the largest number of unpaid home workers (6.1 million), followed by manufacturing (1.5 million).

About 6.5 million self-employed persons did some work at home in May 1997, more than half of all the self-employed who were at work during the survey reference week. More than 4.1 million of the self-employed indicated that they were working in home-based businesses. This was the first time that the CPS had contained questions specifically designed to gather information on home-based businesses. Managers and professionals accounted for 1.7 million, or two-fifths, of those working in home-based businesses. Sales, service, and precision production occupations also had large numbers of such workers. In terms of industry, 2.1 million persons, or about half, were working in services, while construction and retail trade accounted for 726,000 and 532,000 workers, respectively. (See table 5.)

Demographics

More than 70 percent of persons who did some work at home in 1997 were in married-couple families. Women and men were about equally likely to work at home. The work-at-home rate for married parents was about the same as the rate for married persons without children. Whites were more than twice as likely to be engaged in some form of home-based work as either blacks or Hispanics. (See tables 1 and 2.)

Computer Use

Just under 60 percent of those who worked at home in 1997 used computers. Among wage and salary workers, computer use was about the same for those who were paid for work done at home (63.3 percent) as for those doing unpaid work at home (61.6 percent). Paid home workers were more likely to use a modem for their work at home (43.2 percent) than were unpaid home workers (32.8 percent). Also, 23.2 percent of paid home workers used a telephone line that was furnished by their employer. Only 54.4 percent of self-employed home workers used a computer for work done at home. (See table 6.)

Work at Home on a Second Job

Of the 8.0 million persons who worked on a second job in May 1997, 37 percent did at least some of that work at home. Men with a second job were slightly more likely than women to work at home on that job, and married people were substantially more likely to work at home than unmarried people. Married parents were about as likely to work at home on a second job as married persons without children. However, single parents, and especially single mothers, had higher work-at-home rates than single workers without children. (See table 7.)

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A total of 23.3 million persons were engaged in work at home on either a first or second job in May 1997, including 21.5 million who worked at home on their primary job and 3.0 million who did work at home on a second

job. About 1.2 million persons had two jobs and worked at home on both.

Information in this release will be made available to sensory
impaired individuals upon request. Voice phone: 202-606-STAT;
TDD phone: 202-606-5897; TDD message referral phone number:
1-800-326-2577.

Table 1. Job-related work at home on primary job: All workers by sex, occupation status, May 1997
(Numbers in thousands)

Characteristic	Total	Rate(1)	Worked at home	
			Percent distrib /	
			work	
			Wage and salary	
			Paid	Unpaid
Total, 16 years and over.....	21,478	17.8	17.0	51.5
Men.....	11,202	17.3	15.0	50.1
Women.....	10,275	18.3	19.1	53.1
Occupation				
Managerial and professional specialty...	13,120	36.7	14.0	61.7
Executive, administrative, and				
managerial.....	5,940	34.0	14.6	54.8
Professional specialty.....	7,180	39.2	13.5	67.5
Technical, sales, and administrative				
support.....	5,457	15.0	25.0	40.7
Technicians and related support.....	417	10.6	26.9	60.3
Sales occupations.....	3,356	22.4	19.1	39.1
Administrative support, including				
clerical.....	1,684	9.7	36.3	39.0
Service occupations.....	1,250	7.2	20.4	23.0
Precision production, craft, and repair.	1,145	8.2	10.1	26.5
Operators, fabricators, and laborers....	506	2.9	14.4	31.2
Industry				
Mining.....	73	12.3	(4)	(4)
Construction.....	1,330	16.2	10.3	20.0
Manufacturing.....	2,318	11.5	22.3	62.7
Transportation and public utilities.....	963	10.9	21.2	56.2
Wholesale trade.....	1,202	24.4	28.5	42.8
Retail trade.....	1,964	9.2	14.7	36.9
Finance, insurance, and real estate.....	2,008	25.7	16.4	48.6
Services.....	10,954	25.1	14.8	55.6
Public administration.....	666	12.3	29.5	69.2
Race and Hispanic origin				
White.....	19,646	19.2	17.0	50.7
Black.....	1,117	8.5	16.6	64.8
Hispanic origin.....	830	7.2	17.5	53.9

- 1 Refers to the number of persons working at home as a percent of the total at calculation excludes those persons who did not respond to the questions on work
 2 Excludes unpaid family workers, not shown separately.
 3 Includes both the incorporated and unincorporated self-employed.
 4 Data not shown where the base is less than 75,000.

NOTE: Data refer to employed persons in nonagricultural industries who report during the survey reference week as part of their primary job. Detail for the a Hispanic-origin groups will not sum to totals because data for the "other races" presented and Hispanics are included in both the white and black population group revised population controls used in the Current Population Survey effective with estimates. Dash represents zero.

Table 2. Job-related work at home on primary job: All workers by sex, marital s age of children, and pay status, May 1997
 (Numbers in thousands)

Characteristic	Total	Rate(1)	Worked at home	
			Percent distrib	
			work	
			Wage and salary	
			Paid	Unpaid
Total, 16 years and over.....	21,478	17.8	17.0	51.5
With no own children under 18.....	12,179	16.1	16.3	52.0
With own children under 18.....	9,299	20.5	17.8	50.9
With own children under 6.....	3,885	19.6	18.8	47.6
Married, spouse present.....	15,175	21.6	16.9	50.1
With no own children under 18.....	6,804	21.7	15.9	49.1
With own children under 18.....	8,372	21.6	17.8	50.9
With own children under 6.....	3,639	21.1	18.8	48.1
Other marital status.....	6,302	12.4	17.0	55.0
With no own children under 18.....	5,375	12.2	16.9	55.7
With own children under 18.....	927	14.0	17.7	50.9
With own children under 6.....	246	9.9	19.1	40.5
Men, 16 years and over.....	11,202	17.3	15.0	50.1
With no own children under 18.....	6,259	15.4	16.0	47.1
With own children under 18.....	4,943	20.5	13.8	54.0
With own children under 6.....	2,118	18.8	14.2	55.5
Married, spouse present.....	8,385	21.1	14.8	50.8
With no own children under 18.....	3,678	21.5	15.9	45.9
With own children under 18.....	4,707	20.8	13.9	54.6
With own children under 6.....	2,069	19.3	14.3	55.8

Other marital status.....	2,817	11.2	15.8	48.1
With no own children under 18.....	2,581	10.9	16.1	48.7
With own children under 18.....	236	16.1	12.8	41.4
Women, 16 years and over.....	10,275	18.3	19.1	53.1
With no own children under 18.....	5,920	17.0	16.7	57.2
With own children under 18.....	4,356	20.4	22.4	47.4
With own children under 6.....	1,767	20.8	24.3	38.1
Married, spouse present.....	6,790	22.3	19.6	49.2
With no own children under 18.....	3,126	21.9	15.8	52.8
With own children under 18.....	3,664	22.6	22.9	46.2
With own children under 6.....	1,570	23.9	24.7	37.9
Other marital status.....	3,485	13.6	18.0	60.5
With no own children under 18.....	2,794	13.7	17.7	62.1
With own children under 18.....	691	13.4	19.4	54.2

1 Refers to the number of persons working at home as a percent of the total at calculation excludes those persons who did not respond to the questions on work

2 Excludes unpaid family workers, not shown separately.

3 Includes both the incorporated and unincorporated self-employed

NOTE: Data refer to employed persons in nonagricultural industries who reported during the survey reference week as part of their primary job. Own children include daughters, step-children, and adopted children. Not included are nieces, nephews and other related and unrelated children. Data reflect revised population control Current Population Survey effective with January 1997 estimates.

Table 3. Paid job-related work at home on primary job: Wage and salary workers characteristics, May 1997
(Numbers in thousands)

Characteristic	Worked at home (1)	Percent distribution by hours worked at home		
		Less than 8 hours	8 hours or more	
			Total	35 hours or more
Total, 16 years and over.....	3,644	47.7	52.3	16.0
Men.....	1,683	42.2	57.8	19.5
Women.....	1,960	52.3	47.7	12.9
Occupation				
Managerial and professional specialty...	1,836	48.8	51.2	15.3
Executive, administrative, and managerial.....	867	51.9	48.1	16.7
Professional specialty.....	969	46.0	54.0	14.1
Technical, sales, and administrative support.....	1,363	47.4	52.6	13.8
Technicians and related support.....	112	45.3	54.7	18.4
Sales occupations.....	640	39.3	60.7	16.8
Administrative support, including clerical.....	611	56.0	44.0	9.8
Service occupations.....	256	36.3	63.7	31.7
Precision production, craft, and repair.	116	56.5	43.5	12.4

Operators, fabricators, and laborers....	73	(2)	(2)	(2)
Industry				
Construction.....	136	39.4	60.6	21.2
Manufacturing.....	517	43.5	56.5	18.4
Transportation and public utilities.....	205	58.2	41.8	16.8
Wholesale trade.....	343	35.9	64.1	13.5
Retail trade.....	289	59.8	40.2	11.3
Finance, insurance, and real estate.....	330	49.6	50.4	17.3
Services.....	1,616	46.9	53.1	15.6
Public administration.....	196	58.7	41.3	17.4
Race and Hispanic origin				
White.....	3,345	47.8	52.2	15.4
Black.....	185	43.5	56.5	19.3
Hispanic origin.....	145	36.4	63.6	21.1

1 Includes persons who worked at home but did not report the number of hours w did not report the number of hours worked are excluded from the distribution.

2 Data not shown where the base is less than 75,000.

NOTE: Data refer to employed persons in nonagricultural industries who report during the survey reference week as part of their primary job. Detail for the a Hispanic-origin groups will not sum to totals because data for the "other races" presented and Hispanics are included in both the white and black population grou revised population controls used in the Current Population Survey effective with estimates.

Table 4. Unpaid job-related work at home on primary job: Wage and salary worker selected characteristics, May 1997
(Numbers in thousands)

Characteristic	Worked at home (1)	Percent distribution by hours worked at home		Mean
		Less than 8 hours	8 hours or more	
Total, 16 years and over.....	11,067	69.5	30.5	8.9
Men.....	5,615	71.1	28.9	8.7
Women.....	5,452	67.9	32.1	9.1
Occupation				
Managerial and professional specialty...	8,098	67.4	32.6	9.2
Executive, administrative, and managerial.....	3,253	74.3	25.7	8.7
Professional specialty.....	4,845	62.7	37.3	9.6
Technical, sales, and administrative support.....	2,220	73.6	26.4	8.2
Technicians and related support.....	252	79.3	20.7	6.8
Sales occupations.....	1,311	69.4	30.6	9.5
Administrative support, including clerical.....	657	79.7	20.3	6.3
Service occupations.....	288	82.8	17.2	5.8

Precision production, craft, and repair.	303	81.3	18.7	6.3
Operators, fabricators, and laborers....	158	74.7	25.3	10.6

Industry

Construction.....	266	72.4	27.6	7.9
Manufacturing.....	1,454	76.9	23.1	8.1
Transportation and public utilities.....	541	76.5	23.5	8.3
Wholesale trade.....	514	67.7	32.3	9.5
Retail trade.....	725	78.5	21.5	8.2
Finance, insurance, and real estate.....	976	72.4	27.6	9.4
Services.....	6,089	64.6	35.4	9.4
Public administration.....	461	82.0	18.0	6.3

Race and Hispanic origin

White.....	9,958	70.1	29.9	8.8
Black.....	724	64.6	35.4	10.5
Hispanic origin.....	447	71.4	28.6	9.2

1 Includes persons who worked at home but did not report the number of hours w
Persons who did not report the number of hours worked are excluded from the dist

NOTE: Data refer to employed persons in nonagricultural industries who report home during the survey reference week as part of their primary job. Detail for race and Hispanic-origin groups will not sum to totals because data for the "oth group are not presented and Hispanics are included in both the white and black p groups. Data reflect revised population controls used in the Current Population effective with January 1997 estimates.

Table 5. Home-based businesses: Self-employed persons by selected characteristi
(Numbers in thousands)

Characteristic	Worked at home(1)	Percent distribution by hours worked at home		
		Less than 8 hours	8 hours or more	
			Total	35 hours or more
Total, 16 years and over.....	4,125	30.4	69.6	29.3
Men.....	2,157	36.2	63.8	25.5
Women.....	1,968	24.2	75.8	33.5
Occupation				
Managerial and professional specialty...	1,714	28.3	71.7	28.2
Executive, administrative, and managerial.....	1,014	28.3	71.7	29.0
Professional specialty.....	700	28.3	71.7	27.1
Technical, sales, and administrative support.....	1,016	33.4	66.6	22.5
Sales occupations.....	722	34.4	65.6	24.1
Administrative support, including clerical.....	259	33.1	66.9	15.5
Service occupations.....	616	12.0	88.0	58.3
Precision production, craft, and repair.	564	50.1	49.9	15.1
Operators, fabricators, and laborers....	215	36.1	63.9	22.4

Industry				
Construction.....	726	49.5	50.5	14.3
Manufacturing.....	193	13.6	86.4	38.5
Transportation and public utilities.....	132	52.8	47.2	18.0
Wholesale trade.....	185	28.9	71.1	30.2
Retail trade.....	532	38.9	61.1	19.2
Finance, insurance, and real estate.....	291	22.5	77.5	23.6
Services.....	2,054	23.0	77.0	37.8

Race and Hispanic origin				
White.....	3,868	30.5	69.5	29.0
Black.....	135	29.2	70.8	47.0
Hispanic origin.....	156	27.8	72.2	31.3

1 Includes persons who worked at home but did not report the number of hours did not report the number of hours worked are excluded from the distribution.

NOTE: Data refer to employed persons in nonagricultural industries who report home-based business during the survey reference week as part of their primary job above race and Hispanic-origin groups will not sum to totals because data for the group are not presented and Hispanics are included in both the white and black populations. Data reflect revised population controls used in the Current Population Survey of January 1997 estimates.

Table 6. Job-related work at home on primary job: All workers by usage of electronic equipment at home, May 1997
(In thousands)

Characteristic	Total at work	Workers using electronic equipment		
		Computer	Modem	Fax
Total, 16 years and over.....	21,478	12,785	7,533	6,165
Men.....	11,202	7,204	4,739	3,911
Women.....	10,275	5,581	2,794	2,254
Class of worker and pay status(1)				
Wage and salary workers(2).....	14,946	9,223	5,261	3,566
Paid.....	3,644	2,307	1,573	1,276
Unpaid.....	11,067	6,813	3,635	2,247
Self-employed(3).....	6,470	3,517	2,250	2,571

1 Excludes unpaid family workers, not shown separately.

2 Includes persons who worked at home but did not report pay status.

3 Includes both the incorporated and unincorporated self-employed.

NOTE: Data refer to employed persons in nonagricultural industries who report home-based business during the survey reference week as part of their primary job. The number of workers using electronic equipment at home exceeds the total number at work because many of them use more than one type of equipment. Data reflect revised population controls used in the Current Population Survey effective with January 1997 estimates. Dash represents zero.

Table 7. Job-related work at home on second job: All workers by selected characteristics
(Numbers in thousands)

		Worked at home	
Characteristic	Total	Rate (1)	Worked at
TOTAL			
Total, 16 years and over.....	3,005	37.4	8.2
With no own children under 18.....	1,709	33.5	8.7
With own children under 18.....	1,296	44.3	7.6
With own children under 6.....	554	43.4	7.7
Married, spouse present.....	2,091	46.7	8.3
With no own children under 18.....	930	47.3	9.0
With own children under 18.....	1,161	46.2	7.8
With own children under 6.....	524	44.9	7.8
Other marital status.....	915	25.8	8.1
With no own children under 18.....	780	24.9	8.3
With own children under 18.....	135	32.6	6.4
Men, 16 years and over.....	1,686	39.2	9.3
With no own children under 18.....	958	36.2	9.8
With own children under 18.....	728	44.0	8.6
With own children under 6.....	327	40.1	8.3
Married, spouse present.....	1,242	46.3	9.3
With no own children under 18.....	541	48.4	10.0
With own children under 18.....	701	44.9	8.7
With own children under 6.....	322	41.4	8.3
Other marital status.....	444	27.4	9.2
With no own children under 18.....	417	27.2	9.5
With own children under 18.....	27	(2)	(2)
Women, 16 years and over.....	1,319	35.4	7.0
With no own children under 18.....	751	30.6	7.4
With own children under 18.....	569	44.6	6.4
With own children under 6.....	227	49.4	6.8
Married, spouse present.....	849	47.2	6.9
With no own children under 18.....	388	45.8	7.6
With own children under 18.....	460	48.5	6.4
With own children under 6.....	201	52.0	6.8
Other marital status.....	471	24.4	7.0
With no own children under 18.....	362	22.6	7.1
With own children under 18.....	108	33.4	6.5
Race and Hispanic origin			
White.....	2,755	39.7	8.2
Black.....	180	22.5	9.5
Hispanic origin.....	131	25.4	6.5

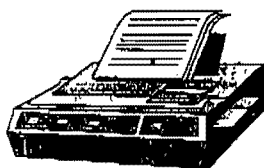
1 Refers to the number of persons working at home on a second job as a percent work on a second job. The calculation excludes those persons who did not respond on work at home on a second job.

2 Data are not shown where the base is less than 75,000.

NOTE: Data refer to employed persons in nonagricultural industries who reported during the survey reference week as part of their second job. Detail for the above Hispanic-origin groups will not sum to totals because data for the "other races" presented and Hispanics are included in both the white and black population groups include sons, daughters, step-children, and adopted children. Not included are grandchildren, and other related and unrelated children. Data reflect revised population used in the Current Population Survey effective with January 1997 estimates.

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From:

Office of the Secretary

Office of Human Resource
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Phone:

Fax phone:

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TRANSPORTATION

Executive Summary

*Implications of
Telecommuting***Objective***April 1993*

This report, addressing the potential cost and benefits of telecommuting, has been prepared by the Department of Transportation, in consultation with the Department of Energy and the Environmental Protection Agency, as required by section 352 of the Department of Transportation and Related Agencies Appropriations Act for fiscal year 1992. The report focuses on future impacts of telecommuting on transportation, environment, and energy use. Despite the existence of many telecommuters and numerous pilot projects and studies, telecommuting is still in a very early stage. The projections of future telecommuting and transportation impacts provided here could change substantially as technology continues to develop, and experience is gained in understanding employer and employee response to this new form of working.

Principal Conclusions

- Telecommuting is now practiced by approximately 2 million workers and could reach 7.5 to 15 million within a decade.
- Estimates of the future level and impacts of telecommuting are highly uncertain.
- Telecommuting has the potential to provide significant transportation-related public benefits in this decade.
- The actual amount and impact of telecommuting in any particular region will depend strongly on the local transportation environment and travel demand measures.
- The congestion and air quality improvements potentially attainable through telecommuting could be substantially diminished if telecommuters removed from the highways are replaced by the emergence of latent travel demand.
- Direct energy, air quality, safety, and time benefits of telecommuting will be increased as the degree of congestion is reduced.
- Telecommuting could stimulate urban sprawl and have other adverse impacts on land use and public transportation.
- Factors which will impact the rate of growth of telecommuting include uncertainty of benefits for employers and the considerable time and effort inherently required to bring about major changes in workstyles and ways of doing business.

- Telecommunication services and equipment are adequate for most current telecommuting, but high-bandwidth capabilities will be needed in the future and would be beneficial now.
- Government agencies can play a significant role in facilitating and encouraging telecommuting.
- Telecommuting can be an effective tool for travel demand management, but cannot be mandated.
- Continuing research is needed to clarify telecommuting costs, benefits, and future impacts.

Background

Computer and telecommunications advances in recent years, including computer networks and data systems, FAX machines, and electronic mail, have dramatically widened the choice of workplace for information workers and others so they can work wherever these tools are available, including at home. This development has paralleled trends toward a service economy, greater worker flexibility, empowerment of employees, and rising frustration from the irritation and time loss associated with commuting. One result is that a substantial portion of the U.S. labor force, perhaps as much as 30 percent, now works at home at least part of the time. In addition to self-employed individuals, contract workers, "moonlighters," and people simply bringing work home from the office, an estimated two million of these people are full-time employees who otherwise would commute daily to an office or other workplace. Most can be characterized very generally as "information workers," in that their work focuses substantially on the creation, distribution, or use of information. In effect, telecommunications services are substituted, partially or completely, for transportation to a more traditional workplace. This practice is called "telecommuting."

Telecommuting does not necessarily imply working at home. Satellite "telework" centers near or in residential areas, fully equipped with appropriate telecommunications equipment and services, can serve employees of single or multiple firms, co-located on the basis of geography rather than business function. In many cases a shared facility provides a more practical and satisfactory location for telecommuting than the home, and a setting less threatening to traditional business management styles. Telecommuting is often practiced as little as one or two days each week, although it can be full-time. While today's most visible telecommuters are predominantly managers or professionals, telecommuting is potentially relevant to most information workers, as well as to some other types of employees.

As corporate information technology and public telecommunications services have advanced, interest in telecommuting has increased markedly in recent years. A major reason is its

TRANSPORTATION IMPACTS	1992	1997	2002
Saving in Vehicle Miles Travelled (VMT) (billions)	3.7	10.0 - 12.9	17.6 - 35.1
Percentage Saving in Total Passenger VMT	0.23%	0.49% - 0.63%	0.7% - 1.4%
Percentage Saving in Commuting VMT	0.70%	1.6% - 2.0%	2.3% - 4.5%
Saving in Gallons of Gasoline (millions)	178	475.9 - 619	840 - 1,679
Percentage Saving in Gasoline	0.25%	0.6% - 0.8%	1.1% - 2.1%
Value of Gasoline Saved (millions)	\$203	\$543 - \$706	\$958 - \$1,914
Percentage Saving in Emissions			
NOx	0.23%	0.6% - 0.8%	1.1% - 2.2%
HC	0.31%	0.8% - 1.1%	1.4% - 2.7%
CO	0.36%	1.0% - 1.3%	1.7% - 3.4%
Annual Hours Saved for Average Telecommuter	77	93	110.3
Total Annual Hours Saved (millions)	156	444 - 577	826 - 1,652

Telecommuting is at such an early stage that prediction of its rate of growth and transportation impacts is difficult. Many factors contribute to a high level of uncertainty in the estimates presented above. The actual degree to which jobs, individuals, and employers will be suited to telecommuting is not clear. Most demonstration or pilot programs have been limited in scale and have involved carefully selected workers and managers. Directly relevant data concerning travel behavior, emissions, and fuel use are not available and would vary from region to region.

The figures shown in the preceding tables do not tell the whole story. Where congestion is severe or strong disincentives to vehicle use are in place, telecommuting might be much more attractive to firms and individuals than in an "average" location. In addition, even a modest decrease of traffic due to telecommuting could reduce congestion significantly, thereby magnifying savings in time and fuel use, and reduction in emission of pollutants. Conversely, telecommuters who at one time commuted by carpools or public transportation, may now choose to drive single-occupant automobiles due to the reduced congestion. In the latter case, congestion reduction would be diminished, and transportation benefits associated with the telecommuter would be partially nullified. The magnitude of these factors, and the balance struck between them, will vary considerably from place to place. Generalization as to the net result is not possible. The benefit estimates shown above do not include either of these important but unquantifiable effects.

Factors Affecting the Future Course of Telecommuting

Telecommuting is not suitable to every job, person, or situation. Whether an individual telecommutes, and how often, are results of the decisions of employer and employee, made within the constraints of the existing physical and institutional environment. Conditions that must be met before a person can become an active home-based telecommuter include the following:

-
- The job must be suited, at least in part, to performance at a remote location.
 - The capabilities and personal characteristics of the employee must be appropriate to working with little or no direct supervision.
 - The employing firm must accept telecommuting as a legitimate and desirable activity, provide necessary support, and have appropriate information technology in place.
 - The supervisor or manager of the employee must accept the concept and practice of telecommuting.
 - The employee must feel comfortable with telecommuting in terms of its suitability to his or her personal work habits and style, its effect on social interactions and on advancement and career.
 - The employee must have a suitable workplace and working time free of distractions (such as child care responsibilities).
 - Available technology, particularly telecommunications services, must be adequate and cost-effective for the work to be performed at home.

While all of these conditions clearly can be met in many cases, each will filter out a portion of the potential telecommuting population. Some of these elements are eliminated or modified for the case of satellite telework centers, but implementation of centers is more complicated, costs could be higher, and depending on specific circumstances, vehicle-miles and emissions reductions could be zero or even negative.

Even when these conditions are satisfied, telecommuting will only occur if businesses and workers are sufficiently motivated toward it. The local transportation environment will be important in establishing the level of motivation. Severe congestion, stringent travel demand management measures, and lack of widespread convenient public transit are all factors that can increase the incentive for establishment of telecommuting programs and participation in them. Similarly, factors affecting the cost of commuting -- vehicle and fuel cost, or dispersion of workers over a large area, also encourage telecommuting.

The rate at which telecommuting is adopted will also be constrained by the still-uncertain cost-benefit implications for businesses and the pace at which employers and workers become familiar and comfortable with this new way of working. Employers naturally await more definitive evidence for claims of dramatic productivity increases. Employees often have initial misgivings about social isolation, being "out of the office loop", being at a disadvantage for career advancement, and mixing their home and work lives. Other concerns revolve around the process of selecting who can telecommute, remote supervision,

and fears of some telecommuters that they must work extra hours to justify and protect their status. Overall, a high level of trust is required between worker and employer.

In pilot programs, these potential problems generally have not proven to be serious, and impressive productivity improvements have been reported. However, in many of these cases telecommuting is practiced only a few days per week, and participants have been carefully selected. These programs, thus provide valuable insight and mitigate some key uncertainties, but do not permit firm conclusions to be drawn.

Major uncertainties with important implications for transportation include the form and importance that local telework centers ultimately achieve and the degree to which telecommuting is center-based as compared to home-based.

Establishment of remote telework centers is a complex undertaking that may require several years to come to fruition.

Barriers to Telecommuting

For the most part, available telecommunications services appear adequate for a large range of telecommuting situations. Of course, a more advanced telecommunications infrastructure would enable more widescale and sophisticated telecommuting to occur. Today, wide-bandwidth services required for video functions or transfer of very large quantities of data are often lacking. While this can be an obstacle to "high-end" telecommuting and other telework situations, availability of telecommunications services do not appear to constitute a serious limitation at present, although this could change in the near future. The need for major advances in the nation's telecommunications infrastructure to support general business, commercial and home uses, an explicit objective of the Clinton Administration, will create markets and drive development of infrastructure to a much greater degree than telecommuting applications. However, many complex and contentious regulatory and legislative issues arise in creating the sophisticated, efficient, high-capacity, broad-bandwidth U.S. telecommunications infrastructure; resolution of these issues could accelerate future telecommuting and other business and societal uses.

A variety of obstacles to telecommuting are identified in the literature, including liability considerations, zoning and tax laws, labor union concerns, and occupational health and safety issues. Pilot program experiences to date suggest that none is a serious constraint to widespread adoption of telecommuting. Nonetheless, as telecommuting becomes more common, issues such as tax codes, liability, and labor laws could become more intrusive. These topics and related issues will have to be addressed in a responsive and fully informed manner by the responsible Federal, state, and local agencies if telecommuting is to achieve its full potential.

Other Telesubstitutions

Many activities, other than commuting to work, are already affected by the availability of sophisticated telecommunications services and computer networks. In general, those services provide convenience and access, and may not significantly affect transportation. These effects are largely unquantifiable at present. These "telesubstitutions" include the ubiquitous automated teller machine (ATM); shopping by catalog and toll-free telephone calls, or home shopping services using cable TV; and electronic submission of tax returns.

Particularly in rural areas, there is increasing interest in providing educational services and medical consultation via telecommunications, as well as establishing telework centers that might provide more and higher-paid employment than could otherwise exist locally. Full-time telecommuting from these regions could also favorably affect the character and economic structure of these areas. However, most observers find that the degree to which rural development in general can be stimulated in this way is likely to be quite limited, at least in the near term.

Governmental Roles

Telecommuting can lead to a reduction in the number of commuting vehicles and thus contribute to the attainment of cleaner air and congestion mitigation. Therefore, many communities view telecommuting as a transportation demand management measure and provide government assistance for establishing a telecommuting strategy. Federal assistance is also available. The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), Public Law 102-240, provides Federal assistance for "operational improvements" which include "...transportation demand management facilities, strategies, and programs..." (Section 1005(f)). Therefore, ISTEA funds may be used to support the planning, development, and marketing of telecommuting programs designed to improve air quality and reduce congestion.

Several states have established telecommuting programs for state employees and actively promote telecommuting in the private sector. At the Federal level, the Flexible Workplace Project, sponsored by The President's Council on Management Improvement, is testing the feasibility and utility of flexible workplace arrangements for Federal employees. This project, managed by the Office of Personnel Management and the General Accounting Office, is designed to facilitate the implementation of pilot programs in Federal agencies.

The telecommunications environment for telecommuting will be significantly affected by the Clinton Administration's stated goal of encouraging investment in the national information infrastructure. The President's recently-announced technology policy specifically notes the importance to the U.S. economy of stimulating development of a broadband, interactive telecommunications network -- an "information superhighway" -- linking the nation's

Chapter 1 - Background

INTRODUCTION

Approximately 30 percent of the U.S. labor force, roughly 38 million people, currently work at home at least part of the time as shown in Figure 1. While most are self-employed or are simply working after regular hours, a growing number of them are full-time employees who otherwise would commute daily to an office or other workplace. Most can be generally characterized as "information workers" in that their work focuses substantially on the creation, distribution, or use of information. The ability to work at home has in large part been made possible by corporate use of computer

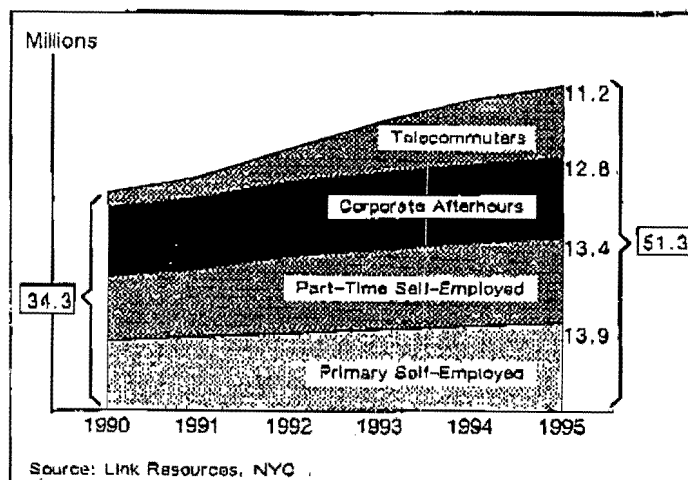


Figure 1. Work-at-Home Trend

and telecommunications advances during the last several years. Sophisticated telephone and personal computers linked by phone lines to central networks and data systems, fax machines, and electronic and voice mail systems have dramatically widened the scope of workplace for information and other workers so they can work wherever these services are available, including at home. In effect, telecommunications services are substituting, partially or completely, for transportation to a conventional office or other workplace. This practice is called "telecommuting."

Traditionally used, the term telecommuting does not always imply working at home. It can refer to local work centers, fully equipped with telecommunications equipment and facilities, to serve the employees of one or several firms, collocated on the basis of proximity rather than business function. In many cases, a shared facility provides a more comfortable and satisfactory environment for telecommuting than the home. Telecommuting can be part-time, need only one or two days each week, although it can be fulltime. While telecommuters are predominantly managers or professionals, many observers see this practice as potentially relevant to most information workers, as well as to other types of

Interest in telecommuting, now that the enabling technologies have reached satisfactory levels of cost and performance, has increased markedly in recent years. In part, this is because in many cases it can significantly improve the productivity and quality of life of employees. From the public perspective, the principal attraction lies in its implications for transportation and air quality. The public cost of urban traffic congestion is not limited to personal stress experienced by commuters and the associated delay costs and corporate productivity losses; commuting in general, and peak-hour congestion in particular, are major sources of air pollutants, energy uses, and accidents. Because of this, the Clean Air Act, as amended in 1990, requires stringent measures be taken in many regions to reduce air pollution through constraints on vehicular traffic. In addition to more familiar approaches such as flexible working hours, carpooling, and use of public transit, telecommuting is seen by many as a potentially important means of managing traffic demand. Other significant possible benefits include reduced national energy and petroleum use, fewer highway accidents, and eased transportation infrastructure requirements. Telecommuting can also be of great value in expanding opportunities for people of impaired mobility or tied to the home for any other reason.

While the basic concept of telecommuting is simple, it touches on many areas of life and raises questions and issues difficult to answer on the basis of current limited experience. The degree to which it is adopted in the future, the specific forms it takes, and the magnitude of the benefits actually obtained depend not only on the technologies involved and the capabilities of the U.S. telecommunications infrastructure, but much more importantly on factors such as attitudes of people toward their work and workplace, the suitability of telecommuting to corporate culture, and the nature of the work performed. There is wide variation in predictions of the future of telecommuting and its impacts on transportation.

Purpose and Scope

This report has been prepared by the Department of Transportation (DOT), in consultation with the Department of Energy and the Environmental Protection Agency, in response to a statutory requirement to conduct a study of the potential costs and benefits of telecommuting, focusing on the impact of transportation on energy use and air quality. The report provides a description of the nature of telecommuting and estimates of its near-term future prospects and implications for transportation and related areas. Although there are many telecommuters and a substantial number of pilot projects and studies have been conducted or are in progress, telecommuting is still in its infancy. The congressionally requested estimates of the potential reduction in commuting and associated pollution, energy use, and lives lost, as well as other social impacts, should be viewed in the context of a full discussion of the many issues and uncertainties that surround the subject.

Accordingly, this report addresses the following topics:

- The nature of telecommuting in its various forms, its current extent, and how new uses of telecommunications will substitute for transportation.
- The forces, both positive and negative, shaping the future course of telecommuting, including barriers to its growth that are within the purview of the Federal and state and local governments.
- Estimates and projections of the growth of telecommuting in the next 10 years.
- Estimates of the effects of telecommuting on transportation, including estimates of:
 - The amount and type of reduction of commuting;
 - Associated safety, environmental, and energy benefits;
 - Impacts on other modes of transportation; and
 - Other social impacts of telecommuting.

Many of the studies surveyed project the numbers of telecommuters 15 to 30 years into the future on the basis of a high level of substitution for transportation. However, these long-term projections have necessarily been developed with a very limited foundation of data. Since this report is to provide information to facilitate formulation of government policies regarding telecommuting, its focus is relatively near-term - the next five to ten years. The principal topic of the report is the potential reduction in highway traffic associated with use of information technologies that permit working at home or at local facilities rather than commuting to a conventional workplace. Although the substitution of telecommunications for transportation has intriguing potential in many areas of life, in most other cases (telemedicine, teleeducation, teleshopping) near-term transportation implications are modest; the real benefits are in providing convenient and efficient access to various services. Those topics will be discussed briefly but will not be examined in depth. Although the emphasis is near-term, many of the issues raised have clear long-term significance.

This report is based primarily on a careful examination of the large and diverse body of literature on the subject, most of it produced in the last few years. The literature covers a broad range of applications (remote work, teleconferencing, teleservices) and issues (transportation, urban and regional geography, economics, management, social and psychological, technical). Types of publications examined include books, policy overviews, various academic research reports, demonstration projects/studies, expert testimonies, personal interviews, in-depth articles from specialist computing and management press, general office automation literature, futurist publications, popular press articles, surveys of teleworkers, and how-to manuals. The effort was initiated by a 2-day workshop at the Department of Transportation which focused and elicited the views of a wide range of individuals knowledgeable in various aspects of telecommuting (see

Appendix E).

Historical Evolution of Telecommuting

One of the first people to foresee the coming of "telework" (as it was termed in Europe) was Norbert Wiener in his landmark book *The Human Use of Human Beings: Cybernetics and Society* published in 1950. Wiener discussed a hypothetical example of an architect living in Europe but supervising the construction of a building in the United States. Using the recently introduced facsimile transmission service "Ultrafax," he said, "...even without transmitting or receiving any material commodities, the architect may take an active part in the construction of the building.... In short, the bodily transmission of the architect and his document may be replaced very effectively by the message-transmission of communications which do not entail the moving of a particle of matter from one end of the line to the other."

Interest in telework did not spread widely until the early 1970s, as terminal-based use of corporate and time-share mainframe computers became widespread. Portable terminals, using voice-quality telephone lines, permitted system access from any location that had telephone service. Gradually it was understood that telecommunications and data processing could be meshed into integrated systems. In the late 1970s, the French neologism term "telematique" (English: telematics) was coined by Simon Nora and Alain Minc in order to describe this growing interconnection of telecommunication and computers into one, integrated national and international system. Also, the early 1970s saw an international oil crisis, which focused critical attention on the waste of energy in private and public transport systems. The combination of technical potential and social need served as a strong stimulus for innovation. The dominant view of telework in this initial phase was the potential to save energy by substituting electronic communication for physical transportation. In 1973, Jack Nilles introduced the term "telecommuting" as the U.S. equivalent of "telework."

In 1980, Alvin Toffler incorporated the idea of telework or telecommuting into his three-phase world history, making it one of the basic elements of the emerging "Third Wave." In his book, *The Third Wave*, he predicted that the new information-based production system would move millions of workplaces from factories and offices back to where the workers had come from: the home.

At the organizational level, many studies have forecast radical changes to existing hierarchical institutions. In his 1979 paper, Daniel Bell refers to the change in libraries - where the world's recorded knowledge housed in buildings may become only a monument of the printed past (Bell, 1979). Wilfrid Lancaster of the University of Illinois suggested the imminent disappearance of the book, to be replaced by the year 2000 with a computer network (Lancaster, 1982).

A number of writers have speculated about the impact of telecommuting on the working

for improved productivity, recruitment and retention, savings in space costs, and other benefits.²

Telecommuting and the Public Sector

Telecommuting has found its way into a number of governmental statements and actions, especially as a transportation strategy, but also addressing other policy concerns. For example:

- At the Federal level, the Flexible Workplace Project, sponsored by the President's Council on Management Improvement, is testing the feasibility and utility of flexible workplace arrangements for Federal employees. This project, managed by the Office of Personnel Management and the General Accounting Office, is designed to facilitate the implementation of pilot programs in Federal agencies. Currently with 800 participants, this undertaking has yielded good initial results in terms of productivity and reduced sick leave.
- The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) provides funding to States and local governments to support compliance with Clean Air Act and to increase the efficiency of existing transportation facilities. Since telecommuting can lead to a reduction in the number of commuting vehicles, it is considered to be a travel demand management measure eligible for funding under the National Highway System program, the Surface Transportation Program, and the Congestion Mitigation and Air Quality Improvement program. Eligible activities include the planning, development, and marketing of an areawide telecommuting strategy designed to improve air quality and reduce traffic congestion.
- The 1989 Air Quality Management Plan for the South Coast (California) Air Basin sets the ambitious goal of reducing work trips by 30 percent in the year 2010 through the combined impacts of telecommuting and alternative work schedules.
- Regulation XV of the South Coast Air Quality Management District (SCAQMD) includes telecommuting on a menu of strategies large employers must use to decrease peak-period vehicle trips. Regulation XV is being widely studied and, to a certain extent, copied by other areas of the country that are out of compliance with Federal Clean Air Act standards.
- Upon the successful conclusion of the 2-year pilot project for State of California employees, legislation was passed authorizing the establishment of telecommuting programs for any state agency. Following the October 17, 1989 Loma Prieta earthquake, California Governor George Deukmejian issued an Executive Order which directed state agencies to include telecommuting in their emergency response to the earthquake.

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- In introducing the Statement of National Transportation Policy on March 8, 1990, President Bush said, "Sometimes the best transportation policy means not moving people, but moving their work...trend known as telecommuting. Millions have already found their productivity actually increases when they work nearer the people they're really working for - their families at home...Think of it as commuting to work at the speed of light."
 - The State of Washington has passed legislation requiring trip reduction plans to be prepared at the local level. The statute sets targets for reducing commute trip vehicle miles 15 percent by January 1, 1995; 25 percent by January 1, 1997; and 35 percent by January 1, 1999 (from a 1992 baseline). A bonus for work-at-home and alternative work schedules is built into the legislation: each commute trip reduced by these means "shall count ...as one and two-tenths vehicle trips eliminated for the purpose of meeting trip reduction goals."
 - Chapter 90-291 of the Laws of Florida authorizes the implementation of telecommuting programs for state agencies, citing "many documented benefits...including less traffic congestion and the associated reduction in air pollution and energy consumption, improved employee morale and productivity, improved ability to hire additional individuals into the workforce, improved ability to recruit and retain valuable employees, and reduced costs for office and parking space."
 - Commonwealth of Virginia House Joint Resolution (HJR) 77 requested the Virginia Employment Commission to prepare a report to the legislature on the feasibility of telecommuting. The resulting document recommended establishing telecommuting programs in state agencies, followed by promoting and assisting its implementation in the private sector. The report cited the potential role of telecommuting in supporting Federal-level policies such as the Clean Air Act of 1990 and the Americans with Disabilities Act of 1989, and state-level efforts toward rural economic development. The Virginia General Assembly responded to the report by passing HJR 339, "encouraging efforts to foster and promote telecommuting in the workplace."
 - A number of other legislative initiatives are underway at Federal and state levels. Telecommuting is a recommended strategy in a variety of local and regional transportation plans, corridor studies, and trip reduction/mitigation ordinances, especially in California.³ For example, "proposed California legislation (State Assembly Bill 374) would provide tax credit to employers implementing telecommuting programs, provided participants telecommute three or more days per week."⁴
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July 1997Agency Policies and
Views on Flexiplace
the Federal Govt.

perceptions held by agency officials or the data provided on the use of flexiplace. In addition, we interviewed nine union representatives to solicit their views on flexiplace, and interviewed OPM, GSA, and DOT officials in Washington, D.C., to identify federal efforts to promote flexiplace. We also visited telecenters (which are facilities for use by the employees of many agencies as alternative work sites) in Virginia and California. Appendix I describes in detail the objectives, scope, and methodology of our review.

Our review was conducted from June 1996 to May 1997 in accordance with generally accepted government auditing standards. We provided a draft of this report to the heads of the departments and agencies discussed in this report for their review and comments. Their comments are summarized at the end of this report.

Results in Brief

OPM, GSA, and DOT have assumed lead roles in promoting flexiplace. OPM promotes awareness of flexiplace, provides guidance on its implementation, and distributes the results of its research on flexiplace. GSA manages and markets federal telecenters. In addition, DOT and GSA provide leadership for an interagency working group formed as part of the National Telecommuting Initiative Action Plan in January 1996. A goal of the plan is to increase the number of federal flexiplace participants by the end of fiscal year 1998 to 60,000, or about 3 percent of the federal civilian workforce, a percentage roughly equivalent to conservative estimates of telecommuting in the private sector. DOT also promotes flexiplace and distributes flexiplace literature to the general public as part of its effort to decrease transportation-associated congestion and pollution.

The 21 policies we reviewed varied in their coverage, generally applying to personnel within individual departmental and independent agencies, one or more federal regions, or specific Department of Defense (DOD) locations. Although none of the five departments we contacted had blanket written policies that covered all employees in all geographic locations, five agencies within three departments and two independent agencies we contacted had such agencywide policies.

About half of the nearly 99,100 employees at the locations we visited were covered by formal flexiplace policies. Because of limitations with these policies, however, about 28,000 of the employees covered by flexiplace policies were, in effect, excluded from flexiplace participation. This exclusion was restricted participation to the medically disabled or members of certain occupations. In contrast, despite the absence of formal policies,

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locations we visited, some of the managers there permitted flexiplace. This resulted in the majority of the employees at these locations who were not covered by a policy, in effect, having the potential to participate in flexiplace.

Flexiplace use appears to have increased since OPM's 1993 estimate of 3,000 to 4,000 participants. A survey completed in July 1996 by the President's Management Council (PMC)² estimated that there were 9,000 telecommuting participants. This number included participants who would fit within a broader definition of telecommuting, but on the other hand, it did not include all participants that would meet OPM's definition. Aside from the PMC estimates, at the 26 locations we visited, agencies estimated that about 4,700, or nearly 5 percent of their employees, participated in flexiplace. We did not determine whether the flexiplace arrangements we observed represented the universe of available opportunities or whether they were effective.

Agency officials told us that most flexiplace participants' occupational categories were professional in nature, such as engineer, attorney, management and program analyst, and computer specialist. Officials reported the use of both regularly scheduled and episodic flexiplace—the latter for completing short-term project-based work. According to agency officials, writing, reading, telephoning, and computer work were the most common tasks performed by flexiplace participants.

Agency officials and union representatives identified management resistance as the greatest barrier to implementing flexiplace programs. They reported that many managers had to see their employees to believe they were working, as opposed to managing by results. They also recognized that some jobs do not lend themselves to flexiplace arrangements and cited other barriers, such as a lack of computers at alternative work sites, the handling of sensitive data, employee reluctance or indifference with regard to participation, and the lack of a formal flexiplace policy.

Agency officials believed that few operational difficulties arose from flexiplace. They cited only a few isolated instances of abuse of the

²The PMC was established in 1993 to advise and assist the President and Vice President in ensuring that the reforms adopted as a result of the National Performance Review (a study that recommends ways to eliminate unnecessary bureaucracy and improve customer service to taxpayers) are implemented throughout the executive branch. This council is chaired by the Deputy Director of Management of the Office of Management and Budget, and members include the chief operating officers of 18 executive branch agencies, the Director of OPM, the Administrator of GSA, the Secretary of the Cabinet, and other officials as designated by the President.

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program. One official said that the use of flexiplace caused a drop in productivity, while several others believed productivity increased as a result of flexiplace. Similarly, agency officials cited few problems with contacting flexiplace participants at alternative work sites or coordinating their schedules, and these problems were subsequently solved.

Background

No specific statute exists that explicitly authorizes or forbids flexiplace. OPM has administratively determined that agencies can develop and implement flexiplace programs. President Clinton has also encouraged agencies to develop family-friendly programs, including flexiplace, through memorandums addressed to the heads of executive agencies in 1994 and 1996.

OPM and GSA established instructional guidelines in 1990 to assist agencies in implementing flexiplace programs. These guidelines recommended that an agency should first identify reasons for establishing a program, and that program benefits should accrue to both the employer and the employee. According to OPM and GSA, reasons for agencies to establish flexiplace programs include improved recruiting and retention of employees, increased productivity, and a reduced need for office space. Reasons for employees to participate in flexiplace include the opportunity to reduce commuting time; lowered personal costs in areas such as transportation, parking, food, and wardrobe; improvement in the quality of worklife and morale accruing from the opportunity to balance work and family demands; and removal of barriers for those with disabilities who want to be part of the workforce. OPM and GSA guidelines stressed the fact that flexiplace is not a substitute for child care because young children can frequently produce distractions that prevent the successful completion of work at home.

OPM updated the 1990 guidelines in 1993. In this update, OPM asserted that flexiplace is a management option rather than an employee benefit, and that flexiplace should be voluntary and should not change the terms and conditions of employment. OPM recommended that agencies develop written policies and procedures, appoint a flexiplace coordinator, conduct training sessions for flexiplace employees and their supervisors, and establish written work agreements that schedule flexiplace options. Although flexiplace is a management option, OPM recognized that under U.S.C. Chapter 71, labor unions representing employees have the right to negotiate on the manner in which flexiplace programs are implemented and on the impact of programs on employees.

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OPM cautioned agencies that the nature of the work, together with the characteristics of both the employee and supervisor, must be suitable for flexiplace. OPM defined suitable work as tasks that can be conducted independently of the work location for at least part of the week. Work that requires extensive face-to-face contact, according to OPM, is generally unsuited for flexiplace. OPM also said that employees who participate in flexiplace programs should be well organized, highly disciplined self-starters who require little supervision and who have received at least fully successful ratings. OPM recommended that supervisors should be comfortable with managing by results rather than by observation.

Federal Efforts to Promote Flexiplace

Since its January 1993 report on the results of the flexiplace pilot, OPM has continued to promote flexiplace to other federal departments and agencies. OPM maintains a Work and Family Program Center to promote flexiplace awareness by publishing leaflets on flexiplace resources, writing about flexiplace in newsletters, operating a computer bulletin board to disseminate and exchange flexiplace information, and offering workshops on flexiplace. OPM has also published descriptive brochures on flexiplace, continues to make available to federal agencies the results of the flexiplace pilot, and has recognized other agencies with awards for promoting work and family programs, including flexiplace. In addition, OPM has disseminated information through direct mailings to personnel directors and heads of executive departments and agencies.

Also since 1993, GSA has promoted flexiplace through the establishment, management, and marketing of facilities that provide alternative office settings for federal employees who would otherwise travel longer distances to work. These facilities, known as telecenters, are equipped with modern workstations, telephones, computers, modems, and facsimile machines, and are generally shared by employees of multiple agencies. Initially established in Maryland and Virginia by fiscal year 1993 appropriations, federal telecenters were also established in Oklahoma City; Seattle; Chicago; Atlanta; Charles Town, West Virginia; and a number of northern and southern California communities. GSA has also established partnerships with local and municipal governments to arrange for the use of their telecenters by federal employees. A more detailed discussion of federal telecenters appears in appendix II of this report.

Flexiplace gained additional promotional emphasis in 1993 as a result of a National Performance Review recommendation that the President issue a directive requiring agencies to implement flexiplace policies. The

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President's July 1994 memorandum to the heads of executive departments and agencies had a family-friendly focus and encouraged these departments and agencies to develop flexible work arrangements, including flexiplace, and to adopt appropriate policies. Through a similar memorandum in 1997, Vice President Gore also encouraged agencies to increase opportunities to telecommute.

Federal efforts to promote flexiplace were also linked to the Climate Change Action Plan issued by the President and Vice President in October 1993. The plan was, in part, a response to the threat of global warming and outlined directives aimed at decreasing U.S. greenhouse gas emissions, including transportation-associated pollution. One of these directives instructed DOT to implement a federal flexiplace pilot project with the goal of inducing 1 to 2 percent of federal employees to work at home at least 1 day per week. Since the plan's inception, DOT has promoted flexiplace by publishing and distributing information to the public on flexiplace and by assisting GSA and the PMC in their efforts to promote flexiplace.

In response to the Climate Change Action Plan, the PMC developed the National Telecommuting Initiative Action Plan in January 1996. The plan, developed by an Interagency Telecommuting Working Group cochaired by DOT and GSA, calls for increasing the number of federal telecommuters to 60,000 by the end of fiscal year 1998. This goal represents about 3 percent of the federal civilian workforce, a percentage roughly equivalent to conservative estimates of participation in the private sector. The plan is a multiphased project that calls for estimating current telecommuting participation, assessing logistics, promoting telecommuting, and implementing programs and pilots. Other members of the Working Group are the Departments of Agriculture (USDA), Defense, Education, Energy, Health and Human Services, the Interior, State, and Veterans Affairs; and EPA, Small Business Administration, Social Security Administration (SSA), and OPM.

In June 1996, President Clinton issued a memorandum to heads of executive departments and agencies reaffirming his commitment to federal telecommuting usage. He also adopted the PMC's national goal of achieving 60,000 federal telecommuters by the end of fiscal year 1998 and directed executive departments and agencies to review, develop, utilize, and expand opportunities for telecommuting so that the PMC's goal would be attained.

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Flexiplace Coverage Varied by Organization

The 21 flexiplace policies we reviewed generally applied to employees in individual departmental or independent agencies, or in specific federal regions or locations, rather than to all employees in a department. About one-half of the employees at the 26 locations we visited were covered by flexiplace policies, but the majority of covered employees were in effect excluded from participating by some type of limitation in the policies. Some policies limited participation to employees who were medically disabled or in a specific occupation. In addition, policies generally prescribed the type of work to be done as tasks which could be performed away from the office and which were quantifiable or measurable.

Most Policies Covered Offices in Specific Federal Regions or Locations

Most of the policies we reviewed varied in their coverage. Of the 21 policies we reviewed, 14 applied to personnel either within (1) headquarters, (2) a specific federal region, (3) more than one federal region, or (4) specific DOD locations. In headquarters, for example, DOT's policy covered only selected Local Union 12 bargaining unit employees within a flexiplace pilot, who worked in the Washington, D.C., area. Also, only EPA employees working in offices within federal regions 8 and 9 were covered by the EPA's federal region 8 and 9 policies, respectively. In contrast to EPA's regional policies, the DOT Office of Motor Carriers' policy covered employees in offices within all federal regions. In addition, the Naval Air Weapons Center's policy that we reviewed applied only to employees working at the Point Mugu, California, location. These 14 policies are described in tables III.2, III.3, III.4, and III.5.

Although none of the policies were departmentwide in coverage, five agencies within three departments and two independent agencies had agencywide policies that covered all their employees in all geographic locations. These agencies were the Federal Aviation, Federal Highway and Federal Railroad Administrations within DOT; the Natural Resource Conservation Service within USDA; the Defense Finance and Accounting Service within DOD; GSA; and SSA. These seven policies are described in table III.1.

Policy Limitations Affected Flexiplace Participation

Although about 47,000 (47 percent) of the nearly 99,100 employees at 26 locations we visited were covered by formal flexiplace policies, 28,000 of these employees were in effect excluded from participating because of limitations within policies. For example, two of the policies we reviewed limited flexiplace participants mainly to medically disabled employees, which in effect excluded most employees covered by the

policy from actually participating at any given point in time. To illustrate, of the estimated 4,000 employees in Denver who were covered by the Defense Finance and Accounting Service's policy, 3 individuals who were disabled were allowed to temporarily work at home for periods during 1994 to 1996. Similarly, according to agency records, fewer than 25 of the 13,305 SSA headquarters employees participated under the flexiplace policy that limited participation to those with certain medical conditions.

In addition, one policy that we reviewed limited participation to employees in a specific occupation. The memorandum of understanding between the National Treasury Employees Union (NTEU) and SSA management limited participation to attorney advisors in SSA's Office of Hearings and Appeals.

In the five locations we visited that had no formal flexiplace policies, the majority of the employees nevertheless had the potential ability to participate in flexiplace arrangements. For example, approximately 6,000 EPA headquarters employees were not covered by a formal policy because their unions had not yet approved management's draft policy. Agency officials told us, however, that they generally allowed flexiplace participation and that about 50 headquarters employees occasionally worked at home under guidelines from a previous pilot. In contrast, about 4,662 employees in three of the five locations that were not covered by flexiplace policies worked in offices where agency officials said they generally did not permit employees to participate in flexiplace.

Flexiplace Policies Generally Prescribed Types of Work and Work Arrangements

In addition to containing restrictions that excluded employees from participating in flexiplace, most agency policies specified the type of work employees could perform while on flexiplace and the types of work arrangements that were permissible. Ten of the policies we reviewed specified the type of work that could be done while on flexiplace as tasks that could be accomplished away from the traditional office. In addition, 8 of these 10 also specified that work had to be quantifiable or measurable.

Nineteen of the 21 policies we reviewed also specified the nature of flexiplace arrangements permitted. GSA and EPA recognized two basic types of arrangements: regular flexiplace, in which employees are to work a certain number of regularly scheduled days each week at an alternative workplace, and episodic flexiplace, in which employees are to work away from the office on a temporary basis for short periods of time to complete discrete projects. Twelve of the policies we reviewed permitted only

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regular flexiplace, while two policies allowed only episodic flexiplace, and five policies permitted both regular and episodic flexiplace. About an equal number of agencies reported that their personnel participated in episodic arrangements as opposed to regular arrangements, despite fewer policies permitting episodic flexiplace.

Extent of Flexiplace Usage

The PMC estimated that about 9,000 federal employees out of approximately 2 million executive branch employees, or less than 0.5 percent, telecommuted in 1996. Although this estimate may not directly correlate with the 1993 estimated flexiplace participants, flexiplace participation does appear to have increased from the 3,000 to 4,000 estimated by OPM in 1993.

Unrelated to the PMC's estimate, agency estimates showed that nearly 5 percent of employees participated in flexiplace at agency locations we visited. Participation at these locations may have been higher than in the federal government in general because we purposely selected some locations that had active flexiplace programs.

Agency officials reported that employees used flexiplace primarily for personal benefits but also to avoid office interruptions. These employees, according to agency officials, were in professional occupations, and they carried out such tasks as writing, reading, telephoning, and working on a computer while on flexiplace.

Flexiplace Use Appears to Have Increased

A survey completed in July 1996 by the PMC's Interagency Telecommuting Working Group indicated that telecommuting had increased since the completion of the flexiplace pilot in 1993. This survey requested members of the PMC and a number of smaller agencies to estimate the number of their telecommuting participants. From estimates supplied by 33 agencies, the PMC estimated that, governmentwide, 9,000 federal employees were telecommuting.

The PMC estimate included participants who would fit within a broad definition of telecommuters but did not include all flexiplace participants. For example, SSA used PMC's definition, which in some respects was broader than OPM's. Under that definition, SSA reported a total of 1,500 telecommuters, including 800 personnel working at contact stations, which are small temporary SSA offices designed to directly serve the public, and 1,000 administrative law judges who traveled to various

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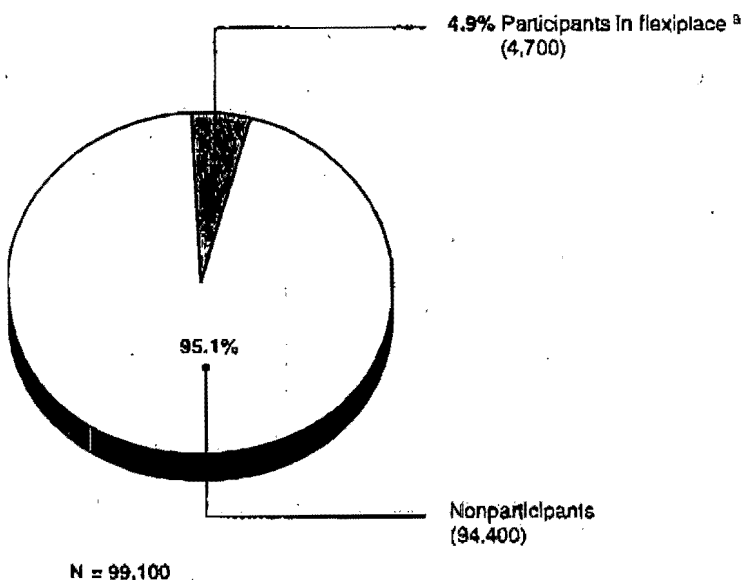
hearing offices. An SSA official said SSA counted administrative law judges and personnel working at contact stations as telecommuters because it considered these employees to be included in the mobile/virtual office category of the PMC's telecommuting definition. This category consists of the activities of field representatives, mobile managers, inspectors, and traveling technical support employees—those who may work in multiple locations or environments, including customer sites, hotels, cars, or at home. According to an SSA official, these employees contribute to decreasing air pollution and traffic congestion and to increasing customer service, all of which are among the goals of PMC's National Telecommuting Initiative.

Conversely, DOL did not include all flexiplace participants in the estimate it supplied to the PMC. DOL's estimate, which was used in the PMC estimate of 9,000 telecommuters, consisted entirely of 581 formal participants in 2 ongoing flexiplace pilots. Realizing that this estimate did not include a large number of field safety inspectors who were informally participating, DOL subsequently resurveyed the number of participants and determined that the total number of participants was actually 3,426.

We also asked officials at the 26 locations we visited to estimate the number of their flexiplace participants, using OPM's definition. According to the information they provided, nearly 5 percent of the approximately 99,100 employees at the 26 agency locations we visited participated in flexiplace. This information is summarized in figure 1 and presented for each of the 26 locations in appendix IV.

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Figure 1: Flexiplace Participation at Locations Visited



^aParticipants include both those covered and those not covered by formal policies.

^bSource: GAO analysis.

Flexiplace Reportedly Associated With Various Benefits

Agency officials told us that employees' use of flexiplace arrangements had various benefits. They said that employees reported benefiting by an increase in their productivity and morale, and a decrease in their commuting time, interruptions, sick leave use, and personal costs. Some agency officials said that flexiplace resulted in a decreased need for office space, an increased ability to recruit and retain employees, lessened environmental impacts, and greater opportunities for disabled employees.

Often cited by agency officials as one of the main reasons for using flexiplace, productivity gains of professional staff are reportedly difficult to define, much less measure. Yet some organizations and some agencies we visited were able to measure productivity gains among some of their staff who used flexiplace. For data entry clerks, computer programmers, and word processors who produce measurable outputs, productivity gains in the neighborhood of 20 to 25 percent are attributed to telecommuting in the literature. Similarly, within SSA's Office of Hearings and Appeals in Salt Lake City, a manager documented a 25-percent increase in the number of

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cases prepared by hearing assistants who worked under flexiplace arrangements. During OPM's pilot, supervisors reported that 39 percent of their staff on flexiplace showed improved work output, and that 10 percent or fewer showed a decrease in output. Similarly, the combined results of DOL's 2 pilots showed that 32 percent of the 238 supervisors believed that staff increased their quantity of work as a result of flexiplace, as opposed to about 14 percent who believed quantity dropped. Seventy-three percent of the 426 employees in these pilots believed their quantity of work increased under flexiplace.

Agency officials we spoke with also reported reasons cited by employees for not using flexiplace. The most common reason cited was a feeling of isolation while working at home. Other reasons agency officials reported were the perception by employees that flexiplace could be career limiting, the presence of family members at home who would interrupt their work, the lack of adequate work space at home, and a lack of self-discipline. They told us that the best flexiplace participants are disciplined self-starters who need little supervision.

Flexiplace Was Reportedly Used Primarily by Professionals

Agency officials said that most employees using flexiplace were in professional occupations. They told us that the staff members most frequently using flexiplace were employed as engineers and engineering technicians, attorneys and paralegals, program and management analysts, computer personnel, investigators, and inspectors. Agency officials also said that flexiplace was used by personnel specialists, scientists, administrative personnel, technical information specialists, contract personnel, budget and financial analysts, accountants, architects, and employee development specialists.

According to agency officials, employees reported that writing, reading, telephoning, and computer work were the most common tasks accomplished while on flexiplace. Other tasks that agency officials reported participants doing on flexiplace included analysis, reviewing and evaluating, preparing legal briefs and decisions, planning, and researching.

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Work/Life ScalesJanuary
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Smith and Kearny noted ways to consider the cost of workspaces that impact productivity:

- Determine how much time a group of employees is unproductive each day due to inadequacies in their workplace. For example, how much time is lost to a "phone tag" because the organization does not have e-mail. If the eight members of a work group lose an hour a day because of problems like this, the group loses 40 hours a week. This equates to the loss of one staff year (one full time equivalent or FTE).
- Separate the amount of time people are present in the workplace but not producing due to one kind of interruption or another – called "body time" – from the amount of time they are producing steadily – called "brain time." When the length of uninterrupted brain time is 60 percent or less, the workplace is not supporting performance.⁷⁴

The most widely-used program dealing with physical workspace issues is telecommuting, which affects where the work is done as well as the furniture and configuration of workspaces.

Telecommuting

Definition

As used in this report, telecommuting means workplace arrangements that allow an employee to work away from the traditional work site, either at home or at an alternative location very close to home. This definition is now used by the Office of Personnel Management (OPM), replacing the term "flexiplace." It includes individuals for whom telecommuting is their regular way to get work done as well as those who telecommute episodically – one or two days a week or only when performing certain types of work. The definition does not include decentralization initiatives, such as organizations establishing local offices. Outside of the United States telecommuting is usually called "teleworking," which may be a more accurate term.

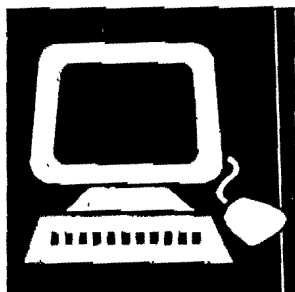
Results in Brief

Telecommuting is not a new concept. The first formal telecommuting center was established in France in 1981. As early as 1990, there were telecommuting centers in such countries as Benin, Sri Lanka, and Brazil.⁷⁵ Today, there are 11 million telecommuters in the United States. Growth in this method of getting work done has been phenomenal, increasing 30 percent between 1995 and 1997. More than four percent of Japan's white-collar salaried workforce now telecommutes.⁷⁶ State and local governments involved in telecommuting include Hawaii's Department of Transportation, the Washington State Energy Office, the City of Modesto, California, and Boulder County, Colorado.⁷⁷ The number of telecommuters is expected to increase by 20 percent annually.⁷⁸ As noted earlier, nearly half of nonfederal employers surveyed offer telecommuting. The federal government has a long way to go. In 1996 an estimated 9,000 federal employees, less than one-half of one percent of the workforce, were telecommuters.⁷⁹

Everyone benefits from the reduction in air pollution resulting from telecommuting. Employers have found that telecommuting means:

- ✓ improved hiring capability
- ✓ decreased attrition

✓ improved productivity



**U. S. Office of Personnel Management****Telecommuting****National Telecommuting Initiative****President's Management Council****January 1996****Goals:**

<i>When?</i>	<i># Federal Employees</i>	<i>\$ Facility Savings</i>
Fiscal Year 1998	60,000	\$150 Million
Fiscal Year 2002	160,000	\$ 2 Billion

For a copy of the plan, contact the U. S. Department of Transportation at (202)
366-5403.

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U. S. Office of Personnel Management

Telecommuting

Basic Parameters for Telecommuting in Federal Agencies

When establishing a telecommuting program, agencies should keep in mind the basic guidelines listed below.

- Telecommuting is a management option rather than an employee benefit and does not change the terms and conditions of appointment.
- Employee participation is voluntary and subject to management approval.
- An employee who works a telecommuting schedule (other than for short periods) should sign an agreement with the agency.
- Canceling the work arrangement is up to either the employee or the supervisor, with notice and in accordance with any procedures the agency establishes.
- Telecommuting should not adversely affect the performance of the employee who is telecommuting or his or her coworkers.
- Supervisors must properly certify time and attendance.
- The employee must have a safe and adequate place to work off-site that is free from interruptions and that provides the necessary level of security and protection for Government property.
- Although telecommuting will give some employees more time for their family responsibilities, they may not use duty time for providing dependent care or any purpose other than official duties.
- The Government may place Government owned computers and telecommunications equipment in employee homes or at other alternative worksites, but the Government retains ownership and control of hardware, software, and data. Such equipment is for official use only, and its repair and maintenance are the responsibility of the agency.
- Agencies may provide employees with telephone credit cards. To the extent permitted by law, agencies may pay for the installation of telephone lines in private residences. Public Law 104-52 allows agencies to use funds to install telephone lines, and necessary equipment, and to pay monthly charges in any private residence or private apartment of an employee who has been authorized to work-at-home.

work-at-home.

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U. S. Office of Personnel Management

Telecommuting

Conditions for Successful Telecommuting Arrangements

Experience in the public and private sectors has yielded information about factors that contribute to successful alternative workplace arrangements. Agencies should consider the following suggestions when establishing a telecommuting program.

Develop Formal Policies. Written policies and procedures are needed to ensure understanding and avoid misunderstanding about the terms and conditions of employment. Policies should cover short term as well as continuing arrangements. As a supplement to written materials, orientation sessions for telecommuting employees and their supervisors ensure a common understanding of the program requirements.

Suitability of Work. The nature of the work should be suitable for telecommuting. Work suitable for telecommuting depends on job content, rather than job title, type of appointment, or work schedule. For example, telecommuting is feasible for work that requires thinking and writing -- data analysis, reviewing grants or cases, writing decisions or reports; telephone-intensive tasks -- setting up a conference, obtaining information, following up on participants in a study; and for computer-oriented tasks -- programming, data entry, and word processing. Positions in the Government-wide project included writer/editor, scientist, investigator, psychologist, environmental engineer, budget analyst, tax examiner, and computer specialist.

Work may not be suitable for telecommuting if:

- the employee needs to have extensive face-to-face contact with the supervisor, other employees, clients, or the general public;
- the employee needs frequent access to material that cannot be moved from the regular office;
- the agency cannot provide any special facilities or equipment that are necessary; or
- it would be too costly for the agency to duplicate the same level of security at the alternative workplace.

Employees and Supervisors. The characteristics of an employee are particularly important. The employee should be an organized, highly disciplined, and conscientious self-starter who requires minimal supervision. His or her performance should be at least "fully successful." In certain situations, however, a supervisor may choose to offer telecommuting as a way to help an employee improve performance.

Telecommuting is not suitable for employees who need to be in the office to learn the organization, who require on-the-job training, who need close supervision, or who thrive on interaction with co-workers and would suffer from the isolation of working alone. The characteristics of the supervisor are also critical. He or she should be willing to try out the new arrangement and take the necessary steps to ensure its success. Most importantly, the supervisor should be comfortable managing by results.

importantly, the supervisor should be comfortable managing by results.

Workplace Schedules. Most telecommuting employees spend part of the workweek in the regular office to improve communication, minimize isolation, and use facilities not available offsite. Agencies should develop flexible procedures that allow supervisors and telecom-muters to determine the best balance for individual situations.

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Work at Home Stats

- BUS
- census 56% lower 1990

Telecommunity Trends

- Site of transportation shed
- pre net - cyberdynamics
- 15.7 million in markets

Federal Telecommunity Programs

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President's Interagency Telecomm
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Flexible Pilot Project 1990

In 1991, the number of people working at home was not dramatically lower, but the number of wage and salary workers getting paid for their work increased

Telecommuting Boosted in 1998 by Internet & Economy

New York, Oct. 28, 1999 -- The number of telecommuters in the U.S. rose to 15.7 million as of mid-year 1998, according to research conducted by Cyber Dialogue, a New York based research and consulting firm. Telecommuting was defined in the research as working at home for an outside employer during normal business hours a minimum of one day/ month or more. The findings are based on interviews with 2,000 Americans 18 years of age and older completed in July.

"The findings indicate that telework is a very dynamic trend closely related to the level of employment in the economy and the growing impact of computers and the Internet," said Thomas E. Miller, vice president of Cyber Dialogue, who directed the research. The new data show that while the telecommuter growth trend has fluctuated some during the 1990s, the number of telecommuters who use PCs and go online from home has risen steadily. Miller pointed out that "the Internet is helping to fundamentally transform how workers connect to employers, giving rise to new workstyle relationships such as small businesses that rely heavily on skilled tele-workers to meet productivity needs when the economy is strong.

The research identified three categories of telecommuters: full-time employees, contract workers and part-time employees who telecommute informally. Full-time employees who telecommute now total 7.4 million workers. These employees work from home an average of 18.0 hours/week at home, or about 2.5 days/week. Almost half are employed by small businesses with less than 100 employees, while 1.8 million (24%) work for large companies with 1,000 or more employees.

Over 90% of the 4.0 million contract-based telecommuters report that they work for companies with fewer than 100 employees. None reported working for large companies with 1,000 or more employees.

The large segment of 4.3 million part-time workers who telecommute informally were found to be comprised largely of retirees and homemakers who are capitalizing on the full-employment economy to supplement income via home-based work. Almost three out of four of this segment are women, by far the highest ratio of the three telecommuting segments. This group was found to be very low-tech and much more a reflection of the strong economy than of PC and Internet adoption.

Demographically, telecommuters in 1998 are around 42 years of age, slightly more likely to be female (51%) than male, and they report median household income of \$45,200. Full-time employees tend to be more male (57%) and slightly younger, and earn more (\$49,500). Contract telecommuters are also more male (58%) and earn \$46,700 per year, while part-time employees who telecommute informally are somewhat older and earn less (\$34,500). (See accompanying charts.)

The long-term telecommuting trendline indicates that as many as 18 million U.S. adults could telecommute by the year 2000, depending on the overall level of employment in the economy at that time. A strong economy could lead to more telecommuting, but most telecommuters will work at home only part of the time, consistent with the pattern that has long been observed in national surveys of the trend.

Press contact: Stuart Gibbel, Cyber Dialogue, 212.255.6655, sgibbel@cyberdialogue.com.



Office of Advocacy

Small-Business-Friendly Provisions of the Taxpayer Relief Act of 1997: A Legacy of the White House Conference on Small Business Prepared by the Office of Advocacy

The Taxpayer Relief Act of 1997, (PL 105-34), signed by President Clinton on August 5, 1997, shows that the Administration and Congress have made a major commitment to be responsive to the needs of small businesses. Since the time of the 1995 White House Conference on Small Business (WHCSB), the Clinton Administration has implemented a number of the conference's recommendations through executive action. Meanwhile, Congress has moved key WHCSB requests that required legislation. For example, within the last year Congress has passed and the President has supported and signed: the Small Business Regulatory Enforcement Fairness Act, the Small Business Job Protection Act and the Health Insurance Portability and Accountability Act, each of which contained new laws proposed by the WHCSB.

The Taxpayer Relief Act of 1997 builds on this outstanding record of cooperation in implementing WHCSB recommendations. Provisions in the new law will direct approximately \$40 billion in tax relief to small businesses over the next 10 years over and above the benefit of general rate reductions credits or exclusions which benefit all taxpayers. The major provisions include:

- **ESTATE TAX REFORM.** By the year 2006, the unified gift and estate tax credit will increase to an amount equivalent to excluding the first \$1 million of a transferred estate from taxation. Small businesses get a special break that, when combined with the unified credit, will increase the excluded amount to \$1.3 million. This targeted credit applies when the family-owned business or farm constitutes half the value of the estate and the family continues to run the business. The added credit, effective January 1, 1998, will save small businesses \$33 billion over 10 years.
- **SELF-EMPLOYED HEALTH INSURANCE.** The percentage of health insurance payments that a self-employed business owner can deduct will increase yearly and reach 100 percent by 2007. This provision will save small businesses \$3.4 billion over 10 years.
- **HOME OFFICE DEDUCTION.** For the purpose of deducting expenses, the new law expands the definition of a home office to include any home office that is the business' sole office and is used regularly for essential administrative or management activities. Courts have construed the previous law to require that customers come to the home and generate income. This antiquated definition disqualified most home office workers, who either communicate electronically with their customers or visit them on site. The new provision is not effective until 1999, but is expected to save small business owners \$2.3 billion over the next 10 years.
- **GENERAL CAPITAL GAINS RELIEF.** Effective July 22, 1997, capital gains taxes are reduced from 28 percent to 20 percent (10 percent for those who are in the 15 percent tax bracket) on property held for at least 18 months making investments with a high potential to appreciate in value more attractive to investors than investments that pay dividends. Small start-up firms appeal to investors seeking returns based on appreciation. The rate drops to 18 percent (or 8 percent for the lower tax bracket) for assets held five years for sales completed after 2001. Collectibles do not qualify. Section 1250 property (i.e. depreciable real estate) is subject to a 25 percent tax.
- **TARGETED CAPITAL GAINS - SMALL BUSINESS STOCK.** Under previous law, only 50 percent of gain on qualifying small business stock held for at least five years is subject to tax. The effective rate of tax was therefore 14%. The 14% rate is retained but the bill reduces the share subject to minimum tax to 42 percent. Also, an individual investor can "roll over" gain from an investment in qualified small business stock held for at least six months into another qualifying stock tax-free. The replacement stock must be purchased within 60 days of the original sale. This provision is effective as of the date of enactment.

U.S. Census Bureau

Working At Home

Working at home is measured in the decennial census by responses to the question, "How did you usually get to work LAST WEEK?" One of the categories respondents may check is "Worked at home." Usually is defined to mean the most number of days during the week. As a result, people who regularly work at home one or two days a week, but elsewhere during the other three days, are not reflected in the work-at-home estimate from the census. These tables provide data at the national level for other geographic levels see our [1990 Census Lookup](#).



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[Census Brief--Increase of At-Home Workers Reverses Earlier Trend \(CENBRF/98-2\) \(46k\)](#)



[Press Release/Product Announcement](#)

CPH-L-195 - Detailed Tables

[Table 1. All Workers and Workers Who Worked at Home: 1960-1990 \(3k\)](#)

[Table 2. Selected Characteristics of Workers Who Worked at Home and Workers Who Did Not Work at Home: 1990 \(10k\)](#)

[Table 3. Selected Characteristics of Workers Who Worked at Home by Class of Worker: 1990 \(21k\)](#)

[Table 4. Selected Characteristics of Workers Who Worked at Home by Gender: 1990 \(13k\)](#)

[Table 5. Class of Worker for Workers Who Worked at Home: 1990 and 1980 \(3k\)](#)

[Table 6. Selected Characteristics of Private Wage and Salary Workers Who Worked at Home: 1990 and 1980 \(13k\)](#)

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See Tables 1-5, 2-5, 3-5, 4-5, 5-5, 6-5, 7-5, 8-5, 9-5, 10-5, and 11-5.

For More Information Contact:

Journey-to-Work and Migration Statistics Branch, Population Division, U.S. Bureau of the Census, Washington, D.C. 20233, (301) 457-2454.

Source: U.S. Census Bureau, Population Division,

- **ALTERNATIVE MINIMUM TAX** . Small corporations (those with gross receipts under \$5 million) will no longer need to calculate the alternative minimum tax (AMT). This provision effectively exempts about 95 percent of all corporations (more than 2 million businesses) from needless and complex paperwork.
- **BALANCED FEDERAL BUDGET** - The 1980, 1986 and 1995 WHCSB all recommended that the federal government establish a plan to balance the federal budget. The Taxpayer Relief Act, as part of the Balanced Budget Act of 1997, helps to achieve balance by 2002.
- **EMPLOYER-PROVIDED EDUCATION ASSISTANCE**. The law extends for 3 years the exclusion from taxable income of money spent by the employer on education for employees.
- **ELECTRONIC FEDERAL TAX PAYMENTS**. For firms with more than \$50,000 in annual payroll deposits that are required to pay taxes electronically, no penalty will apply for failure to do so until June 30, 1998.

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Small Business

Research Summary

United States Small Business Administration

Office of Advocacy
RS 134

Myths and Realities of Working at Home: Characteristics of Homebased Business Owners and Telecommuters

by Joanne H. Pratt

1993. 112p. Joanne H. Pratt Associates, Dallas, Texas under contract no. SBA-6647-OA-91

Purpose

Working out of the home has become a significant and growing phenomenon in the United States. "Homebased business owners" are self-employed individuals who operate a business or profession primarily from or in a home office. "Telecommuters" are employees who do office work at home during normal business hours. The 1987 Characteristics of Business Owners survey found that more than 7 million businesses - including the majority of women-owned businesses (54.6 percent) and nearly half of all non-minority male-owned businesses (49.8 percent) - were homebased. The May 1991 Current Population Survey identified 5.6 million primary homebased businesses. A 1990 proprietary survey estimated 7.4 million home business owners - including those with a side business - and 7.2 million freelance workers, totaling 14.6 million "homebased business" persons out of a work force of 122.7 million.

Owning a homebased business and working at home for wages are both labor market options that offer flexibility to potential entrepreneurs and employees. Understanding why people choose these options, how homebased businesses benefit the larger economy, and whether homebased business ownership and work should be encouraged are relevant to current policy discussions.

Scope and Methodology

Data from the Bureau of Labor Statistics' National Longitudinal Survey (NLS) were used for this research. The NLS provides detailed information that allows for comparisons between homebased and non-homebased business owners and between workers who work at home and those who do not. Nearly the full range of variables believed to be critical to choice of homebased work are reported in the NLS: labor market experience, socioeconomic variables and environmental factors.

Three cohorts from the NLS, encompassing 17,068 individuals, were selected for this study: 1988 surveys of men and women ages 23 to 30 (the NLS of Youth), the 1988 survey of women ages 34 to 44 (the NLS of Young Women) and the 1989 survey of women ages 52 to 66 (the NLS of Mature Women).

In each cohort, four labor market categories were examined: among the self-employed, homebased business owners and non-homebased business owners were compared; among wage-and-salary workers, telecommuters were compared with non-telecommuters.

Three types of analysis were used: (1) comparative profiles of individuals who pursue each of the four labor market outcomes; (2) logistic regression models to explain the demographic and human capital variables associated with each of the labor market categories; and (3) regression models to examine the consequences of working at home as opposed to earning income on-site.

Highlights

Homebased Business Owners

- Employment characteristics are key determinants of the mode of work and certain cohorts are associated with certain industries. For young men, having a homebased business is associated with a professional occupation such as engineering or computer science. For men in their 20s, it is associated with employment in the construction industry, agriculture and business services industries. For women in their 20s, homebased businesses are most strongly associated with private household occupations and employment in the personal services industry. For women in their 30s, it is associated with service, sales, professional specialties and clerical occupations. For mature women, the personal services industry is the only determinant of self-employment (there was only one homebased business in this cohort).
- There is little difference in the profile characteristics of business owners who work at home and those who do not. While age is not a limitation for men entering business, the likelihood of a woman becoming a homebased business owner increases with age. Also, non-minorities are more likely to be self-employed and own homebased businesses than members of minority groups. Education and work experience do not influence the likelihood of homebased business operation for women and only increase it slightly for young men.
- There are interesting differences in the incomes of homebased businesses. Homebased businesswomen in their 20s earn substantially less than self-employed women who work outside the home. Businessmen of the same age make almost the same income, regardless of the location of their business. Women over 30 earn about the same net income working at home in a homebased business or in a non-homebased business.
- The mean number of employees for homebased businessmen in their 20s is 5.9 employees; for non-homebased businessmen it is 10.6 employees. For women the corresponding numbers are 1.5 and 5.2.
- Homebased businesses have greater net worth than non-homebased businesses. Young men homebased business owners have mean family assets of \$10,014 compared with \$4,801 for non-homebased business-men. Women in their 20s have \$9,378 and \$6,004, respectively. Homebased business women in their 30s and 40s have family assets of \$137,796 compared with \$112,617 for those women who do not work at home. These findings belie the notion that homebased businesses lack assets against which they can borrow to raise capital.
- There is little difference between the hours worked in a homebased versus a non-homebased business. Self-employed male youth work 52.1 hours at home versus 49 hours for non-homebased, with a mean number of 21.9 home hours. Self-employed women in their 20s work a mean number of 36 hours regardless of work location. Businesswomen work 21.6 hours at home when they are homebased, and 41.6 if employed outside the home. Self-employed women in their 50s average 42.7 hours per week working for their firm. (There was only one homebased businesswoman in the older cohort.)

Telecommuters

- Work patterns of telecommuters and non-telecommuters are very similar. Men and women spend about the same amount of time - about one hour - on lunch, coffee breaks and personal relaxing.
- Homebased work is not associated with employees who have a young child. Employees do not care for their children on telecommuting days.
- Telecommuters do not smoke, drink or use drugs as much as people who do not work at home.

- Telecommuters receive promotions at a greater rate than non-telecommuters.
- Telecommuters have positive attitudes toward their work. They like the kind of work, they do not feel isolated from their peers, and they enjoy considerable job stability.

Ordering Information

The complete report is available from:

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Previously Unpublished Census Data Show Jump In
Number of People Who Work at Home

The Commerce Department's Census Bureau today released previously unpublished data from the 1990 Census of Population and Housing showing a 56 percent increase over 1980 in the number of people who work at home in their primary jobs. These workers numbered 2.2 million in 1980 and 3.4 million in 1990.

A two-page "census brief" and six supporting tables may be accessed on an embargoed basis at <http://www.census.gov/dcmd/www/embargo/embargo.html>. After the release time, they will be available on the Census Bureau's public Internet site at <http://www.census.gov/prod/www/titles.html>.

The brief, titled Increase of At-Home Workers Reverses Earlier Trend, CENBRF/98-2, and the tables date from 1960, when these data were first collected in a census, through 1990. Prior to 1990, the trend was a steady decline in the number of people who worked at home. The data are scheduled to be collected again in Census 2000.

The data include age, gender, race, Hispanic origin, occupation, earnings, education, hours and weeks worked and industry.

Designated as CPH-L-195, computer printouts of the tables can be obtained for \$15 from the Census Bureau's Population Information Staff on 301-457-2422. A printed version of the brief is available at no charge from the same office.

-X-

Editor's Note: The Public Information Office now has a media-access server for embargoed news releases and data sets. It is available to accredited media representatives only. To gain access, please contact us for a username and password. The media-access server's Internet address is <http://www.census.gov/dcmd/www/embargo/embargo.html>. We would appreciate any comments you may have about the site.

The Census Bureau pre-eminent collector and provider of timely, relevant and quality data about the people and economy of the United States. In more than 100 surveys annually and 20 censuses a decade, evolving from the

first census in 1790, the Census Bureau provides official information about America's people, businesses, industries and institutions.

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SUCCESSFUL TELECOMMUTING PROGRAMS
IN THE
PUBLIC AND PRIVATE SECTORS:
REPORT TO CONGRESS

June 1997

Prepared for the
U. S. Department of Transportation
Office of the Secretary
and
U. S. Environmental Protection Agency
Office of Policy

By the
Texas Transportation Institute
The Texas A&M University System
College Station, Texas 77843-3135

DRAFT

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EXECUTIVE SUMMARY

INTRODUCTION

Telecommuting encompasses a variety of non-traditional work arrangements that move work to people, rather than people to work. Recent interest in telecommuting on the part of businesses, public agencies, employees, and policy makers has been generated by a desire to increase productivity, reduce costs, balance family and work responsibilities, and address traffic congestion and environmental issues. Recent advances in telecommunication and computer technologies have also enhanced the ability to communicate and work at home or from remote sites.

Telecommuting is a relatively new approach to work arrangements. As a result, the extent of telecommuting programs, the various techniques being used, the benefits and limitations of different approaches, the keys to successful programs, and other related issues are just beginning to be documented. Further, the roles federal, state, and local governments can play to encourage telecommuting are not well known.

In 1996, the United States Congress directed that the Department of Transportation, Office of the Secretary, examine these issues. The Department was charged with identifying successful telecommuting programs in the public and private sectors and with disseminating information on these programs and the benefits and costs of telecommuting. The Texas Transportation Institute (TTI), a part of The Texas A&M University System, conducted the research on telecommuting for the Department of Transportation to address this request. The findings from this research are provided in this report.

To accomplish the objectives set forth by Congress, TTI researchers conducted a number of activities. A state-of-the-art literature review was completed to identify available reports, articles, and other information on telecommuting programs in the public and private sectors. Both traditional approaches and on-line search capabilities were used in the literature review. Telephone calls were made and meetings were held with individuals from selected companies, agencies, and organizations to discuss specific telecommuting initiatives and programs.

RESEARCH RESULTS

Approaches to Telecommuting

Telecommuting involves non-traditional forms of working, which eliminate the need for an employee to commute on a daily basis to a central employment location. Telecommuting may involve the use of advanced communications technology, or it may just focus on doing regular work tasks outside the office. Home-based telecommuting is the most familiar form of telecommuting. In this case, a telecommuter works at home and communicates with the organization's main office by telephone, computer modem, or other means. Telecommuting may

also involve mobile workers, home-based business owners, and employees working at satellite, local, or neighborhood centers.

Telecommuting initiatives have been supported by programs and activities at the federal, state, and local levels. At the national level, the Clean Air Act Amendments of 1990, the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), the President's Council on Management Improvement - National Telecommuting Initiative Action Plan, the Federal Telework Centers, and the President's Global Climate Change Action Plan, all provide support and potential funding for telecommuting activities.

Examples of state and local telecommuting policies and programs also exist. California, Arizona, Minnesota, Oregon, and Washington provide just a few examples of states with telecommuting initiatives underway. Comprehensive programs have also been implemented at the regional and local levels by Metropolitan Planning Organizations (MPOs), transit agencies, communities, and other groups. The Dallas-Fort Worth Metroplex, the Phoenix Metropolitan area, and the Washington, D.C. area provide examples of regional telecommuting programs.

Currently, telecommuting programs are in use in large and small organizations throughout the country. Numerous case study examples of telecommuting programs in the public sector and in private businesses are documented in this report. These include programs focusing primarily on employees working from home one or two days a week, to full-time telecommuters, to the use of satellite or telework centers.

Keys to Successful Programs

The literature review and case study assessments provide insight into the components of successful telecommuting programs. The following elements appear to be important in helping to ensure the success of a telecommuting program and in maximizing the potential benefits to all groups.

- • **Top Management Involvement.** Support from the top management in a business or agency is critical to the successful development and implementation of a telecommuting program.
- ! **Telecommuting Policies and Guidelines.** Clearly defined program policies and guidelines appear to be an important component of most successful telecommuting programs. These guidelines outline the expectations and responsibilities of both management and telecommuters and establish the parameters for the program.
- ! **Selection of Job Tasks and Job Functions.** Identifying the types of jobs and the job functions that can be accomplished from home or a remote work site is important. Most program guidelines outline the types of jobs, tasks, and functions that will be considered for telecommuting.

- • **Selection of Telecommuters.** Not all employees have the skills and personality to be telecommuters. The guidelines and selection processes in most programs focus on employees who are self-motivated and self-starters, can work independently, have extensive experience, and work well without supervision.
- • **Selection of Managers and Supervisors.** The selection of managers and supervisors is also important. Characteristics identified for supervisors of telecommuters include managing by objective, trust in employees, and good communication skills.
- • **Pilot Tests.** A number of telecommuting programs in both the public and the private sectors started as pilot tests or demonstrations. These efforts allowed the concept to be tested with a small group of employees. In many cases, the development of telecommuting policies, the identification of appropriate jobs and job tasks, the selection of participants, and the monitoring and evaluation program were part of the initial tests. The success of these pilot efforts resulted in ongoing programs.
- • **Labor Union Involvement.** Obtaining the support and the active involvement of labor unions or other employee groups is an important element of many telecommuting programs. Involving representatives from these groups early in the planning process and throughout the implementation stage can help ensure successful programs.
- • **Establishing Communication Methods.** Establishing regular methods of communication between supervisors and telecommuters is important. Telephone calls, e-mails, and faxes represent just a few of the communication techniques reported in the case studies.
- • **Equipment and Support.** Ensuring that telecommuters have the equipment necessary to perform their jobs is an important component of successful programs. The exact type of equipment, possible cost sharing arrangements, and the requirements for use varies by program.
- ! **Ongoing Monitoring.** Most of the case studies conducted some type of monitoring and evaluation program. These activities can help address and resolve problems which may arise and can assist in documenting the benefits from telecommuting.

Employer Benefits and Costs

The most common benefit cited by organizations with telecommuting programs is an increase in the productivity of their telecommuting workers. Faster completion of assignments, fewer sick and absent days, better time management, and increased morale and commitment to the company or agency were all reported by telecommuters and their supervisors. Other benefits realized by some companies include reduced office space needs and associated costs, enhanced ability to attract and retain quality employees, and improved customer service. The following examples highlight reported benefits to employers from telecommuting programs.

- • **Reduced Office Space Needs and Costs.** One of the more significant potential cost savings from telecommuting for businesses and public agencies appears to be in reduced office space needs and related facilities, such as parking. For these benefits to be realized, however, telecommuting programs have to eliminate the need for existing office space or allow additional employees to occupy current spaces. Given the long-term nature of building leases and real estate ownership, savings in these areas may not be realized in the short-term.
- • **Increased Employee Productivity, Morale, and Commitment.** One of the most frequently cited benefits by organizations with telecommuting programs is an increase in the productivity of their telecommuting workers. Faster completion of assignments and accomplishing more work due to fewer distractions, better time management, and increased morale and commitment to the organization have been reported.
- • **Decreased Sick Leave.** Another benefit from telecommuting programs noted by management personnel at many of the case studies was decreased use of sick leave by telecommuting employees. Although telecommuting is not a substitute for sick leave, the ability to work from home on days when they are not feeling well enough to commute to the office helps contribute to the increased productivity of telecommuters discussed previously.
- • **Improved Ability to Attract and Retain Employees.** A number of the case studies indicated that the telecommuting programs have helped retain quality employees, as well as assisted with recruiting new employees. Examples were also provided of using telecommuting to assist and retain valued employees through times of illness or special needs.
- • **Address Special Situations and Needs.** Telecommuting programs have also been used to assist and retain valued employees during special situations or in response to specific needs. Examples provided in the case studies included expanding telecommuting programs to assist employees during pregnancies, illnesses, illness in the family, and other special situations. In addition, telecommuting can assist in hiring and retaining employees with handicaps or special needs, and dealing with natural disasters such as the earthquakes in California.

Employee Benefits and Costs

- • **Costs Associated with Telecommuting.** The literature review and the case studies indicated a lack of uniformity related to the possible costs for telecommuters. In some of the case studies, the employer assumes all of the costs associated with telecommuting. These may include computers, modems, fax machines, additional telephone lines, and other related equipment. In other cases, the costs of needed equipment is shared between the telecommuter and the organization. In still other instances, the telecommuter is responsible for providing a computer or other items needed to successfully complete their job.

CHAPTER ONE INTRODUCTION

Interest in telecommuting, which encompasses a wide range of non-traditional work arrangements that move work to people rather than people to work, is being driven by a number of factors. Businesses and government agencies continue to pursue ways to enhance productivity, reduce costs, and remain competitive in the local, national, and international market place. Employees are concerned about accomplishing work requirements in a timely and quality fashion, while balancing job and family responsibilities. Finally, issues relating to traffic congestion, air quality, the environment, and quality of life continue to be concerns throughout the country. At the same time, rapid advancements in telecommunication and computer technologies have greatly enhanced the ability to communicate and work across long distances.

Telecommuting is one potential technique to address these issues and to help accomplish these objectives. Telecommuting includes a variety of non-standard employment arrangements allowing employees to work at home or at other nearby locations. Telecommuting programs offer benefits to employers and employees through reducing office space needs, improving productivity, and allowing greater flexibility for individual workers. By removing vehicles from the roadway system during the peak-periods, telecommuting helps reduce congestion levels and accidents, improve air quality, and decrease energy consumption.

Telecommuting is a relatively new approach to work arrangements. As a result, the extent of telecommuting programs, the various techniques being used, the benefits and limitations of different approaches, the keys to successful programs, and other related issues are just beginning to be documented. Further, the roles federal, state, and local governments can play to encourage telecommuting are not well known.

To better address these needs, the United States Congress directed the Department of Transportation, Office of the Secretary, to carry out research to identify successful telecommuting programs in the public and private sectors and provide for the dissemination to the public of information regarding the establishment of successful telecommuting programs and the benefits and costs of telecommuting (1).

Congress further directed the Department of Transportation to report the findings, conclusions, and recommendations from this study to Congress. This report is presented to Congress by the Department of Transportation in response to this mandate. The research was conducted by the Texas Transportation Institute (TTI), a part of The Texas A&M University System, and administered through the Texas Department of Transportation (TxDOT).

RESEARCH ACTIVITIES

A number of activities were conducted to accomplish the objectives set forth by Congress. Researchers were able to build on a recent telecommuting study sponsored by TxDOT in completing many of these activities (2, 3). For example, the case study methodology developed for the TxDOT study was used in this project, as was the Texas experience with telecommuting.

- • **Reduction in Stress, Time, and Costs Associated with Commuting.** Telecommuters in the case studies reported a number of benefits from not commuting to a central office one or two days a week or on a daily basis. Employees reported lower levels of stress and fatigue from not having to drive and deal with traffic congestion on telecommuting days. Telecommuters also reported savings in gasoline and parking costs from not having to drive to and from work every day.
- • **Increased Productivity, Morale, Job Satisfaction, and Responsibility.** Telecommuters in many of the case studies reported increased productivity from eliminating commuting time, reducing interruptions, and establishing flexible work schedules. Telecommuters reported increased motivation, job satisfaction, and loyalty to their employer, as well as greater feelings of accomplishment, responsibility, and trust.
- • **Balancing Job and Family Responsibilities.** Telecommuters noted a better balance of work and home responsibilities. Positive aspects of telecommuting on home life included spending more time with children, making meal preparations easier and dinner more enjoyable, arranging needed services or home repairs easier, and scheduling other personal appointments. Employees viewed the telecommuting programs as providing additional benefits in special situations. Examples provided included caring for sick children or relatives and individual illnesses.

Community Benefits and Costs

Telecommuting programs may also provide benefits to the community and society as a whole. As discussed in this section, these may include reductions in energy use and pollution associated with commute trips. In addition, telecommuting programs may help enhance the economy and human capital of some areas and neighborhoods.

- **Travel Reduction, Air Quality Enhancement, and Energy Reduction.** Telecommuting programs can benefit the transportation system by reducing commute trips. These benefits can help companies, agencies, and areas meet air quality legislative requirements and other policy directives. Since telecommuting removes work trips from congestion peak-periods, telecommuting programs should have positive impacts on traffic congestion, air quality, and energy consumption. The experience at many of the case studies supports these benefits.
- **Enhance the Economy and Human Capital of Neighborhoods and Areas.** Telework centers and telecommuting programs may have secondary benefits related to enhancing the local economy and providing resources for local residents. For example, one of the objectives of the Minnesota Department of Transportation Cambridge Telework Center was to enhance the economy and human capital in the Cambridge area. The location of telework centers may help stimulate the economy in the area. Further, facilities such as the Metro Blue Line TeleVillage in Los Angeles provides resources for the local

community to use. Another potential secondary benefit is the added presence of telecommuters in their neighborhood during the day.

ACTIVITIES TO ENCOURAGE TELECOMMUTING

The results of this study indicate that telecommuting programs offer numerous benefits to employers, employees, the transportation system, and the general public. For these benefits to be fully realized, telecommuting will need to become more widespread. A number of policies and activities can be undertaken to support and promote telecommuting. Potential policies and activities for use by federal, state, and local agencies, MPOs, transit agencies, private businesses, and other groups to further encourage telecommuting are highlighted here.

- • **Federal, State, and Local Legislation and Policies.** Legislative mandates or policies that encourage telecommuting can be enacted at the federal, state, and local levels. At the federal level, the 1990 Clean Air Act Amendments and the ISTEA both provide support for telecommuting programs. Although the Employer Trip Reduction (ETR) program is now voluntary, telecommuting was being considered in many air quality non-attainment areas to help meet the requirements. State and local legislative actions, administrative support, and agency policies can all help encourage telecommuting efforts. Some states, MPOs, and other agencies have developed policies and programs supporting telecommuting activities. The headquarters and regional offices of federal agencies could take a lead role in promoting many of these activities.
- • **Regional and Local Policies and Programs.** Regional agencies, MPOs, transit authorities, and local governments can play important roles in promoting telecommuting. The Dallas-Fort Worth, Phoenix, and Washington, D.C. area case studies provide just a few examples of comprehensive regional programs. Similar activities could be undertaken in other metropolitan areas throughout the country.
- • **Labor Union Support.** Support for telecommuting activities from labor unions and other employee groups at the national level could assist in dealing with these organizations at the state and local levels. Initiating discussions at the national level could enhance support for telecommuting programs at public agencies and private businesses throughout the country.

Technical Assistance and Public Information

Agencies at all levels can continue to promote telecommuting through a number of methods. Public information campaigns and targeted marketing efforts can be used to communicate the benefits of telecommuting to all groups. The *Home Office 2000* contest in the Dallas/Fort Worth area represents just one example of possible informational and promotional activities. Ensuring that all groups are aware of the benefits of telecommuting and continuing to promote telecommuting programs on an ongoing basis can encourage more widespread use. The following approaches provide a few examples that may be appropriate for consideration by public agencies.

- • Videos
- ! Workshops or Training Courses
- • Peer-to-Peer Networks
- • National and Regional Conferences and Symposiums
- ! Educational Outreach Programs
- • Technical Assistance
- ! Use of Advanced Technologies

Provide Incentives for Telecommuting Programs.

Providing financial or other incentives to companies or agencies to implement telecommuting programs represents another potential strategy. Possible incentives could include tax breaks, reductions in parking requirements, zoning bonuses, and other benefits to public and private sector groups.

Encourage Telecommuting Within Public Sector Agencies

Leading by example, through the implementation of telecommuting programs, represents another approach public agencies may wish to pursue to encourage more widespread use of telecommuting. The federal initiatives, as well as those underway in some states and local areas, provide instances of public agencies leading by example. More wide-spread public sector use of telecommuting programs can show a commitment that may encourage private businesses, as well as other public agencies, to follow.

First, a state-of-the-art literature review was completed to identify available reports, articles, and other information on telecommuting programs in the public and private sectors. Both traditional approaches and on-line search capabilities were used in the literature review. Previous reports published by the Department of Transportation, other federal agencies, state and local groups, and other organizations were examined. Electronic databases such as First Search, Dialog, Lexus/Nexus, TRIS, NTIS, and Compedex, as well as Internet search engines, were used to obtain more current information on the status of various telecommuting programs.

Second, telephone calls were made and meetings were held with individuals from selected companies, agencies, and organizations to discuss specific telecommuting initiatives and programs. For example, meetings were held with representatives from various agencies, organizations, and companies in the Washington, D.C. area to obtain information on federal, regional, and private sector programs. Additional telephone calls were made to obtain current information on selected projects.

ORGANIZATION OF REPORT

This report is divided into five chapters following the introduction. Chapter Two provides an overview of telecommuting, discusses the various approaches to telecommuting, and summarizes recent federal initiatives to encourage telecommuting. The best practice case studies are presented in Chapter Three. Examples of regional and state-wide activities, public and private sector telecommuting programs, and satellite telework centers are provided. Chapter Four identifies the keys to successful telecommuting programs. Chapter Five discusses the benefits and costs that have been documented through the telecommuting case studies. The report concludes with the identification of strategies and activities that could be used at the federal, state, and local levels, and by the private sector, to encourage telecommuting.

CHAPTER TWO OVERVIEW OF TELECOMMUTING

BACKGROUND DEFINITION AND SCOPE OF TELECOMMUTING

Telecommuting encompasses a wide range of approaches involving non-traditional work arrangements. Rather than moving people to work, telecommuting focuses on moving work to people. Telecommuting is most commonly thought of as employees working full-time or part-time at home. It may also include employees working at a satellite center, conducting sales or services from home or personal vehicles, and working in clients' offices.

Current estimates by the U.S. Department of Transportation and other groups indicate that approximately 30 percent of the American labor force now works at home at least part of the time. While these may not all be telecommuters, some two to seven million workers are estimated to be full-time employees who would otherwise be commuting daily to work (4). Initial telecommuting demonstration projects have been implemented in Hawaii (5), California (6), and the Seattle area (7). Telework centers have also been developed in the Washington, D.C. area (8), Southern California (9), and other parts of the country (10). Further, private companies and public agencies in different areas have initiated telecommuting programs for various reasons.

The potential for telecommuting has been estimated to reach as many as 15 million workers in the next decade (4). A number of factors will influence the widespread use of telecommuting and the ability to reach this target. These include the nature of businesses, specific work tasks, management structures, employee characteristics, costs, legal issues, traffic congestion levels, air quality concerns, and advances in technologies. This chapter summarizes the various approaches to telecommuting and discusses recent federal initiatives supporting telecommuting.

APPROACHES TO TELECOMMUTING

Telecommuting involves non-traditional forms of working which eliminate the need for an employee to commute on a daily basis to a central employment location. Telecommuting may involve the use of advanced communications technology, or it may simply focus on doing regular work tasks outside the office. Home-based telecommuting is the most familiar form of telecommuting. Telecommuting may also involve mobile workers and employees working at satellite, local, or neighborhood centers. Examples of the various approaches to telecommuting are summarized below.

- **Telecommuting Working at Home.** The most common form of telecommuting involves an employee working full-time or part-time at home. Under this approach, an employee may work on a daily basis from home, or may work one or more days a week from home. This approach may include the use of advanced technologies such as equipping a home office with a computer, fax, and modem or it may simply involve

conducting work tasks such as reading reports or reviewing plan specifications at home.

- ! **Telecommuting Satellite or Telework Centers.** Satellite or telework centers are offices located closer to an employee's residence than the company's main office. Telework centers may house only employees from one company or agency, or space may be available for use by personnel from multiple firms and agencies. Satellite or telework centers may vary in size from smaller neighborhood facilities, to mid-size local centers, to larger regional facilities. Most telework centers provide computers, modem connections, fax machines, and other services.

- **Telecommuting Hoteling or Free Addressing.** These are terms used to describe employees who spend most of their time in a client's office. They may have temporary work space, usually in the form of cubicles or offices that are shared with others, at their own office. Accountants or auditors who spend most of their time in a client's office provide an example of this form of telecommuting.

- ! **Telecommuting Mobile Workers or Virtual Offices.** Sales and marketing staff often use these approaches. Using notebook computers, faxes, modems, and cellular telephones, sales personnel may spend most of their time working from home or their automobile, with only periodic trips to their main office for meetings and other business.

FEDERAL PROGRAMS AND INITIATIVES

A number of programs and initiatives supporting the greater usage of telecommuting are underway at the national level. These include legislative actions, administrative directives, and federal agency programs. The major national programs and initiatives related to telecommuting are summarized below.

- **Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA).** The ISTEA provides funding and policy support for surface transportation programs including highways, highway safety, and mass transportation. The ISTEA also implements the transportation provisions of the Clean Air Act Amendments of 1990. The Clean Air Act Amendments include requirements and schedules for urban areas not meeting the air quality standards. Transportation control measures, including telecommuting, can be used to help these areas meet the attainment requirements, as well as reduce traffic congestion and energy consumption. The ISTEA also provides greater flexibility for state and local agencies in the use of federal transportation funds to address specific issues and priorities. It has also created new programs, including the Congestion Mitigation and Air Quality (CMAQ) Program. This program provides funding for projects to help regions designated as air quality non-attainment areas meet the requirements contained in the 1990 Clean Air Act Amendments. Telecommuting programs and related activities may be eligible for funding through the CMAQ, as well as through the Surface Transportation Program (STP) and other programs.

! **The President's Council on Management Improvement.** In 1990, the President's Council on Management Improvement initiated the Federal Flexible Workplace Pilot Project, called Flexiplace. The Flexiplace program included allowing federal workers to telecommute and to use telecenters. The initial effort involved approximately 1,000 participants with 15 federal agencies across the country. More detailed information on the pilot program is provided in Chapter Three (11).

! **Federal Telework Centers.** ~~Legislation approved by Congress in 1992 and 1993 authorized the General Services Administration (GSA) to develop and operate telework centers for federal employees in the greater Washington, D.C. Metropolitan area. Ten telework centers are currently in operation and more are in the planning stage. More information on the development and use of these centers is provided in Chapter Three.~~

• **National Performance Review.** The U. S. Department of Transportation (DOT) was designated in the National Performance Review as the lead federal agency to evaluate the potential for telecommuting, to implement a telecommuting program for Department employees, and to encourage, monitor, and evaluate state, local, and private sector telecommuting efforts. In 1994, the Department developed and issued a telecommuting policy and initiated a telecommuting program.

! **Global Climate Change Action Plan.** The President's Global Climate Change Action Plan identified telecommuting as one technique to help meet environmental goals and enhance the quality of life in areas throughout the country. The DOT was identified in this plan as the lead federal agency to promote telecommuting. The plan also recommended that the GSA and the Office of Personnel Management (OPM) develop legislative proposals to allow telecommuting by federal employees.

• **President's Management Council C National Telecommuting Initiative Action Plan.** This initiative, which was approved by the President's Management Council in 1996, includes a five-phased plan for increasing the number of federal personnel telecommuting to 60,000 by the end of FY 98. The five phases of the program include benchmarking the status quo, preparing a comprehensive and coordinated telecommuting program, promoting the initiative, implementing the program, and evaluating the program (12).

CHAPTER THREEC BEST PRACTICE CASE STUDIES

This chapter provides examples of telecommuting programs in use throughout the country. The chapter is divided into four sections. Examples of regional and state-wide telecommuting programs are presented first. Public sector telecommuting case studies are then highlighted, followed by private sector examples. The chapter concludes with an overview of satellite or telework centers.

There are numerous examples of telecommuting programs and related activities underway throughout the country. The case studies highlighted in this chapter were selected to provide a mix of public and private sector experiences, company or agency size, and geographical distribution.

REGIONAL AND STATE-WIDE TELECOMMUTING PROGRAMS

Regional, metropolitan, and state-wide telecommuting programs are being implemented in many parts of the country. In some cases these efforts are being led by the MPO, while in other instances the state or regional transit agency has headed the effort. These programs often contain a mix of elements and activities including the adoption of goals and objectives supporting telecommuting, production and distribution of videos and brochures, marketing and public education efforts, establishment and operation of telework centers, and implementation of telecommuting programs within the agency.

Comprehensive programs encompassing multiple elements have been developed by MPOs, state agencies, transit authorities, and other groups in many areas. Case study examples from the Dallas-Fort Worth Metroplex, the Metropolitan Washington area, the Regional Public Transit Authority in Phoenix, and the State of Minnesota are highlighted in this section.

Dallas-Fort Worth Metroplex

The North Central Texas Council of Governments (NCTCOG) is the MPO for the Dallas-Fort Worth Metropolitan area. Working with other agencies and groups, including Dallas Area Rapid Transit (DART), the North Texas Clean Air Coalition, and the Fort Worth Transportation Authority (The T), NCTCOG is conducting a number of activities to promote telecommuting and alternative commute modes. Many of these efforts are focusing on the summer months, when the potential for ozone alert days is especially high. Elements of the comprehensive approach being taken in the area include encouraging commuters to take the bus or light rail transit (LRT), carpool, vanpool, telecommute, travel outside the peak-periods, and other strategies.

The NCTCOG produced a telecommuting brochure that explains the various telecommuting approaches, outlines the basic elements to be considered in developing a telecommuting program, and provides suggestions on common issues that may be encountered in

In addition, NCTCOG and other agencies have used a variety of public information and marketing techniques to promote telecommuting and the use of transit and ridesharing. For example, a series of Home Office 2000 contests were held during the summer of 1996 ozone season. These included the *Wannabe Telecommuter*, the *Messiest Home Office*, and the *Ultimate Home Office*. Prizes and copies of telecommuting guides and reports were awarded to the winning contestants.

The Metropolitan Washington Telework Resource Center (MWTRC) was established in 1996 by the Metropolitan Washington Council of Governments (MWCOC) as part of its Commuter Connection program. The goal of the MWTRC is to increase the number of people working at home or at telework centers in the Washington, D. C. metropolitan area. More specifically, the MWTRC is undertaking the following activities (14, 15).

- The MWTRC program is being carried out by staff at the MWCOC. As a first step in the process, a survey was conducted of 1,025 randomly selected households in September of 1996, and six focus groups were conducted with senior managers from regional employers in January of 1997. Three of the focus groups included representatives from employers with some form of organized telecommuting program, while three involved managers from firms without current programs. The results from the focus groups are being used to develop an outreach program to

to reduce commute travel and enhance the environment. The following elements are included in the activities and services provided through the RPTA's telecommuting program (17).

- • **Public Information and Marketing.** The RPTA has developed information on telecommuting for the general public. Billboards, advertisements, and other media have been used to educate the public on the scope and benefits of telecommuting. Other activities, like the Telecommute America Week and a home page on the Internet, have been used to promote telecommuting and raise public awareness.
- • **Public Agency and Private Business Support.** The RPTA provides interested agencies, firms, and groups with more detailed information on telecommuting programs. Presentations by RPTA staff are given on a regular basis and round table discussions with top management personnel have been hosted. These include general telecommuting guidelines, tips for developing telecommuting programs, and examples of telecommuter agreements.
- • **Training.** The RPTA has developed two training courses on telecommuting. One is a two hour session that provides a general overview of telecommuting and is intended for managers and top agency personnel. The second is a half day session that provides more detailed training for individuals responsible for developing telecommuting programs within a company. A training manual has also been prepared for use with the courses. The manual contains sample policies, telecommuter agreements, surveys, and other information. These courses are offered on a regular basis.
- • **Ongoing Technical Assistance.** Staff from the RPTA provide ongoing technical assistance to agencies and businesses interested in developing and maintaining a telecommuting program.

These efforts have been successful in raising the awareness about telecommuting in the Phoenix area and in developing telecommuting programs in public agencies and private businesses. The RPTA reports that numerous agencies and businesses in the Phoenix area currently have some type of telecommuting program.

State of Minnesota

In 1993, the Minnesota State Legislature requested that the Minnesota Department of Transportation (Mn/DOT) conduct a study of telecommuting in the Minneapolis-St. Paul Metropolitan area. The Legislature further required that the study assess the current extent of telecommuting, the potential for telecommuting to substitute for vehicle commuting, present legal and policy obstacles to telecommuting, and legal and policy alternatives to expand the use of telecommuting (18).

Mn/DOT examined these items and presented a report to the Legislature in 1994. To assist with the required tasks, Mn/DOT sponsored a survey of 800 households in the seven county metropolitan area, reviewed available literature on telecommuting in the area and on a nation-wide basis, and examined potential legal and policy issues related to telecommuting. The report identified the following public policy initiatives that the State could undertake to encourage telecommuting (18).

- Establish and encourage partnerships among public, non-profit, and private sector groups to engage in educational, promotional, research, pilot studies, and other efforts to encourage telecommuting.
- Encourage MPOs to include telecommuting in their transportation planning process and congestion management systems.
- Establish and evaluate telecommuting pilot projects.
- Establish and encourage initiatives within government agencies and the private sector to establish and monitor telecommuting programs and document the results.

This report, as well as other efforts underway at the time, resulted in a number of follow-up activities and actions. As highlighted below, these included efforts by the Legislature, the Governor, state agencies, and other groups.

- In 1994, the State Legislature passed a law requiring the preparation of a telecommuting program by any state agency intending to request office space, such as a new building, renovation or remodeling, or relocation. The plan must be approved by the Department of Administration's Information Policy Office and reviewed by the Government Information Access Council (19).
- The Governor declared the week of July 22, 1996, as Telecommuting Week to heighten awareness about telecommuting. A variety of information was provided through media channels and numerous activities focused on explaining and promoting telecommuting.
- Personnel from state agencies worked together to develop a *State of Minnesota Telecommuting Policy and Telecommuting Program*. The purpose of the policy is to encourage telecommuting among state agencies and to help ensure statewide consistency. The program further provides guidelines and examples of employee surveys, agreements, home office requirements, evaluations, and plans that can be used in establishing telecommuting programs at individual agencies (20).
- In 1996, Mn/DOT established the Cambridge Telework Center, for use by Mn/DOT and other state employees. More information on this center is provided later in this chapter.

An evaluation of the pilot program was conducted by the TAC (23). Based on the success of the initial test, the telecommuting program was formalized and expanded to include additional employees. Currently, approximately 50 employees are participating in the program.

The *Telecommuting Guide* developed for the pilot program continues to govern the telecommuting program in the Information Services Department. The *Guide* contains the seven policies governing the program, outlines the expectations and the responsibilities of telecommuters, provides suggestions on organizing and managing work, and contains suggestions for managers of telecommuters. It also includes a listing of potential benefits of telecommuting for the Department, employees, and the community at large, along with adjustments that may need to be made by the various groups.

The experience with telecommuting at the Information Services Department was examined based on the evaluation of the six-month pilot program conducted by the Department (23), interviews conducted by TTI researchers of managers and telecommuters in the Department, and surveys completed by seventeen telecommuters. The following points highlight the experience with telecommuting at the Information Services Department (3, 23).

- • The telecommuting program has been well received by both supervisors and employees in the Department. No major problems have been experienced and numerous benefits have been documented for the agency, employees, and the environment.
- ! The productivity of employees and the Department as a whole has improved with the telecommuting program. The Information Services Department supports other city departments. These departments were surveyed before and after the pilot program to measure their satisfaction with the work in the Information Services Department. The other departments noted improvements in responsiveness and faster turnaround time on data processing requests during the telecommuting pilot program. One example of the improved responsiveness, which involved an emergency request from another department, was provided during the interviews. The responsible Department employee, who was telecommuting that day, was able to provide the needed information within the hour. This experience helped establish the seamless nature of telecommuting for the Department's customers.
- ! The productivity of telecommuters has been high and no problems have been reported with poor performance. In addition, with the computer links, telecommuters can respond to emergencies after regular work hours and on weekends, expanding the coverage of the Department and providing standby services over extended hours.
- ! Telecommuters identified numerous benefits from the program. These included saving money from reduced commuting and parking costs, reduced stress and more time for other activities from not commuting, improved productivity from fewer distractions and interruptions, more time with family and enhanced home life, better balance of work and family responsibilities, and improved morale.

- ! The evaluation of the pilot program reported an average savings of 37 kilometers per telecommuter per week from not commuting one or two days per week. The 17 surveys completed for the case study indicated similar savings. Commute distances on in-office work days ranged from two kilometers to 88 kilometers, with corresponding travel times of five minutes to over an hour. The average commute distance for the 17 survey respondents was 29 kilometers. Fourteen of the respondents regularly drive alone, while two take the bus, and one carpools. Only one participant reported making regular stops to and from work for day care needs, while seven employees noted periodically stopping on the way home for errands and other activities. None of the 17 respondents make regular trips in the morning of the days they telecommute and only two reported periodic trips after work.

County of Los Angeles

With approximately 80,000 employees, the County of Los Angeles is one of the largest public sector employers in the nation. The County has an extensive telecommuting program, which was initiated in 1989. The program was started to help reduce operating costs, increase worker productivity, and address severe traffic and air quality problems in Southern California. These continue to be the primary objectives of the program.

Currently some 4,000 employees participate in the telecommuting program, which has evolved over time, and an additional 25,000 employees are eligible. The program involves three basic telecommuting work arrangements. These are working from home, working at a Telebusiness Center or a Telework Office, and emergency or short-term telecommuting (24). In addition, one of the unique features of the County=s program is the partnership with local municipalities. The County has established arrangements with 14 cities to allow County employees to work in local offices at no cost.

Similar procedures are used with all three telecommuting arrangements. Interested employees make a request to their supervisor to participate in the program, and, if approved, a second request is made to the Department Telecommuting Manager. The telework location and the exact arrangement are agreed upon by all parties and the employee participates in the County=s training program. The nature and extent of equipment provided to the telecommuter is a department decision.

Evaluations of the telecommuting program have been conducted by different departments. For example, the County Assessor=s Office has documented a 42 percent increase in productivity with the telecommuting program over time. Telecommuting employees in the Children=s Services, Probation, and Public Services Departments all have reported lower stress levels and increased productivity (24).

Federal Flexible Workplace Pilot Project

The Federal Flexible Workplace Pilot Project, called Flexiplace, was initiated in 1990. The pilot was developed to enhance the ability of federal agencies to recruit and retain a skilled workforce, to improve employee=s quality of life, and to reduce federal operating costs. The pilot program involved approximately 1,000 employees from 15 agencies throughout the country.

Three types of telecommuting options were tested. These were telecommuting from home, using a telework center, and flexible accommodation for disabled employees (25).

An evaluation of the pilot program was conducted by the OPM and GSA. The evaluation included surveys of telecommuters, supervisors, co-workers, and customers, focus groups of telecommuters and supervisors, and observations by the Flexiplace Management Team. Initial surveys were completed to provide a baseline prior to the initiation of the pilot. Additional surveys were conducted at six months and one year to measure changes over the course of the pilot program. The following highlight the major findings from the evaluation (25).

- ! Most of the participants were mid to senior level staff with very high performance ratings.
- ! The high performance ratings continued or improved during the telecommuting pilot.
- ! Telecommuters indicated enhanced work productivity and greater flexibility in work arrangements.
- ! Approximately 43 percent of the participants reported their most productive work periods were outside normal business hours.
- ! Communication among telecommuters and their supervisors and co-workers remained strong.
- ! Telecommuters reported positive impacts on the quality of their personal life, reduced stress levels, reduced time spent commuting, and other related benefits.
- ! A majority of telecommuters reported reduction in work-related transportation costs. These savings were somewhat off-set by increases in home utilities and other expenses. Approximately half of the participants reported no change in total job-related expenses, while almost a third indicated a reduction.
- ! The majority of telecommuters and supervisors supported continuing the Flexiplace option.
- ! Overcoming management reluctance was noted as a major challenge in implementing Flexiplace in many agencies and offices.

- Data from the pilot program indicated that telecommuting has a positive and measurable effect on the environment, the community, and the family. Each telecommuter saved approximately 800 kilometers in commute travel during the year, for a total savings of 48,300 kilometers for all participants.
- The results also indicated that community leaders recognized that telecommuters who are working from home have a positive impact on the community and neighborhood. Further, telecommuters responded that they were able to increase the amount of time devoted to their personal life by reduced commuting requirements.
- Most telecommuters and supervisors reported no change in customer contact or other innovations during the pilot. The potential for enhancements in these areas were expressed by a number of participants, however.

The overall results from the pilot program were positive and the Department plans to expand the telecommuting program and make it a permanent part of work arrangements available to employees. A number of ways to enhance the program were also identified during the evaluation and recommendations were made on incorporating these into the ongoing program.

Puget Sound Telecommuting Demonstration Project

The Puget Sound Telecommuting Demonstration was initiated in 1990 by the Washington State Energy Office (WSEO). The demonstration included 25 public agencies and private firms in the Seattle area. Although the demonstration was motivated primarily to explore potential energy and environmental benefits from telecommuting, organizational and personal issues were also explored. The demonstration focused primarily on telecommuting from home. One telework center was established, however, and 24 employees from nine groups used this facility (7).

The demonstration was developed and operated to provide a comprehensive assessment of the potential for telecommuting in the area. A conference on telecommuting in 1989 was used to recruit agencies and businesses to participate in the demonstration. These groups signed a memorandum of understanding with WSEO, which outlined the policies and procedures that would be used to oversee the demonstration and the evaluation.

WSEO staff provided assistance to the participating groups in establishing and operating individual telecommuting programs. Help was provided in establishing policies and procedures, selecting the telecommuters and supervisors, training, and ongoing trouble shooting. The actual demonstration lasted from 1990 to 1992.

A number of techniques were used to evaluate the demonstration. These included surveys, travel logs, focus groups, case studies, informal observations, and follow-up interviews. The results of the demonstration are briefly summarized below (7).

- **Most participants telecommuted an average of one day a week.**

! Telecommuters used a mix of equipment at home. In some cases, new or surplus computers were provided to telecommuters, while in other cases, personal equipment was used. Equipment concerns did not appear to be a major problem for most of the participants.

- **Benefits of the demonstration reported by telecommuters included increased levels of job satisfaction, enhanced performance, and greater flexibility. Some concerns were raised over job security, however.**

! Reasons cited by telecommuters who discounted participation in the demonstration included not liking it, concerns about being less visible in the office, job changes, problems in the office, and lack of adequate equipment.

- Factors identified by participants that contribute to a successful telecommuter included supporting family, computer skills, adequate space at home, supportive organization and management, nature of the job tasks, and self-motivation.

! Supervisors generally rated telecommuter=s performance the same or better as those days spent in the office. A few cases of declining performances were noted, however.

! Reduction in the number of commute trips were realized by telecommuters in the demonstration. An average of 26 fewer commute trips per year were estimated for each telecommuter. Approximately 61 percent of the participants drove alone to work, while 18 percent carpooled, and 17 percent took the bus. These results were used to estimate that each telecommuter reduced their work travel by some 1,900 annual kilometers. Corresponding savings in gasoline and travel time were also estimated.

State of Arizona Telecommuting Program

Telecommuting was first introduced at state agencies in Arizona in 1989. The program, which started as a pilot effort, has grown steadily over the years. The initial pilot program allowed selected employees to telecommute from home one or two days a week. It was initiated to help address concerns over growing levels of traffic congestion and declining air quality standards, as well as enhancing worker productivity (30).

The success of the pilot effort led to the second phase of the program, which started in 1993. This effort focused on the development of a telecommuting program and information and materials to promote the use of telecommuting within all state agencies. The preparation of these materials have been coordinated with the states of Washington and Oregon.

Currently, the third phase of the program is under way to implement telecommuting efforts at all state agencies in Maricopa County as mandated by the Governor. The goal of the third phase is to have 15 percent of state agency personnel participating in some type of telecommuting program by the end of 1998 (30).

The Arizona Department of Administration conducted an extensive evaluation of the telecommuting program in 1996. The evaluation focused on the following elements.

- • Assess current perceptions, attitudes, and level of support for telecommuting at different levels within the participating agencies.
- ! Estimate the current level and potential for telecommuting within these agencies.
- • Determine what the purposes of telecommuting are and should be within state agencies.
- ! Explore middle management=s perceptions of the potential barriers and possible incentives to telecommuting.

A number of components were included in the evaluation to answer these questions. Interviews with senior management, focus groups with supervisors, research on other telecommuting programs, surveys of employees, members of the state legislature, and the public were all conducted as part of the evaluation. The following highlight some of the main findings from the evaluation (30).

- • Senior managers tended to be positive toward telecommuting whether their organization had a program or not. The most frequently cited benefits of telecommuting by this group was increased work efficiency and productivity.
- ! Supervisors were also supportive of telecommuting. Supervisors noted that telecommuters have fewer disruptions and are better able to work during their peak performance times. Improved staff morale among telecommuters was noted as a benefit. Positive experiences with managing telecommuters were expressed by a number of participants.
- • The survey of state employees, which included both telecommuters and non-participants, indicated support for telecommuting among both groups. Benefits of telecommuting noted by state employees included increased productivity, reduced absenteeism and job turnover, improved job satisfaction, and more time with family. Telecommuters reported reduced stress levels and increased ability to meet work objectives.
- ! Although not all of the legislators responding to the survey were aware of the demonstration program, most supported allowing state employees to telecommute. Potential benefits of telecommuting noted by the legislators included greater flexibility in balancing home and work requirements.
- • The results of the survey of the general public was generally favorable toward telecommuting and the state demonstration.

The Department of Administration provided assistance to participating groups during the pilot program and is continuing to help during the full scale deployment. Videos, brochures, guidelines, and other informative material have been provided to public agencies and private firms. These efforts are being coordinated with the activities being pursued by the Regional Public Transit Authority described previously.

State of TexasCTexas Workforce Commission-Commission of Appeals Department

Telecommuting at the Commission of Appeals Department within the Texas Workforce Commission began on an informal basis in 1991 when a part-time attorney was allowed to work from home in response to family demands. The positive experience with this initial effort led to the development of a formal telecommuting program at the Commission. Currently, 14 attorneys, representing approximately 74 percent of the legal staff, and three stenographers are full-time telecommuters.

A set of formal guidelines, which are outlined in the *Telecommuter=s Handbook*, govern the program at the Commission (31). The *Handbook* establishes the telecommuting program as a management option, not an employee entitlement. Participation in the program is voluntary and can be terminated without cause. To be eligible for consideration to telecommute an employee must have been with the agency for one year, be self-motivated, and possess a good understanding of their job and the operations of the department.

The employee must provide a safe and adequate work space at home. Agency or personal equipment may be used at home, but agency equipment and software may not be used for personal purposes and other family members and individuals must not have access to equipment, documents, or information. Telecommuters are covered by the Agency Worker=s Compensation Insurance, provided the work location and schedule has been approved. Telecommuting is not viewed as a substitute for child care or dependant care on a regular basis. Suggestions are provided to telecommuters on planning their work space, organizing their work day, managing their time, and developing good work habits.

A formal agreement, which is signed by the supervisor and the telecommuter, governs participation in the program (32). The agreement contains many of the items covered in the guidelines. The responsibilities of the telecommuter and the Commission are outlined relating to work schedules, equipment, supplies, use of software, and communications with the office. The expectations relating to a telecommuter=s work production and work quality are outlined. Telecommuters are required to maintain a tracking log of work assignments and completion dates. Telecommuters and supervisors agree to participate in studies, surveys, and other evaluations of the program.

The Commission of Appeals Department conducted an assessment of the telecommuting program in 1996. The progress report completed on this assessment documents a number of benefits for both the agency and for employees from the telecommuting program (33). Researchers obtained additional information on the experience with the program through

interviews with telecommuters and supervisors in the Department. The following points summarize the highlights from the assessment and the interviews.

- ! The telecommuting program has had a measurable improvement in the productivity and work output of participating employees. Measuring changes in productivity is easier in this case because the attorneys have weekly assignments of cases, hearing tapes, and case quotas. As a result, employee performance is easy to monitor. In 1996, the Department set a new record in the timely processing of caseloads.
- The Department was also able to better manage existing office space and realized cost savings as a result of the telecommuting program. Between 1991 and 1996, the number of attorneys working for the Department increased from 18 to 20. The office space needs during this same time period were reduced through the telecommuting program. The Department has also been able to realize savings in the costs associated with providing parking spaces, telephones, and other items to telecommuters.
- ! Benefits of the program identified by telecommuters include greater work productivity, a better balance between work and home demands, reduced stress from daily commuting, and improved job satisfaction. Telecommuters appreciate the program and feel it has enhanced employee morale and loyalty.
- Telecommuters noted that their work productivity has improved through elimination of time spent commuting and parking, fewer interruptions, and flexibility in work schedules. For example, some 60 percent of the Department telecommuters report doing half their work outside the standard 8 a.m. to 5 p.m. workday.
- ! The Department also perceives that the program provides a unique recruiting tool and helps in retaining good employees.
- Key elements to the success of the program that were identified by both supervisors and the telecommuters included establishing clear guidelines and expectations, maintaining regular communication, and ensuring strong support for the program from top management. Telecommuters stressed the need to establish regular work routines, to maintain an organized work area, to limit distractions, and to maintain ongoing communication with supervisors and co-workers. Managers identified regular communication and focusing supervision on measurable work accomplishments as two key elements to a successful program.

Wisconsin Department of Transportation-District Two

District Two of the Wisconsin Department of Transportation (WisDOT) conducted an Alternative Worksite (Telecommuting) Demonstration Project in 1994 and 1995. District Two encompasses the Milwaukee Metropolitan area in Southeastern Wisconsin. The project was undertaken to accomplish the following objectives (34).

- • To provide guidance to managers receiving requests from employees to telecommute.
- • To determine the potential for telecommuting to help achieve the District Two employee commute option goals.
- • To allow District Two staff responsible for the travel demand management program to gain experience with telecommuting programs.
- • To share information on telecommuting with public and private sector employers in the area.

The demonstration included two phases. The procedures and evaluation methods were established during the first phase and the actual demonstration was conducted in phase two. From April 1994 to June 1995, a total of 15 employees and 14 supervisors participated in a demonstration which allowed telecommuters to work from home one or two days a week. Daily work logs, surveys, and group meetings were used to monitor and evaluate the test. The following points highlight a few of the major findings from the demonstration.

- Overall, participation in the telecommuting demonstration was lower than originally anticipated. Most participants averaged telecommuting one day a month, rather than the one day a week that was initially envisioned.
- The telecommuting demonstration appeared to have a positive impact on the effectiveness of both the work unit and the telecommuters. Approximately 50 percent of the supervisors indicated that telecommuter=s work quantity increased on telecommuting days and 40 percent indicated that participant=s overall work performance increased on telecommuting days.
- There was no reported decrease in the overall effectiveness of the work unit because of telecommuting.
- Co-workers were supportive of the telecommuting program and the overall impact of telecommuting on the performance of the work unit was viewed as positive.
- Telecommuters reported positive reactions from co-workers and other employees to their participation in the program.
- The type of work found most conducive on telecommuting days was project analysis, reading and writing reports, data entry, receiving reports and paperwork, and software testing.

As a result of the demonstration, the District recommended that the Department adopt a policy that at a minimum would allow telecommuting at worksites impacted by mandated employee trip reduction programs. It was further suggested that telecommuting programs be

structured to maintain employee accountability, and that it be limited to situations where the supervisor is comfortable that the job tasks and the employees are suited (34).

WORKING AT HOMEPRIVATE SECTOR

First Interstate Bank

First Interstate Bank employs approximately 3,500 people in the Los Angeles area, including many in the downtown headquarters office. A telecommuting program was initiated in 1991. The objectives of the program focused on increasing worker productivity, while at the same time providing more flexibility for employees (35).

Employees must be with the bank for at least one year before they will be considered for the program. An employee submits a formal request to participate in the telecommuting program, as well as an equipment checklist. A signed agreement is used to ensure all parties understand the policies, procedures, and expectations of the telecommuting program. Most telecommuters work from home, although a few use telework centers. Some equipment is provided by the bank, and business-related telephone calls are reimbursed.

Response to the program has been positive for managers and telecommuters. Benefits noted by supervisors include increased productivity and less time off. Telecommuters reported fewer distractions and greater flexibility in balancing home and family responsibilities (35).

Georgia Power

Georgia Power, located in Atlanta, first implemented a pilot telecommuting program in 1992. The program was initiated primarily to assist with reducing peak hour commuting and related air pollution by company employees. During the pilot, 14 employees telecommuted from home. The benefits of the pilot program, which included savings of approximately \$100,000 in leased office space, resulted in an ongoing telecommuting program.

Currently, some 80 employees telecommute from home or work at a telecenter on a regular basis. Georgia Power does pay for the installation of a second telephone line at telecommuter=s homes. The company feels modest costs are offset by the benefits of reduced office space needs, sick leave use, parking requirements, and employee turnover (36).

Health Net

Health Net is one of the largest Health Maintenance Organizations (HMOs) in California, with some 1,700 employees. Interest in telecommuting at Health Net grew out of a concern relating to office space needed to accommodate additional staff. A pilot telecommuting program, which allowed selected staff from the customer service and claims processing departments to use the Antelope Valley Telebusiness Center, was initiated in 1993.

The pilot program started with 10 telecommuters sharing five work stations at the Center and two more departments. The success of the pilot program resulted in the addition of five workstations at the Center and two more departments. Health Net also installed additional computer equipment at the Center to provide enhanced links to the main office.

Based on the success of the initial efforts, the telecommuting program at Health Net continues to expand. The ability to work from home was added, and approximately 10 employees are currently telecommuting from home on one or more days a week. The use of the Antelope Valley Telebusiness Center has grown to 36 work stations. Benefits identified from the program include reduced overhead costs, improved productivity, enhanced employee retention, and better ability to respond to the 1994 Northridge earthquake and other natural disasters. Factors contributing to the success of the program include top management support including the Chief Executive Officer, and the active participation of supervisors (37).

IBM

IBM uses a number of different telecommuting programs in its offices throughout the United States and Canada. The telecommuting programs focus primarily on sales and service personnel, as well as administrative and management staff. IBM estimates that as many as 20,000 employees use some form of telecommuting on a regular basis (38).

The telecommuting programs at IBM were developed in response to multiple needs. These included enhancing customer sales and services, reducing real estate costs, increasing productivity, and responding to employee needs. Telecommuting options available to IBM employees include working at home, working Aon the road@ with customers, and working in a customer=s place of business. The time spent telecommuting and in an office varies among employees depending on the nature and requirements of the job. All telecommuters periodically visit their base office for meetings and other activities.

IBM reports positive results with the various telecommuting programs. Documented benefits include significant savings in real estate costs, increases in customer satisfaction, improvements in employee productivity, and enhanced abilities to attract new and retain existing workers. The support of top management has been noted as an important key to the success of the program (38).

Mobil Oil Corporation

Telecommuting at Mobil Oil Corporation in Dallas was initiated in 1994, with a 90-day pilot program in the Exploration and Producing Division. The pilot program involved five employees who telecommuted one or two days a week during the three-month test period. The success of this initial effort resulted in company support for telecommuting at the discretion of the individual operating divisions. Rather than a company-wide program, each division is responsible for determining if telecommuting is appropriate and for establishing specific guidelines and procedures.

The guidelines (39) developed during the pilot program continue to be used by the various departments with telecommuting programs. Most departments are organized into work teams, and the decision to allow telecommuting is left to the individual teams. The telecommuting guidelines used in the Exploration and Producing Division establish telecommuting as a cooperative arrangement among a supervisor, an employee, and the work group. Telecommuting is viewed as a management tool allowing flexibility in work options and is a voluntary agreement between a supervisor and an employee which can be terminated at any time. Jobs identified as suitable for telecommuting are characterized by clearly defined tasks and deliverables that can be measured. The telecommuter eligibility criteria focuses on employees who are responsible, self-motivated, results oriented, independent, effective communicators, adaptable, familiar and comfortable with job tasks and procedures, and committed to making telecommuting work.

A checklist is included to help rate employee and work characteristics for individual telecommuting requests. Telecommuters must have designated work space at home, and telecommuting is not to be used as a substitute for day care or other dependant care. Telecommuters must be accessible during agreed upon work schedules and must take all precautions to secure any proprietary information. The telecommuter is responsible for all equipment in the home, including providing a second telephone line if necessary. Mobil makes outdated computer equipment available to employees at no cost, so most telecommuters have computers at home. Mobil also provides appropriate software to link to the local area network (LAN) and an analog telephone line at the employee's on-site computer if needed.

Information on the experience with telecommuting at Mobil was obtained from an assessment of the 90-day pilot program conducted by the Exploration and Producing Division (40), interviews with management personnel, and surveys completed by two employees in the Oil and Gas Account Group. The following points highlight the experience with telecommuting at Mobil (3, 40).

- ! Overall, experience with telecommuting has been very positive. The results from the pilot program and current programs indicate that telecommuting is a feasible and effective work arrangement.
- Telecommuting has been transparent. This means customers, peers, and management perceive no differences in an employee working at home or in the office.
- ! The pilot program documented increases in productivity related to a number of performance targets. Experience since the initial test has supported the productivity of telecommuters.
- Telecommuters identified a number of benefits with the pilot program and subsequent efforts. These included reduced stress, increased job satisfaction, reduced travel time commuting to work, savings in gasoline and parking costs, enhanced independence and flexibility, and a greater feeling of accomplishment, responsibility, and trust.

- ! Both management and employees view telecommuting as a positive way of dealing with potential conflicts between work and family responsibilities. Telecommuting helps ease the strain and stress of trying to balance priorities at work and at home.
- • The two employees completing surveys identified travel time savings of 40 and 75 minutes on their normal one-way commute trips of 24 and 58 kilometers, respectively, on telecommuting days. No regular trips were reported on telecommuting days.
- ! Other potential benefits from telecommuting identified by both managers and employees were the enhanced ability to recruit new employees and retain existing staff, as well as show corporate and individual support for air quality and transportation concerns.
- • Keys to successful telecommuting identified by supervisors and employees included planning and flexibility. Telecommuters, supervisors, and the work group should all have a common understanding of the requirements of the program, the days that individuals will telecommute, and the mechanism for ensuring ongoing communication. Telecommuters need to be well organized to ensure they have the right materials and enough work on telecommute days. Telecommuters also need to be flexible in order to respond to meetings and other activities that may require them to be in the office on days they are scheduled to work at home.

Movo Media

Most of the private sector telecommuting program case studies focus on larger employers. Movo Media provides an example of how telecommuting is being used successfully to enhance the operation and productivity of a small company. Movo Media, located in West Hollywood, employs about 30 people in the entertainment and telecommunication business. Telecommuting was implemented at Movo Media in response to limited office space to accommodate a growing staff (41).

Employees frequently work at home one or two days a week and three employees telecommute from other cities in California and the east coast. Currently, telecommuting arrangements are made informally among employees and managers. More formal guidelines and policies are being developed, however.

Benefits realized to date from the program include greater flexibility and improved productivity for the employees, better balancing of professional and personal needs, enhanced ability to recruit employees, and improved ability to address office space needs and costs. For example, the company estimates that it has saved approximately \$30,000 per year in reduced overhead expenses through the telecommuting efforts (41).

Paddock Swimming Pool Company

Paddock Swimming Pool Company is a small business specializing in building pools for commercial water parks located in Rockville, Maryland. In 1993, the Chief Executive Officer (CEO) began working from home on a part-time basis. Based on the success of his initial trial, the CEO continued to work from home one or two days per week, and has extended the same option to most of the firm's 50 headquarter employees. Currently, between 8 and 16 employees may telecommute once or twice a week.

The telecommuting program has allowed the firm to keep valued employees, to enhance productivity through reduced time spent commuting, and to improve employee morale. For example, a key employee recently married and relocated a longer distance away from the main headquarters. The individual is now telecommuting two days a week, allowing the company to retain a valued employee for an investment of \$150 for a high-speed modem connection (42).

TRW

TRW uses various forms of telecommuting throughout its international offices and plants, including the Company's Information and Services Division, located in the City of Orange, California. This Division, which has approximately 1,000 employees, has been using telecommuting for a number of years to enhance interaction with customers and to provide better service to clients.

The telecommuting program is governed by a series of guidelines, which identify the responsibilities of all groups and establish the ground rules for participation in the program. One of the issues for TRW, which does a good deal of defense and aerospace work, was the security of information and access for telecommuters. To address these concerns, TRW provided enhanced local area network (LAN) connections for telecommuter's homes and built in security access for persons linking in from home (43).

The telecommuting program at TRW has been well received by staff and management. Benefits noted to date include reducing stressful work levels for employees, which has enhanced productivity, and reducing commuter trips and related emissions and air pollution (43).

UNISYS Corporation

The Mission Viejo, California, Office of UNISYS has had a telecommuting program since 1991. The telecommuting program focuses primarily on the software engineering group within the 1,000 employee office. Formal policies and guidelines govern the program, and all managers and telecommuters go through a training and orientation process. Most telecommuters work at home between one and three days a week.

Although the telecommuting program was developed partly in response to air quality regulations, the ability to attract and retain skilled software engineers was also a driving force. The program has accomplished both of these objectives. Reduced commute trips by company employees has helped address air quality concerns, and many employees from the closed Pasadena Office remained with UNISYS based on the ability to telecommute (44).

United Airlines

United Airlines uses a number of telecommuting approaches in its offices throughout the country. These include working at home, working at telework centers, and the use of Avirtual offices.@ In 1992, the Airlines Information Services Department in Los Angeles implemented a telecommuting program partially in response to trip-reduction requirements. The program has been expanded to include the use of the Moreno Valley Telework Center, as well as allowing account executives to work primarily on the road or with their major customers (45).

Formal guidelines govern the telecommuting program at United Airlines. Employees interested in participating in the program complete an initial survey. An agreement is developed and signed by the employee and their supervisor. Telecommuters complete work plans prior to their telecommuting days and a list of accomplishments the day after. Most employees using the telework center do so on a full-time basis. The account executives, who are provided with laptop computers and cellular telephone, spend most of their time in client=s offices.

Benefits documented to date include an approximate 30 percent increase in productivity during the first year of the program. Using the telework center has reduced employee commute trips by some 6,400 daily kilometers. Improved employee morale and enhanced customer service has also been noted (45).

SATELLITE TELEWORK CENTERS

Hawaii Telework Center

A combination of public and private sector groups sponsor the Hawaii Telework Center Demonstrations Project. The project involves employees from the Bank of Hawaii, IBM Corporation, Inter-Island Legal Services, Hawaii Medical Services Association, and Title Guarantee of Hawaii, as well as a number of state employees. The telework facility is located in the suburb of Mililani, Oahu, approximately 32 kilometers from downtown Honolulu. The companies lease office space and provide computer equipment, telecommunications services, and other related equipment. The Hawaii State Legislature provided \$125,000 to help initiate the project. Employees report reductions in trips, travel time and fuel consumption and an increase in productivity and job satisfaction (5).

Los Angeles Telework Centers

A number of telework centers are in operation in the Los Angeles Metropolitan area. These centers have been developed by a variety of federal, state, and local groups. Examples of the implementation and operation of telework centers in the Los Angeles area are highlighted here.

In response to the Northridge Earthquake in 1994, the GSA established three telework centers for federal employees. The development of these centers, which were located in Valencia, Westlake, and Sherman Oaks, was funded through special authority of the Federal Buildings Fund. The centers were well utilized during the aftermath of the earthquake. Occupancy rates ranged from 87 percent at the Valencia center to 34 percent at the Sherman Oaks facility. Use levels dropped off as the transportation system in the area returned to normal. As a result, the Sherman Oaks and Westlake Centers were closed at the end of 1994 (8).

After the earthquake, the California Department of Transportation (Caltrans), local communities, and other groups also began developing telework centers. Currently, at least six telework centers are in operation in the Los Angeles area, and additional facilities are being planned. Telecenters are also in operation in the San Diego and San Francisco areas.

The Metro Blue Line TeleVillage is one of the newest telework centers in the Los Angeles area. The TeleVillage, which was developed by the Metropolitan Transportation Authority (MTA), is located at the Compton Transit Center adjacent to the Metro Blue LRT Line. The TeleVillage is a state-of-the-art community center that provides space for telecommuters, as well as access to computers, distance education, video conferencing, and other services to local residents. The facility is being operated by a non-profit community development corporation (46).

Minnesota Department of Transportation Cambridge Telecenter

The Minnesota Department of Transportation (Mn/DOT) developed the Cambridge Telecommunications Center, which opened in the Fall of 1996. Cambridge is located approximately 45 miles north of the Minneapolis-St. Paul Metropolitan area. A number of Mn/DOT employees, as well as personnel from other state agencies, live in the Cambridge area and commute on a daily basis into the Twin Cities. The Mn/DOT Cambridge Telecommunications Center was established to reduce commute trips, with accompanying reduction in energy consumption and accidents, to improve employee performance and satisfaction, and to enhance the economy and human capital of the Cambridge area (10).

Currently, approximately 20 Mn/DOT employees work in the Center once or twice a week, rather than commuting into the Twin Cities. Under Mn/DOT sponsorship, an evaluation of the Center is being conducted by the Center for Transportation Studies (CTS) at the University of Minnesota. U. S. West is also co-funding the evaluation. The evaluation was initiated in October, 1996. Components of the evaluation include surveying employees, supervisors, and local businesses in Cambridge; examining community tax, fee, and site cost records; assessing

Based on surveys of workers using the telecenters, telecommuters save an estimated 6,000 miles of travel annually by using the centers one or two days a week. The corresponding time savings for a telecommuter is some 160 hours a year and \$500 a year in transportation costs.

- Although benefits to the federal agencies were not examined in detail, anticipated advantages included maintaining or enhancing worker productivity, and improved customer services.
- No agencies reported office space reconfigurations or cost savings from the initial use of the satellite centers, due to the small number of participants.

The more detailed analysis of the telecommuting centers being completed by GSA is exploring many more factors related to their use, the benefits to telecommuters and employers, and the elements that seem to influence the success of a facility.