

Perspectives on Successful Telework Initiatives

Final Report

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16. ABSTRACT The concept of telework was introduced in the 1970's as a way to substitute telecommunications technology for the commute to work (Nilles 1998). Telework promised many environmental, family, employee, and business benefits. With continued advances in information and communication technology, there were great expectations for the growth of telework and its benefits. While the practice of telework has grown, in many respects the high expectations have not been fulfilled. We believe there is value in reexamining telework in order to more proactively take advantage of the beneficial impacts telework might be able to provide to businesses and citizens. The purpose of this research is to develop new perspectives on successful, long-term telework initiatives at organizations in order to better understand <ul style="list-style-type: none"> ➤ How and why initiatives mature, ➤ How organizations view telework initiative benefits, and ➤ The implications for supporting telework in the future. We conducted research about telework in three areas: telework and the changing nature of work, telework in organizations, and telework and transportation. We used a combination of research methods including secondary research, analysis of successful telework initiatives at three organizations (involving 31 interviews with coordinators, managers and teleworkers), and interviews with key informants.			
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Executive Summary

The concept of telework¹ was introduced in the 1970's as a way to substitute telecommunications technology for the commute to work (Nilles 1998). Telework promised many environmental, family, employee, and business benefits. With continued advances in information and communication technology, there were great expectations for the growth of telework and its benefits. While the practice of telework has grown, in many respects the high expectations have not been fulfilled.

We believe there is value in reexamining telework in order to more proactively take advantage of the beneficial impacts telework might be able to provide to businesses and citizens. The purpose of this research is to develop new perspectives on successful, long-term telework initiatives at organizations in order to better understand

- How and why initiatives mature,
- How organizations view telework initiative benefits, and
- The implications for supporting telework in the future.

We conducted research about telework in three areas: telework and the changing nature of work, telework in organizations, and telework and transportation. We used a combination of research methods including secondary research, analysis of successful telework initiatives at three organizations (involving 31 interviews with coordinators, managers and teleworkers), and interviews with key informants.

Changing Nature of Work

The changing nature of work provides a context for how telework will evolve and be applied in the future. In fact it will become increasingly difficult to differentiate telework from a variety of other developments and innovations that will change how business is conducted and work is carried out (European Commission 1999). Some of the trends shaping the changing nature of work include changes in workforce demographics, markets, and technologies. These trends are changing occupations, the content of work, work settings, and the relation of work to other aspects of daily life.

Efforts to encourage and support telework must recognize and understand this broader context for telework. Fundamentally, this affects both how one views the motivations and benefits of telework as well as the scope of telework initiatives. The motivations and benefits of telework need to be viewed in the context of *improving work processes* that create best practice organizations. Simply cutting costs, having satisfied employees, or meeting travel reduction goals are very limited perspectives that limit the potential of telework. The scope of telework needs to integrate these issues in a way that results in

¹ We use the term telework to include telecommuting and any other use of telecommunications to perform ones job at locations remote to the traditional work site. Telecommuting is the substitution of telecommunications for the commute from home to the traditional work site.

improved work processes and best practice organizations. Those in the telework community cannot limit telework to a narrow definition that views the benefits of telework in the context of traditional ways of working.

Telework in Organizations

Successful telework involves *organizational change*. Changing the way employees do work is a long-term change process. Telework is one aspect of creating more effective work processes and best practice organizations. Successful telework initiatives make a commitment to creating organizational change through visible upper management support and linking the initiative to the organization business strategy. They plan for creating organizational change in an integrated way by accounting for technology, human resource, cultural, and facilities issues. They allow for the evolution and growth of telework by adapting to changes in technology, providing ongoing support, training, and outreach, and planning for expansion. Performance is measured both to demonstrate program success and to make improvements. As telework becomes institutionalized, the difference between teleworkers and conventional workers begins to disappear. In the long-term, these organizations become more competitive, best practice organizations.

Most organizations identify employee benefits (employee retention and satisfaction) and cost savings (primarily from space reductions) as the primary benefits of telework. However, perhaps the most compelling benefit of telework is how it can contribute to the evolution of a competitive, best practice organization. In this context the "savings" from implementing a telework initiative are really not relevant. Comparing telework to the old way of doing business is really the wrong measure. The key question is whether your organization measures up against the best in the business. Can your organization compete in terms of measures like cost per employee? Perhaps this broader view of the benefits of telework needs to be developed before telework becomes more common.

A Topology of Telework in Organizations

We propose the following four categories as a way of comparing and characterizing the application and evolution of telework in organizations. The categories are based primarily on the motivation for telework. While the application of telework in an organization may incorporate elements of different categories, at any point in time we believe that a telework initiative will predominately reflect the characteristics of one of these categories.

- *Stewardship Focus*: Organizations with successful telework initiatives in this category view environmental stewardship or "green" image as an important business consideration. The telework initiative is often part of a commute trip reduction program or of an effort to improve air quality by reducing travel.
- *Employee Focus*: Organizations with successful telework initiatives in this category have a culture that highly values employees. Developing and enhancing the employee resource is central to the business strategy of the organization. Telework is often part of a flexible work program that includes compressed workweeks and flextime.

- *Cost Focus:* Organizations with successful telework initiatives in this category tend to be driven by the business needs to reduce overhead costs and improve customer service. Telework is part of a significant organization work transformation initiative.
- *Work Focus:* Organizations with successful telework initiatives in this category are responding to opportunities to improve the way work is done in order to meet important business goals. Telework is part of an effort to improve work processes by using integrated workplace strategies.

Telework is undergoing an evolution. Early programs tended to focus on commute trip reduction and on employee benefits and employee retention. The next generation of programs focused on work transformation and took a more integrated approach to generate significant cost savings and improved customer service. We believe the evolution will continue towards programs that focus on opportunities to improve work processes that lead to more competitive, best practice organizations. For these organizations, telework becomes transparent - it is just how they do business. Many successful initiatives that began in former categories will ultimately evolve to the later category as telework becomes institutionalized. Younger companies, by the nature of their work and their cultures will start in the work focus category. We believe the driver for this evolution will come from employees that embrace the opportunities for working differently and drive continued innovation. Employee support functions will respond to this employee demand and help to institutionalize the changes in work processes across the organization.

Telework and Travel

Early interest in telework was generated from the idea that telecommunications could be substituted for the commute to work. Many early evaluations of telework programs showed net travel reduction benefits from telework. However, the scope of these research studies was limited and "it is certain that the long-term, system-wide effects of telecommuting will be less positive than is suggested by the results from the short-term, small-scale studies conducted to date" (Mokhtarian 1999).

We believe three important trends are relevant when considering the transportation benefits from telework.

- Changing travel patterns and increases in travel and congestion.
- Changing work trends towards more flexible and decentralized forms of work..
- Changes in telework towards more flexible, informal patterns.

These trends suggest viewing the transportation benefits from telework more from the perspective of modification (altering the time, mode, destination, or route of a trip) rather than substitution.

Telework enhances flexibility, dispersion and mobility. The travel implications of telework need to be understood in this context. Views of telework as a substitution for travel to the

office are limited and as telework evolves are becoming less pertinent. We believe that telework has a much greater potential to provide transportation benefits as a transportation demand management strategy rather than a travel reduction strategy.

Individuals and organizations that are telework capable have some flexibility in terms of how and when they make work-related trips. This flexibility increases with their capability to telework and do work from a location remote from the main office. This means that work-related travel can be conducted at different times of the day to avoid congestion, or travel can be avoided on certain days when major events may cause congestion, when emergencies may limit travel, or when air quality is especially poor. Clearly, research is needed to better understand the travel implications and potential benefits from growth in telework, but we believe efforts to encourage and promote telework need to better recognize the travel flexibility benefits it offers.

Implications for Telework Initiative Support

This research has attempted to raise a variety of issues related to successful telework initiatives and to how telework will evolve in the future. We offer the following recommendations for organizations that promote, encourage, and support the development of telework initiatives.

1. View telework in the context of changing and improving work processes. Efforts to develop telework must strive to and be seen in the context of efforts to improve work processes.
2. Strive to create organizational change. Resources and tools need to be provided that help create organizational change over the long-term.
3. Recognize telework as an effective transportation demand management tool. Those promoting and encouraging telework as a transportation solution need to demonstrate how the targeted use of telework can be used to improve the efficiency of the transportation system and benefit organizations and individuals through more effective use of their travel time.

Public Sector Roles

Public sector organizations were some of the earliest promoters of telework programs, largely as a way to provide travel-related social benefits. These public sector organizations have provided telework information and education, and have conducted demonstration programs. Given the current level of awareness about telework and the emergence of new private businesses offering telework-related services, we believe there are some important roles the public sector needs to consider to more proactively support the development of telework.

1. **Public Policy:** What public policy is necessary to support the application of telework in ways that meet important social goals?
2. **Public Sector Telework Initiatives:** Public sector organizations can work to lay the groundwork for telework in government organizations.

3. **Social/Economic Benefits:** The public sector must ask how telework can be used to respond to social and economic needs and develop the political support and resources to proactively take advantage of the potential benefits telework offers. We suggest some of the following social needs as areas where telework can provide some solutions: rural economic development, traffic congestion, urban planning, and small business development.
4. **Research:** Research provides the basis for proactively applying telework to meet social needs. Research needs to be conducted on the implications of growth in telework on transportation, how work is done, and on how business is conducted.

We believe the public sector plays a critical role in encouraging the application of telework in a way that provides social benefits. Telework will continue to grow and evolve, even without public sector action. However, only through proactive action and collaboration will we be able to fully take advantage of the social benefits telework can provide.

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Introduction

The concept of **telework**² (in the form of telecommuting) was introduced in the 1970's as a way to substitute telecommunications technology for the commute to work (Nilles 1998). Telework promised many environmental, personal and family, employee, and business benefits. With continued advances in information and communication technology, there were great expectations for the growth of telework and the benefits it could provide. While the practice of telework has increased, in many respects the high expectations have not been fulfilled (see Background Section). We believe there is value in reexamining telework in order to more proactively take advantage of the beneficial impacts telework might be able to provide to businesses and citizens. A quote from the recent Status Report on European Telework illustrates this.

Telework continues to very rapidly develop as a normal way of working in Europe. By becoming a mainstream practice, it is now even more urgent for European governments, enterprises and individuals to recognize and respond to the impact that freedom from the constraints of time and place on work and a change in working culture is having on our economy and society, as well as on working and private lives. It is important that we make every effort to better understand where these developments are taking us, and where we wish ourselves to go, in order to exploit the new opportunities for ensuring great competitiveness at the same time we improve the quality of working lives (European Commission 1999).

The purpose of this research is to develop new perspectives on successful, long-term telework initiatives at organizations in Washington State and other regions of the country to better understand

- How and why initiatives mature,
- How organizations view telework initiative benefits, and
- The implications for supporting telework in the future.

The research takes a long-term focus with an emphasis on why some programs grow and flourish while many programs languish and do not grow. Its goal is to help provide a broader context for viewing and understanding the factors that contribute to successful telework initiatives and the impacts of those initiatives. The results of this research will be used to provide information and knowledge that supports the continued development of a telework outreach program that increases the application of telework in Washington State and nationwide.

This is a multi-phase research effort. The first phase completed in November of 1997 explored telework program characteristics and impacts at the organizational and

² We use the term telework to include telecommuting and any other use of telecommunications to perform ones job at locations remote to the traditional work site. Telecommuting is the substitution of telecommunications for the commute from home to the office.

teleworker levels. This research suggested taking a closer look at the context for telework and developing a deeper understanding of the nature and benefits of successful telework programs. It identified telework issues and helped establish the three areas of research for this second phase of research. This current research phase used primary and secondary research approaches to examine the relation between telework and the changing nature of work, telework and organizations, and telework and travel. This report summarizes the results of the second research phase. This research project was funded by a January 1997 ISTEA Grant to research the long-term impacts of telework programs.

In the remainder of this section we provide some background for this research effort and describe our approach. In the remaining sections of the report, we discuss our findings regarding the three areas of research (telework and the changing nature of work, telework and organizations, and telework and travel). We conclude with recommendations for efforts intended to support the development of successful, long-term telework initiatives.

Background

This research is motivated by the belief that we need to reexamine the way we view telework programs. This belief is based on

- Research following the Puget Sound Telecommuting Demonstration that showed that many telework initiatives languish or fail, and
- Technological, social, and market factors changing the nature of how work is conducted.

From 1990 through 1992 the Washington State Energy Office (currently the Washington State University Energy Program) conducted the Puget Sound Telecommuting Demonstration to research and evaluate the environmental, organizational, and personal impacts of telecommuting on public and private sector organizations in the Puget Sound Region. The Demonstration produced a wealth of information that indicated telecommuting reduced the number and length of vehicle trips.

In 1994, an informal follow up survey was conducted of 17 of the 21 organizations that participated in the Demonstration (Kunkle and Lagerberg 1994). For the most part, the telecommuting program characteristics at the organizations remained as they were during the Demonstration. Seven of the 17 respondents to the survey indicated they had a formal telecommuting program, eight said they had an informal program and two said they had no program. Of the formal programs, several appeared inactive, while several of the informal programs seemed active. None of the organizations had direct knowledge of the number of Demonstration telecommuters at their organizations that were still telecommuting, but estimates suggested that about half still were. It appeared that the telecommuting programs had grown at only two of the organizations.

More recently (Gilmore Research 1997), the Commuter Challenge completed a survey of 111 organizations in the Puget Sound and Spokane regions of Washington State to better understand why alternative work arrangements including telework programs that are

initially promising within an organization do not grow or may even languish. A secondary objective of this research was to gain understanding that will give direction to communications aimed at increasing participation within organizations. Note that the survey included most of the private organizations involved in the Puget Sound Telecommuting Demonstration as well as large organizations considered to have successful programs, organizations with new programs, and organizations who had either begun or looked into beginning programs.

The results of the survey suggest the organizations are taking a laissez-faire approach toward telework. Telework is generically viewed as an employee benefit rather than a business improvement. As a result, the organizations do not tend to actively support it. Any goals are expressed in soft terms, results are not measured, and a significant portion of organizations did not know the number of teleworkers within their organization. However, these organizations believe their telework programs are successful.

Results from the Commute Trip Reduction Program that affects major employers in Washington State indicate that telecommuting accounts for less than 1 percent of the all commute trips for these organizations (CTR 2000). This compares to other metropolitan regions of the country where telecommuting accounts for 5 to 10 percent of the commute trips (Kunkle and Lagerberg 1994).

A recent survey of 450 businesses in Washington State (Sundel Research 1999) indicated that one-third have some type of telework program. The largest portion of teleworkers were mobile workers (such as sales staff)/business travelers and after hours workers (those that work at home after working a full eight hour day at the office). However only about 2 percent of employees at the businesses surveyed participated in telework. About 17 percent of the businesses reported that more than 10 percent of their employees participate in telework.

Meanwhile, traffic congestion in the Puget Sound region is some of the worst in the country. The most recent traffic congestion survey conducted by the Texas Transportation Institute (Schrank and Lomax 1999) shows that the Seattle area now shares the distinction of having the second worst traffic congestion (in terms of travel rate index) in the country. Los Angeles is first and the San Francisco-Oakland area is third.

On the surface, these findings may be disappointing. However, we believe the region has a great deal of untapped potential for telework. Reasons include relatively high congestion levels on major transportation corridors, robust economic growth, urban and suburban sprawl, progressive high tech industries, and an environmentally and socially progressive population. In the recent (November 1999) city council elections in Seattle, two of the key election issues were traffic congestion and affordable housing. Telework can potentially contribute to the solution to both of these problems.

Approach

This was a multi-phase research effort. The first phase was designed to test the broader scope of the research effort. In the first part of the research we developed a survey instrument and conducted interviews with contacts at seven organizations and with eight teleworkers and four managers at four organizations. A summary report was produced that helped establish the direction for this additional research effort.

To reexamine the context for telework, we conducted research about telework in three areas.

1. Telework and the changing nature of work. How does the changing nature of work influence the nature of telework and how telework will be applied in the future? Does this differ from historical views of telework?
2. Telework in organizations. How do organizations or departments with a significant proportion of teleworkers incorporate telework into their organization or department culture? Does the application of telework in these organizations or units differ from a more typical telework program with a small number of part-time teleworkers?
3. Telework and transportation. How does growth in telework impact transportation? Do the travel patterns of a long-term teleworker differ from a more traditional teleworker who occasionally works from home and avoids the commute to work?

This was a qualitative research project. We used the following approaches in our research.

1. Conducted secondary research of the growing body of literature on the changing nature of work.
2. Collected and analyzed over 30 recent case studies on telework initiatives at organizations.
3. Performed an analysis of successful telework initiatives at three organizations. We conducted 31 interviews with key contacts and program coordinators, upper management, managers of teleworkers, and teleworkers at these organizations. In addition we conducted three interviews with key contacts at three organizations, but were unable to conduct additional interviews in those organizations.
4. Conducted key informant interviews with 6 individuals regarding successful telework initiatives and future implications of changes in telework. These key informants have many years of experience working with organizations implementing telework programs.
5. Conducted secondary research on recent work and ideas on the travel benefits and impacts of telework. This was supplemented by the interviews with teleworkers regarding their travel and input from the key informants.

The fundamental questions addressed by the research included:

- How does the changing nature of work provide a context for telework?
- What are the characteristics of successful, long-term telework initiatives?
- What are the long-term organizational benefits of telework?
- What are the factors contributing to the growth of telework initiatives?
- What are the trends influencing the future evolution of telework?
- What are the transportation implications from growth in telework?

We discuss our findings in the remaining sections of the report.

Changing Nature of Work

Much has been said about the transition from the industrial to the information age and the transformation to a knowledge-based society. Peter Drucker asserts:

Every few hundred years in Western history there occurs a sharp transformation. Within a few short decades, society rearranges itself—its world view; its basic values; its social and political structure; its arts; its key institutions. Fifty years later, there is a new world. And the people born then cannot even imagine the world in which their grandparents lived and into which their own parents were born. We are currently living through just such a transformation (Drucker 1993).

It is not the intent of this research to consider the magnitude of this transformation or to suggest its extent. However, we do believe these changes have a significant influence and continue to influence how work is done. Fundamentally, this changing nature of work provides a context for how telework will evolve and be applied in the future. In fact it will become increasingly difficult to differentiate telework from a variety of other developments and innovations that will change how business is conducted and work is carried out (European Commission 1999). In this section we consider what the changing nature of work means, why it is happening, how it is happening, and implications for the practice of telework.

What does the changing nature of work mean?

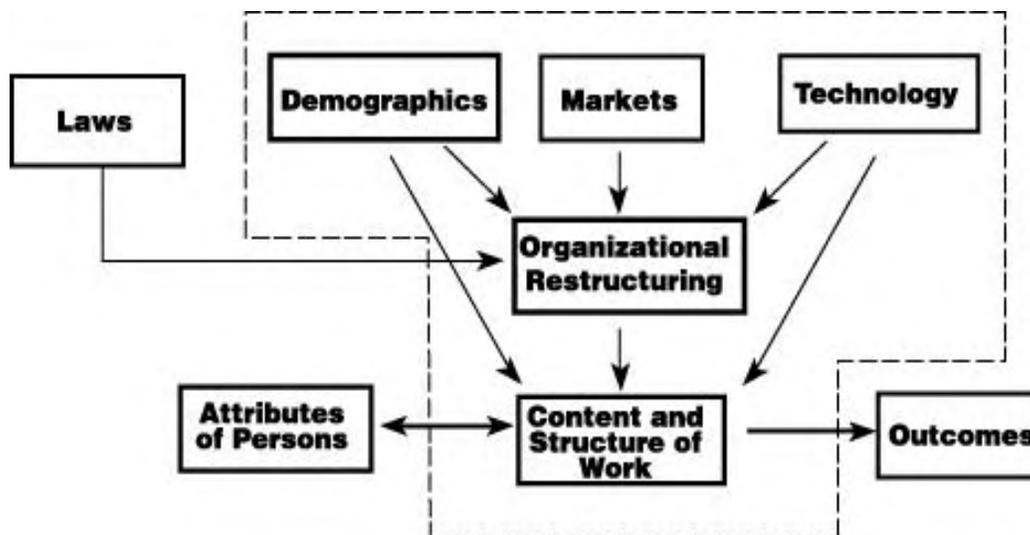
There has been a significant shift in the last fifty years from blue-collar to professional and white-collar workers. Within this shift there has been growth in professional and knowledge based workers and a decline in managerial and administrative staff (Robertson 1999). Within five years, almost half of all workers will be employed by industries that produce or are intensive users of information technology (DOL 1999). Clearly, the nature of work is changing. How should one look at the changing nature of work?

When speaking of the nature of work, one can consider four related aspects (National Research Council 1999).

- Occupations: The primary lines of work that characterize a society at a particular point in time.
- Content of Work: How people do their work - the techniques, technologies and skills they employ.
- Context for Work: The organizational, social and institutional contexts in which work takes place.
- Relation of Work to Other Aspects of Daily Life: The way work affects standards of living, community life, social status, and family life.

In its research on the changing nature of work, the National Research Council provides a conceptual framework for examining how and why work is changing (see Figure 1). Figure 1 identifies the external factors affecting work and how it is changing (law, demographics, markets, and technology). However, these external factors do not determine the nature of work, but must operate through the strategies, structures, and processes of organizations that employ workers. Thus these external forces working through and with organizations are what ultimately shape the nature of work (content and structure of work). In this report we focus on those factors within the dotted lines in Figure 1 as the most relevant for our research.

Figure 1. Framework for Conceptualizing the Changing Nature of Work



Why is the nature of work changing?

In this section, we consider the factors shaping the changing nature of work noted in Figure 1. These factors act through organizations, so it is also appropriate to look at changes in organizations. These four areas (demographics, markets, technology, and organizations) of change are consistent with the four key external changes identified in Ken Robertson's book, *Work Transformation* (Robertson 1999).

Changing Workforce Demographics

The changing demographics of the workforce include:

- The growing presence of woman in the workforce. In particular, there are a growing number of mothers in the labor market. The percentage of married women with children under 6 in the workforce in the United States grew from 18.6% in 1960 to 62.7% in 1996 (Robertson 1999). Today, nearly three out of four women with children are in the workforce (DOL 1999).

- The increasing number of dual-income families. The percentage of families in which both spouses worked increased from 17% in 1961 to 57% by 1980 and 66% by 1998 (U.S. Census Bureau 1999a).
- The increasing diversity in the workforce. The share of minorities in the U.S population is expected to increase from 28% today to 36% by 2020 and 47% in 2050 (U.S. Census Bureau 1999b).
- The increasing level of educational attainment. The fraction of the workforce with less than a high school diploma declined sharply from 1970 to 1995, while the fraction with some college has increased (National Research Council 1999). Seventy percent of young women and 64% of young men are enrolling in college (DOL 1999).
- The aging of the workforce. The population in general is aging and this is reflected in the age of the workforce.

Changing Markets

The global economy along with deregulation (both domestically and internationally) have created changes in product (and service) markets and increased market competition. This has resulted in (1) pressure to decrease prices (including labor and other production costs); and (2) pressure to compete in terms of speed, innovation, variety, and customization (National Research Council 1999).

Two changes in financial markets should also be considered. Increased focus by American companies on shareholder interests have impacted organizational downsizing, restructuring, and management focus, all of which affect the nature of work. Increasing volatility in international capital flows creates added uncertainty that may impact managerial decision-making (National Research Council 1999).

Changing Technology

Technology is a means by which humans transform resources into outputs. Advances in technology are often identified as the key factors influencing changes in the nature of work. Some would argue "that current changes in the nature of work driven by the multiple uses of digital technology (digitization) are symptomatic of a third industrial revolution (National Research Council 1999). The technologies contributing to this transformation include microelectronics, robotics, computer integrated manufacturing, artificial intelligence, electronic data exchange, micro-computers, network computing, and digital telecommunications. Unprecedented growth in the Internet and Internet and telecommunication applications (e-mail, voice-mail, teleconferencing, wireless voice and data, remote access) have impacted how work is done and business is conducted.

Changes in technology generally have three effects on work and occupations.

1. It creates new occupations and reduces or eliminates some existing occupations.
2. It increases the skills required in some jobs and decreases the skills required in others.

3. It changes the nature of skills required.

Change in Organizations

The forces noted above affect organization strategies, structures, and processes. Changes within organizations also influence the nature of work. Two significant changes are downsizing and the trend toward flatter organization structures.

Significant downsizing in the late 1980's and early 1990's was in response to market forces that demanded dramatic cost reduction. More recently, downsizing has tended to be more strategic and targeted and many firms are hiring at the same time they are laying staff off. White-collar and management jobs were the most affected by this downsizing, with the biggest negative effect on middle management. In contrast knowledge-based workers such as technical and professional positions grew.

Organizations are also experiencing flatter hierarchies. This is in part due to the elimination of many jobs from organizations, particularly management and clerical positions. With the decline in traditional management positions and roles has come an increase in team-based work structures. This shift from individualized work structures to teams shifts authority from management to teams and blurs the boundaries between job categories.

How is the nature of work changing?

"Today many organizations, including AT & T and IBM, are pioneering the alternative workplace - the combination of nontraditional work practices, settings, and locations that is beginning to supplement traditional offices" (Apgar 1998). To examine how the nature of office work is changing, we consider both the evolving nature of the office (work settings) and various alternative work arrangements and strategies.

"The office is a particular conception of how to convene workers in space and time" (WorkSmart 1996). The evolution of office spaces tends to be a mix of previous experience and models. The following ten workplace models describe offices observed in organizations today (WorkSmart 1996).

1. **Fixed Offices and the Bullpen:** This industrial arrangement for office work consists of a sea of desks or bullpen easily visible to supervisors who work in nearby fixed, private offices.
2. **Integrated Systems Furniture:** This office arrangement represents the "cubicles" that emerged in the 1970's and 1980's and are common in many offices today. This office arrangement is a response to producing more flexible and egalitarian office arrangements that more easily adapt to the flow of information and communication.
3. **Universal Plan:** This is a variation on the "cubicle" arrangement that standardizes several different sizes of offices (rather than having a large mix of arrangements) to

- reduce the need to reconfigure spaces when units and departments change. This tends to diminish distinctions between ranks in terms of office size.
4. Home-Based Telework: Home-based office settings that incorporate computer and telecommunications technology to allow a full range of work to be conducted.
 5. Telework Centers: Neighborhood and community based centers that provide office settings and access to technology for employees living near the centers.
 6. Non-territorial Offices: Offices in which employees are not permanently assigned to a workspace. This type of office is often aimed at field and sales staff that conduct much of their work remote to the main office. The concept of "hoteling" is a form of a non-territorial office.
 7. Found Alternative Workplaces: These workplaces represent the "found" work settings used by employees that conduct much of their work remote from the main office. These spaces are not designed for work and may include automobiles, hotel lobbies, clubs, restaurants, hotel rooms, etc.
 8. Designed Alternative Workplaces: These are settings that have not been historically used as workplaces, but that recently have been designed to accommodate work. Examples include office clubs, hotel rooms, and businesses such as Kinko's.
 9. Team Offices: These workspaces are designed to accommodate cross-functional teams by shifting from the creation of individual workspaces to creating a range of personal and teamwork settings to accommodate a variety of privacy, communication, and work needs.
 10. Integrated Workplace Strategies: This is an integration of the previous workplace models in a strategic manner that offers a full range of workplace settings to achieve new ways of working and optimum workplace performance.

Although the first several office models on this list are still common today, the nature of work settings and arrangements will continue to evolve and incorporate a greater mix of non-traditional models. These different work settings are being integrated in new ways, such as the "virtual office" in which workers and managers in different locations are brought together into work units through telecommunications.

Related to the work space models noted above are a variety of alternative work arrangements (AWA) that are being applied by many organizations and that illustrate how employees are doing their work differently.

- Flextime: Employees work around certain core hours, but have some flexibility in terms of when they start and end work and the hours they work.
- Compressed Workweeks: Employees work longer hours each day while working fewer days per week (i.e. they work 4 x 10 hour days or 9 x 9 hours/days).
- Regular Part-Time: Employees scheduled to work less than a regular 35 to 40 hour workweek.

- Job Sharing: Two employees with similar skills share a single job.
- Temporary, Project-Based Workers: These workers include independent contractors, on-call workers, and temporary-help agency workers.
- Telework: Employees perform a portion (or the majority) of their job from a remote location, often their own home or a telework center. Telework can include employees who work remotely on occasion, on a regular schedule, or full-time. It can also include mobile workers that work from multiple locations, often spread across some geographic distance.

A recent survey of senior executives, human resource managers, workers, and managers indicated that 91% of companies use some form of “boundaryless” workers (Ceridan Employer Services 1999). The boundaryless workforce was defined as work arrangements that included telecommuting (35%), virtual teams (42%), flexible time and pay plans (66%), and temporary, project-based professionals (67%). Roughly one in ten workers fit into this later category of project-based professionals (DOL 1999).

These different work settings and alternative work arrangements impact how work is performed and how workers interact with co-workers, clients, and peers. Table 1 illustrates the changing context of work. The table suggests that the future context of work will be much more flexible and adaptable than past more static models.

Table 1. The Changing Context of Work (Russell 1998)

The Changing Context of Work			
	Past	Present	Future
Work Focus	Individual	Teams	Project Dependent
Workspace Reflects	Status	Work Process	Options for Change
Office Reflects	Strength/Image	Culture/Image	Values/Image
Space Allocation	Status	Function and Status	Function Only
Balancing Privacy	Scheduled Interaction	Scheduled Privacy	Continuum of Options
Rate of Change	Static Organization	Continuous Change	Continuous Change
Market Focus	Static/Inward	Globalization	Boundless
Technology	Ancillary	Integral	Fully Integrated
Socialization	Negative View	Encouraged	Value Achieved
Work/Life	9 to 5	8 to 8	Time/Place Flexibility
Career Path	One career, one company	Evolving Career, one company	Multiple Careers, Multiple Companies

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Implications for Telework

When we consider the application of telework, we must fundamentally understand the nature of work and how it is changing. Telework is about doing work. To understand the application of telework, we must understand the occupations, content, context and relations of work and the forces that are shaping the nature of work. Otherwise, we are likely to apply telework to outmoded ways of doing work, outmoded classifications of work, and outmoded contexts for work. Only by considering how work is changing can we understand how telework might be applied in the future and how it will provide important business and social benefits.

Advocates of telework have identified many of the factors influencing the changing nature of work noted in this section as trends that favor the application of telework.

- **Demographic Changes:** Changes such as more women in the workforce and dual income families suggest the need for more flexibility in work arrangements to allow employees to manage complex and competing needs in their lives. A more diverse workforce creates needs for effective communication tools, new cultures of management, and methods of education that enhance equity. The aging workforce creates a need for work arrangements that allow employees with life changing illnesses, disabilities, or care needs to continue to work. Clearly telework can provide solutions to many of these needs. However, telework can also have negative implications by allowing work to intrude further into personal lives and as a way to segregate and isolate certain classes of workers. Attention must be given to developing the application of telework in a proactive way in order to provide positive solutions to the changing needs of the workforce.
- **Market Changes:** Increasing global competition is causing organizations to reengineer their business processes to reduce costs, improve product and service quality, reduce development cycle times, and increase flexibility. Market changes can result in positive organization changes, but they can also introduce a great deal of uncertainty that can act as a constraint on innovations such as telework. Large scale downsizing, ongoing reorganizations, and short-term management horizons make it difficult to make the long-term strategic decisions necessary to support the organization change necessary for telework.
- **Technology Changes:** Technology is clearly changing how work is done. It allows for more advanced and widespread application of telework. Some of the more familiar enabling technologies include: the Internet, electronic mail, voice mail, networks (local, wide-area, and metro-area), scheduling tools, workgroup computing, wireless voice and data, remote access, flexible technology, conferencing, and high speed telecommunications. Application of these technologies in ways that meet business needs will shape the application of telework in the future.
- **Organization Changes:** All the factors noted in this section impact the strategies, structures, and processes organizations use to be successful. Market forces such as global competition as well as changes in the workforce have resulted in a shift

away from hierarchical, control-based management structures to more team-based structures where professional and knowledge-based workers make up more of the workforce and have much broader roles. Work arrangements and work settings are becoming more flexible. Technology is helping to enable these changes. Again, these trends are conducive to the application of telework. However, there are challenges in terms of applying telework in ways that enhance teamwork, communication, flexibility, and new management/accountability roles.

As we consider the application of telework in the future, it is important to recognize that broad changes in work and in organization structures and processes take time. While a growing number of companies are taking advantage of alternative work settings and strategies and are applying technology in new ways, telework is not widely practiced, even by the most innovative firms. The trends point to the continued evolution of the concept of the office, and eventually to the concept of telework becoming synonymous with work. This later concept becomes an indicator of success and has implications about how we approach telework in the future.

This leads to a fundamental point.

"Telework as a concept and in practice is now fusing with, and metamorphosing into, a whole range of other developments and innovations, such as electronic commerce, knowledge management, the globalization of trade and markets, virtual and learning organizations and teams, intellectual capital development, skills and competence development, organizational teaming, smart organizations, digital or network economy, de-materialized or intangible production, etc., etc. It is starting to be difficult, now, to separate telework from these other developments, and indeed it becomes increasingly irrelevant to do so, except in the sense that telework, as work based upon or enabled by network technologies, represents the new work perspective of the burgeoning Information Society. Thus telework today has many names and appears in many guises, such as new ways and methods of working; work nouveau; working across the networks; networking; virtual working; digital learning, etc. Teleworking is catalyzing change in all work and, as such has spill-over and dissipation effects" (European Commission 1999).

This suggests that telework is integral to a variety of processes, including organization and work change, and the nature of this integration is increasing. It implies that telework must be viewed in a much broader context than we have done historically.

Telework is often viewed together with other alternative work strategies such as flextime and compressed workweeks. While telework works very well with these alternative work strategies, it is in many respects quite different. Telework requires both significant changes in work settings as well as in work methods and strategies. As a result it requires more significant organizational change (incorporating space, technology, and personnel change) than other alternative work strategies. Telework needs to be applied in the

context of the changing nature of work, rather than within the context of a program promoting alternative work strategies.

This all has implications for our historical view of telework. As the concept, "Work is something you do, not someplace you go" becomes more a reality and our capability to do work effectively anywhere increases, some of the traditional concepts of telework seem less relevant. For example, the idea of telework as occasionally working from home to avoid the trip to work seems to be outmoded. Likewise, the idea of working from home to avoid the disruptions at work (i.e. escaping from work) seems less appropriate. This is not to suggest that avoiding a commute or controlling disruptions are not relevant benefits, but that the changing nature of work and where it is done changes how we should view these issues. The context for how we view telework and the nature of its benefits becomes much broader.

The application of telework in the future must be viewed in the context of the changing nature of work and the demographic, market, technical, and organizational changes that shape the structure, content, context and relation of work in our society. Fundamentally work is becoming more mobile and flexible in response to these changes. To consider the application of telework from the perspective of more static, traditional work arrangements is becoming increasingly difficult and limits the potential for telework to provide important business, social, and environmental solutions.

Telework in Organizations

Our experience indicates that telework initiatives in organizations often fall short of expectations and fail to grow. We believe it is valuable to reexamine the nature of successful telework initiatives from the perspective of what creates successful telework initiatives in organizations, how organizations view the benefits of telework, and the factors that contribute to the growth of telework initiatives in organizations. Our emphasis is on understanding how successful telework initiatives evolve in organizations and why. We also consider the trends influencing the future evolution of telework. We conclude this section with a topology of telework in organizations based on the information we collected.

Characteristics

What are the characteristics of successful, long-term telework initiatives?

In this section we consider the characteristics of successful, long-term telework initiatives. We base our findings on our three organizational case studies, existing case studies, key informant interviews with individuals with years of experience working with telework programs, and existing research on telework programs.

While this section reviews the characteristics of successful telework initiatives, we do not intend to imply that a formal telework program is necessary for telework to be successful in an organization. We use the term initiative to suggest that the approach to encouraging telework in an organization may take many forms and may not even be referred to as a telework program.

Formal telework programs are often characterized by having four elements: formal written policies, training for teleworkers and managers, criteria for selecting teleworkers, and a signed agreement between the teleworker, manager, and organization. While these elements may be important for establishing a program, they may not necessarily contribute to program success.

In order for telework initiatives to be successful in the long-term, organizational change is required. Fundamentally, we are talking about changing the way that people do work in an organization. The characteristics of successful telework initiatives need to be viewed in the context of organizational change. Initiatives need to plan for this change and recognize that integrated efforts are required.

Successful telework requires a team effort involving staff from Information Technology, Facilities and Real Estate Staff, and Human Resources staff. In many cases we have failed to recognize this kind of integrated, connected aspect of telework, and we have also failed to recognize that the very culture of an organization changes when we start to change some of its parts. The very best telework programs I have seen are the ones that involve a lot of planning to consider

these cultural changes, and also anticipate what else in the organization must change for telework to succeed in the long run (Gordon 1999).

What is important for creating change in one organization may not be important in another. Thus the characteristics we present should not be viewed in a prescriptive sense, but should be tailored to the needs of a particular organization. How an organization defines success also shapes how one goes about achieving that success. While an organization can choose a variety of success indicators for its particular circumstances, we believe that a primary indicator for program success is growth. Successful initiatives achieve a critical mass of participation on the order of 10 percent of employees (that can telework) and continue to grow. Telework ultimately becomes transparent. Teleworkers in these organizations report that they are treated like any other employee and that people they work with both inside and outside the organization do not know they are teleworkers. This is the nature of success we are considering.

What are some of the characteristics of successful telework initiatives? In order to create organizational change, we believe successful telework initiatives need to exhibit the following characteristics. When considering these characteristics, it is important to recognize how they are interrelated. The characteristics do not stand on their own.

Have an integrated planning and implementation process

In a commentary on going beyond telework, Ken Robertson suggests that the next generation of telework programs "need to shift the focus from simply telework to work transformation" (Robertson 1999b). This is consistent with the ideas in the previous section that we need to view telework in the context of the changing nature of work. In his book on work transformation (Robertson 1999), Ken Robertson clearly describes this integrated planning and implementation process. This integrated process includes human resources, information technology, and facility management for an organization in the planning process. The involvement of each of these groups is critical in order to create the long-term changes in organization work practices to facilitate telework. It is also critical in order to achieve the many benefits that telework has to offer.

This type of integrated planning and implementation process is rare in most organizations' telework initiatives. Typically the initiatives begin in either the information technology or the human resources department or they take on a very clear human resources or technology perspective. This was the situation for many of the organization case studies we reviewed. The facility management aspect seems to be the element least addressed. Even in cases where space was an issue, it seemed that space issues were not being considered in a systematic way.

However, there is evidence that long-term telework initiatives do begin to bring together the three integrated planning elements, even though they may not have been initially included. For the programs to grow and to continue, it becomes necessary for these issues to be addressed. For example, from the human resources side, the need for training for managers supervising remote workers becomes clear and the managers want the

training. From a technology standpoint, connectivity issues become important as teleworkers and managers try to conduct more of their work remotely. The space issue becomes evident when leases come up for renewal or when management realizes their offices are half empty. In fact in many cases, if these types of issues are not addressed existing initiatives will slowly whither.

Obtain upper management support

This characteristic was exhibited by many of the initiatives we examined. Upper management support is critical for overcoming organizational cultural barriers and creating organizational change. In these organizations, upper management tends to be progressive and views telework as a beneficial strategy for their organization. In some cases CEOs go to great lengths to create a vision of their organization that is employee friendly. This can go a long way towards creating a culture that includes such things as flexibility, independence, empowerment, trust and high performance. All of these elements are important for telework.

While most telework programs are voluntary, there are examples where upper management has issued some type of mandate to require or strongly encourage telework. These mandates have the effect of greatly increasing the visibility of a telework initiative. If the mandates are supported with resources and direction, then the potential exists for creating organizational change and a successful telework initiative. In cases where mandates have been issued, strong and visible upper management support is identified as one of the important reasons for success.

Conversely, lack of management support is almost always one of the reasons cited for programs that whither or languish. These organizations may be experiencing a variety of challenges that are diverting management attention. Telework may even be viewed as contributing to the problems the organization is experiencing, rather than as a solution.

Link with business strategies

One of the best ways to generate long-term support for a telework initiative, particularly from management, is to link telework to important organization business strategies. Telework must contribute to meeting organization business goals. It must fit with how the organization sees itself and where it wants to go.

Many telework initiatives are developed around one narrow issue, such as space savings, travel reduction, employee retention, or productivity. When that one issue becomes less important (for whatever reason), then the primary justification for the telework program can go away. Initiatives that are justified on one or a narrow set of issues do not survive. There are numerous examples of this.

Initial pilot programs may be developed around a narrow set of issues or benefits, but at some point in the program's evolution, links with broader business strategies need to be made. This is necessary in order to generate the resources and support to create long-term organizational change.

Account for technology/connectivity issues

Organizations that have large, successful telework programs identify their technology/connectivity package as central to their program's success. Teleworkers we interviewed that are provided with fully supported technology/connectivity packages tended to cite fewer challenges with teleworking and in many cases said they had no challenges. For them, teleworking was completely transparent.

However, the importance of technology/connectivity is often overlooked in the development of telework initiatives. Some views of telework suggest that too much emphasis is placed on technology and that it is possible to telework without having a computer, or all that is necessary is a computer and a phone. We did interview teleworkers who save up work they can do at home and that focus on doing "quiet/thinking" type work when they are at home. Certainly, identifying work that one can do most productively in different work locations is good and one of the advantages of telework. However, if an employee is limited to being able to do only certain types of activities on their telework day, then they are not likely to telework often. Generally we found that people that telework in this way do it informally on the order of several times a month.

Fundamentally, for telework to be effective, an employee must be able to fully do their job remotely. For example, one person we interviewed teleworked informally. This individual wanted to telework more, but indicated his manager wanted him to be in the office. His job was to support the financial/accounting applications in the office. It became clear in the interview that the organization did not provide the technology/connectivity for him to fully provide this support remotely. Even though he could be very productive at home and do many tasks, his manager's resistance to allowing him to telework more was fully justified because he could not completely fulfill his job functions remotely.

A manager not being able to "see" if their employees are working is often identified as a key barrier to telework. While this can largely be a cultural issue, it is important to recognize the role technology/connectivity plays both as a potential solution and a cause of management concerns. If employees are not fully accessible or capable of meeting their job requirements from a remote location, then telework is a very limited work option and a manager should limit the pursuit of that option. Two of the three organizations we worked with clearly had technology/connectivity issues that limited the ability of teleworkers to fully do their jobs from a remote location.

Address cultural change issues

In order to create organizational change in the way that work is done, cultural change issues must be addressed. Cultural issues were often overlooked in early telework initiatives, but now seem to be receiving more attention. There is growing recognition that cultural change issues may be the most important aspects to address when creating successful telework initiatives.

Middle management resistance to telework is one issue that has focused attention on the cultural aspects of telework. Generally efforts have focused on education and developing management techniques such as management by objectives to provide the tools for managers to better manage teleworkers. Organizations with successful programs are providing education opportunities on how to communicate with and manage a remote workforce. This type of training seems more relevant than management by objectives training, which most of the managers we interviewed were familiar with.

When considering the issue of middle manager resistance to telework, it is important to recognize that managers are a reflection of the culture they work in. In other words, if the organization is a traditional, hierarchical, and central-control based culture, middle managers will reflect this. The only way to address manager resistance is to address the control culture of the organization. Many organizations are moving away from industrial-based control cultures to more decentralized, team-based approaches where authority is distributed. Clearly telework fits well with these trends. These culture changes need to be considered as part of telework initiatives.

Many organizations with telework initiatives are striving to create a culture that provides flexibility and supports employees in achieving work-life balance. The ability to create this culture is an important aspect of some successful telework initiatives. The cultural aspects that seem to support this include trust, accountability, and empowerment. A high value is placed on the human resource and employees are viewed as central to business success.

How people communicate is a cultural issue and there are many potential barriers and perceptions that can limit effective communication with teleworkers. Many of these issues are cultural. For example, this can be as simple as co-workers believing that when someone is teleworking they should not be contacted or interrupted because they are away from the main office. Responsibilities, expectations, and approaches need to be established. Organizations need to develop communication plans and provide education on effective communication between teleworkers, supervisors, co-workers, and clients.

Another topic related to communication is the importance of establishing ways for remote workers to stay in touch with what is happening in the organization. This is most important for teleworkers who do most of their work from remote locations. Techniques employed by the organizations we talked to include monthly or quarterly visits by teleworkers to the central office, establishing buddies in the office to communicate things that are happening, ensuring there is daily phone communication, extensive use of e-mail, and clear communication of work schedules.

Another important cultural issue has to do with how space is treated and the cherished employee right to having a personal office space. In order to fully take advantage of the space benefits of telework, typical expectations about office space need to be addressed and adjusted.

It is important to recognize that telework is a different way of doing work and that cultural issues related to how work is done need to be considered. Some large programs have extensive training programs and lab experiences to help employees develop new work techniques. Many organizations do not have the resources to do this. However, they do need to address how work is changing and on an ongoing basis consider issues that may be limiting work effectiveness. Many telework initiatives do not consider work related issues.

Measure results

Many telework initiatives do not measure benefits or rely on very simple qualitative or anecdotal information to justify their existence. Initiatives that are unable to back up their initial hype are not likely to grow or get much attention. Measuring results and verifying benefits is central to the success of many long-term telework programs. This is one of the best ways to get upper management support and ongoing resource support to ensure the long-term success of a telework initiative. It is also an effective way to address and overcome the resistance and perceived barriers to telework.

An evaluation of a pilot initiative or the first several years of a telework initiative is a tool that has been used both to justify the continuation of the program and to make program improvements. The evaluation is a critical element in the long-term success of the organization.

Some organizations conduct annual employee surveys to get input on employee satisfaction and on ways to improve their work experience. These surveys can be used to compare teleworkers to typical employees. Positive responses by teleworkers relative to typical employees have helped to justify the continued growth of telework initiatives that have used this measurement approach.

There are a small number of telework initiatives that have made significant investments in telework and in transforming the way work is done in their organizations. These initiatives incorporate extensive measurement of program costs and benefits. Often, the most visible measured benefit from these programs is dramatic reductions in the costs for space. These large benefits generate a lot of support for the telework initiatives and their ongoing growth.

Provide ongoing support and refinement

Most telework initiatives only plan for initial development and implementation. They do not plan for growth or for the resources that are necessary for providing ongoing support. Creating organization change is a long-term process. Most successful telework initiatives evolve and change over time. Change will not happen without the resources and support to deal with changing needs and opportunities and to continually reinforce the benefits of telework.

Benefits

What are the long-term organizational benefits of telework?

There are a number of widely recognized benefits from telework. These generally can be grouped into four categories.

- Employee benefits
- Cost benefits
- Work quality/performance benefits
- Community/environmental benefits

Different organizations will tend to look at the benefits differently depending on how they define success. There is a tendency by organizations to view benefits from certain perspectives. Organizations will tend to focus on the benefits in a certain category, rather than view the benefits in a synergistic fashion. In many respects, this limits organizations from seeing the overall potential benefits telework can offer in terms of improving work processes and supporting the development of competitive, best practice organizations.

Employee Benefits

The employee-related benefits of telework that we consider include those benefits an organization receives as a result of having more satisfied employees. These benefits result from the improved work-life balance that telework provides employees and the benefits teleworkers receive (reduced commute time, lower stress, more time with family, ability to meet family care needs, better ability to meet work demands, etc.). The organization based employee benefits include:

- Employee retention
- Improved recruitment
- Reduced absenteeism
- Ability to attract and utilize persons with disabilities
- Increased employee dedication

Employee recruitment and retention is the benefit on this list receiving the most attention from organizations today. In one of the organizations included in this research, three of the 30 teleworkers likely would not be working for the organization if they could not telework. In another organization, two of the six teleworkers interviewed would not be working for the company if they could not telework. In several cases these were lifestyle choices, in another it was medical/disability reasons, and in another it was a job relocation of a spouse. While these samples are not scientific, it is not unreasonable to assume that five to ten percent of the teleworkers at an organization would not be working for the organization if it were not for telework. This percentage is likely to grow.

In research done by Jack Nilles on a sample of 160 telecommuters, the benefit of decreased turnover for the group was computed to be \$206,000 or \$1,300 per telecommuter (Nilles 1998). This was based on survey responses from the telecommuters

on whether they had seriously considered quitting and how decisive the ability to telecommute was on their decision to stay. Note that this cost is likely to be higher for highly skilled individuals or for organizations with high turnover.

The Telework America Survey produced a more optimistic estimate of employee retention savings of \$7,920 per telecommuter (Pratt 1999). This was based on an average annual salary of \$44,000 and one-third of employee salary for replacement prorated for the 54% of survey respondents who reported the ability to telework was important or extremely important.

Reduced absenteeism results both from less stressed employees and the ability of employees to do some work when they are at home recovering from an illness or caring for someone in their family. This can result in several fewer sick leave days each year (Nilles 1998). Pratt estimates that the ability to telework results in a 63% reduction in absenteeism costs, equivalent to \$2,086/teleworker/year (Pratt 1999).

The ability to attract and utilize persons with disabilities can help increase diversity in an organization's workforce, can broaden recruitment pools, and can help retain and effectively utilize existing employees who may become disabled. This latter issue becomes more significant when considering that the workforce is aging. This can reduce recruitment costs and long-term disabilities costs as well as take advantage of an often-underutilized human resource.

Increased employee dedication is demonstrated through the willingness of many teleworkers to go the extra mile for their employer. Many telecommuters report that they put in more hours of work as teleworkers than they did before. This can potentially be an issue of concern, but for many teleworkers, it seems to contribute to work satisfaction.

Cost Benefits

While benefits from telework noted in some of the other benefit categories have the potential to reduce costs, the most significant and tangible cost benefit results from reductions in facility and related infrastructure costs. This is the key benefit that we include in the cost benefits category.

Organizations such as IBM and AT&T have reported huge space savings. Over the next five years AT&T expects annual savings to approach \$50 million and over the long run their alternative work programs could generate savings of \$5,000 to \$10,000 per person. Likewise, IBM saw \$1 billion in savings from mobility initiatives from 1992 to 1997. Over that period, worldwide costs per person dropped 38% or almost \$6,000 and the ratio of facility and IT-voice costs to revenue dropped from 8.8% to 4.2% (Apgar 1998). Jack Nilles suggests a value of \$1,600 per telecommuter for space savings (Nilles 1998).

While these savings are dramatic, many telework initiatives do not take advantage of space savings in a systematic way. In these cases, there is the potential for space costs to actually increase as a result of maintaining multiple work locations for a given employee.

Unless central office space needs are reduced through the application of more efficient alternative space strategies, then it is not possible to generate space savings. Without these space savings, it becomes difficult to justify the cost of a technology/connectivity package that allows the teleworker to be fully functional at a remote location.

Work Quality/Performance Benefits

Much has been said about the potential productivity benefits associated with telework. Benefits on the order of 10 to 20% are often reported, although these values are usually based on qualitative, self-reported information.

The difficulty of measuring productivity for professional, information workers needs to be acknowledged. Most professional workers are assigned projects or areas of responsibility. Output in the conventional sense is often not the only relevant measure. Quality, timeliness, and handling of multiple responsibilities are also important. This has led to the suggestion of effectiveness (the combination of all of these attributes) as a more relevant measure than productivity for knowledge based workers (Gordon 1998).

We believe self-reported measures of productivity improvement of 10 to 20% should be viewed with caution because it is not clear what is really being measured and for professional, knowledge workers productivity is not the only relevant performance measure.

However, we do believe teleworkers can be more effective. There are data for such applications as call centers and medical transcriptionists that provide sound evidence of improved teleworker effectiveness. The caution with these data is that there is a tendency for the teleworkers to be the best workers in the organization, so they naturally would tend to have higher performance.

When considering improved worker effectiveness, it is important to identify and analyze the aspects of telework that contribute to improved work processes and increased effectiveness. For example, teleworkers that do a lot of fieldwork can use their remote office as a base of operation, thus saving travel time they might otherwise have spent going back and forth to the office. Or, the ability of a teleworker to more effectively control interruptions at a remote location can be important for certain kinds of work. Or, for some workers the traditional office setting can be a very bad place to do work due to environmental reasons (noise, air quality, daylight, etc.). In all these cases, telework provides a work process improvement that should lead to improved work effectiveness.

Likewise, there are a number of factors associated with telework that can result in less effective work processes. Some of the examples from our interviews include:

- Not having access to files (electronic or hard copy) that they need to do their job does not allow them to effectively complete their work tasks while teleworking.
- Not having office software on their home computer.
- Not having the connectivity to manage large database files.

- Not being able to run large applications remotely due to access issues.
- Not having a way to charge the organization for work related long-distance calls while working remotely.
- Not having a second phone line that allows handling work related phone calls from a home office location in a professional manner.
- Distractions at home

While there are ways to address many of these issues, the methods for working around them can result in inefficient work processes.

The fundamental point of this discussion is to consider whether work processes have really improved before claiming productivity or effectiveness benefits. It is our belief, based on this research, that the work processes of part-time teleworkers in many cases do not improve significantly. For teleworkers that telework infrequently (less than 4 times a month), improvements in effectiveness as a result of telework are likely to be small. As the frequency of telework increases, the potential for work process improvements also increase. Thus it is likely that frequent teleworkers are more effective. We believe there is a need for more research in this area.

Community/Environmental Benefits

Many historical telework programs started as a result of initiatives to reduce traffic congestion or improve air quality. The community ultimately benefits from these efforts. The organization may benefit in several ways.

- The image of the organization in the community is improved.
- Improving air quality or reducing congestion may be central to the mandate of the organization. For example, an environmental quality agency might directly benefit from contributions to meeting air quality goals.
- Having clean air or reduced traffic congestion may be important to the ability of the organization to conduct business. For example, an organization that relies heavily on transportation may be quite sensitive to traffic congestion issues.
- Having the ability to comply with laws to reduce congestion or improve air quality in an efficient manner.

It is difficult to quantify these benefits, but many organizations do make investments for the benefit of the community. Investments in telework can be viewed in a similar way.

Competitive, Best Practice Organizations

Perhaps the most compelling benefit of telework is how it can contribute to the evolution of a competitive, best practice organization. In other words, for an organization to respond to the trends noted in the section on the changing nature of work, an organization does need to consider how to change its work processes to be a competitive, best practice organization. The application of telework can be an aspect of this change.

In this context the "savings" from implementing a telework initiative are really not relevant. Comparing telework to the old way of doing business is really the wrong measure. The key is whether the organization can compete and perform alongside best practice organizations. The key question is whether your organization measures up against the best in the business. Can your organization compete in terms of measures like costs per employee? Will your organization be able to keep up with its peers?

However, it is unusual for an organization to identify being a best practice organization as a benefit of doing telework. Perhaps this broader view of the benefits of telework needs to be developed before telework becomes more common (or perhaps as telework becomes more common, this will become the primary benefit organizations identify).

Long Term Growth

What are the factors contributing to the growth of telework initiatives?

Most telework initiatives do not plan for growth, nor do they provide the resources to encourage growth. As a result, many initiatives languish because they are unable to create the changes in the organization necessary to support the growth of telework. We believe the following factors need to be considered in order for telework initiatives to grow.

- Adapt to changes in technology: Technology is constantly changing. There will continue to be cheaper and faster ways to meet the technology/connectivity needs of employees. This will continue to provide wider access to telework. A growing telework initiative needs to take advantage of these benefits. For example the use of the Internet and virtual networks has the potential for offering significant cost savings versus dedicated phone lines to access local area networks.
- Provide ongoing support, training, and outreach: The need for support does not go away after the initial training. Teleworkers need support just like every employee. A help desk or some provision of technical support needs to be established. Issues and challenges change over time, which require ongoing outreach and education. As new employees join the organization, they need to be educated about telework. Ongoing outreach is necessary to maintain visibility and ensure growth. The approaches used can be quite simple and may rely on organization intranet and existing methods for supporting employees.
- Plan for expansion: Resources need to be established to support growth of the program. In particular, the demands on information technology staff to support teleworkers needs to be planned. In many cases, the special demands of teleworkers are just added onto the existing workload of information technology staff without consideration of the impact this has. The result is less than adequate support.
- Measure and demonstrate success: Evaluation and verification of success is critical for obtaining upper management support and the resources necessary to continue

an effective initiative. In addition, measurement and evaluation can identify areas in need of improvement.

Implementation of a telework initiative is a change process. Change takes time and requires long-term planning. Implementation should be viewed as a continuous improvement process of the way an organization does work.

Trends

What are the trends influencing the future evolution of telework?

Telework initiatives in the future are likely to be much broader. They may not even be called telework initiatives (one of the successful telework organizations we interviewed did not call their initiative a telework program). They are likely to include a variety of alternative work strategies in the context of changing ways to work. In the long run telework may no longer be alternative, although our key informants noted that many organizations have a long way to go in this regard and it may be 5 to 10 years before telework becomes common practice.

Based on our research and particularly our interviews with key informants, here are some of the trends we believe will shape the future evolution of telework and telework initiatives.

- **Access/Connectivity:** As technology advances and the speed and bandwidth of remote access improves, the potential applications of telework expand. This will allow the expansion of tools for collaboration such as video conferencing, which ultimately can make dispersed work very common.
- **More network based work:** More and more organizations are conducting large shares of their work across networks. One of the telework coordinators we interviewed noted that his organization "lives and dies" by our networks. Network computing provides the potential for dispersed work.
- **Tight labor markets:** Tight labor markets and organizations looking for ways to recruit and retain workers will expand the application of telework. For example, to expand recruitment pools, organizations will not limit their search to certain geographic locations, but will consider new hires working from remote locations. Organizations will use telework to retain existing employees who need to relocate.
- **Changing demographics of the workforce:** Younger workers currently entering the workforce are comfortable with using the tools of remote work and will easily adapt to and demand this work option. As older workers and managers are displaced, work cultures will continue to change and the historical barriers to telework will diminish.
- **Employee demand:** The number of informal teleworkers significantly exceeds those teleworkers that are participants in formal telework initiatives. Ultimately, it will be the expansion of informal teleworkers that will drive the application of telework. Organizations will need to respond to what is already happening.

Employee demand for telework from the bottom up will become a driving force in the development of successful telework initiatives.

- Traffic congestion: Recently, the traffic benefits of telework have received diminished attention. However, in certain locations traffic congestion is becoming a severe problem. In some cases it has become an important political issue. For employees, it is a quality of life issue. Employees will increasingly use telework as a response to traffic congestion. In many instances telework is one of the few options that provides the flexibility in terms of when people travel to respond to traffic congestion.

The combination of these factors will shape the application of telework in the future. In these trends, we are suggesting that employees will play an important role in shaping the evolution of telework and that this may very much be a bottom-up rather than top-down movement. Technology will make it possible for more people to telework, particularly in advancing the degree of collaboration that can occur between dispersed work locations. Organizations will respond to these trends that encourage new ways of working and dispersed work, although organizations are slow to change and the widespread application of these changes may be slower than we expect.

A Topology for Telework in Organizations

As a way of summarizing the previous discussion, we conclude this section with a topology of telework in organizations. The topology is a way of categorizing the application of telework in terms of the motivations, characteristics, and benefits of telework initiatives. We believe this is a useful way of providing a context for the ideas discussed in this section and for comparing the application of telework in organizations. In particular, this can provide insights into the application of telework in organizations in the future and how these organizations should be supported.

We propose four categories for considering the application of telework in organizations based primarily on the motivation for telework.

- Stewardship Focus
- Employee Focus
- Cost Focus
- Work Focus

The categories are not exclusive. The application of telework in an organization can incorporate elements of different categories or an initiative may evolve from one category to another. However, at any point in time we believe that a telework initiative will predominately reflect the characteristics of one of these categories.

Stewardship Focus

Organizations with successful telework initiatives in this category view environmental stewardship or "green" image as an important business consideration. Many early telework programs were started with a stewardship focus as a result of efforts to improve air quality or traffic congestion. However, many of these early programs languished because environmental stewardship was not part of the organization's business strategy or the initiative was unable to connect to other important business benefits.

- **Characteristics:** The telework initiative is often part of a commute trip reduction program or of an effort to improve air quality by reducing travel. An individual responsible for commute trip reduction often coordinates the program. The program emphasis is on using telework as a tool for reducing travel.
- **Benefits:** Program benefits focus on meeting travel reduction and air quality goals. The community benefits from reduced traffic congestion, improved air quality and improvement to the environment. Improved employee satisfaction and productivity benefits are often identified as secondary benefits. For organizations with a strong stewardship focus, these secondary benefits help to justify the program.
- **Success:** Factors that contribute to success for this type of telework initiative include strong top-down support, even including some kind of mandate to generate high visibility and awareness. A strong environmental ethic among employees is also important. Targeting the use of telework to meet program goals of travel reduction or air quality improvement help to produce more significant results (see the following example).
- **Example:** The Arizona Department of Environmental Quality (ADEQ) has a mission to improve environmental quality in the state. It is also located in a region with significant air quality problems. Arizona state government has identified telework as one important approach for addressing air quality problems in the region. A successful pilot program was run that included an evaluation that verified results and helped overcome perceived barriers to telework. Following the pilot program the governor mandated that all state agencies implement a telework program with a goal of 15% participation by the end of 1998 as a response to air quality programs. ADEQ is one of the state agencies that have successfully embraced the telework program. A little less than half of ADEQ employees are trained as telecommuters. However, many ADEQ employees telecommute on a limited basis. The use of telework is targeted to air quality alert days. Prior to days when air quality levels are expected to be excessive, employees are alerted and are encouraged to use alternative modes to get to work, including telework. Participation on these air quality alert days reaches 40% of employees. Over a third of the participants are telecommuters. This is an example of the targeted use of telework to meet specific community needs.

Employee Focus

Organizations with successful telework initiatives in this category have a culture that highly values employees. Developing and enhancing the employee resource is central to the business strategy of the organization. Many telework programs today focus on the employee benefits of telework as a primary motivating factor. However, those programs that view telework solely as an employee benefit and fail to directly relate these benefits to business needs are likely to languish.

- **Characteristics:** Telework is often part of a flexible work program that includes compressed workweeks and flextime. The human resource department often plays a central role in coordinating the program. There is an emphasis on meeting employees' needs for flexibility by providing options that enhance work-life balance.
- **Benefits:** Employee recruitment and retention are currently the key business benefits that organizations in this category focus on. Improved employee morale and satisfaction and increases in productivity that result from more satisfied employees are also important benefits.
- **Success:** Top management support that creates a vision and culture that supports employees is central to the success of these programs. The organization culture views employees as a valuable resource. Organizations with successful initiatives often use annual employee surveys to compare teleworkers with other employees. The results of these surveys are important for demonstrating the value of telework in meeting employee related business goals.
- **Example:** Hewlett Packard is an example of an organization in this category. According to CEO Lew Platt, "I want HP to be the employer of choice... When people come to work here, they want to stay." There is a belief at HP that employees want to do a good job, and they will if they are provided the proper environment. Telework is "an employee-driven business decision" according to a human resources manager. Employee satisfaction with work-life balance on employee surveys has jumped 10 points since 1995. In the last survey, 85% of teleworkers believe it enables them to increase work effectiveness. Telework is thriving in this culture, although it appears the growth is occurring with informal teleworking.

Cost Focus

Organizations with successful telework initiatives in this category tend to be driven by the business needs to reduce overhead costs and improve customer service. Some of the largest and most visible telework initiatives over the last half dozen years fall into this category.

- **Characteristics:** Telework is part of a significant organization work transformation initiative. This usually involves significant organization change and includes a number of organization departments including human resources, information technology, and facility management. These are resource intensive efforts that incorporate a significant level of planning with very specific goals.

- **Benefits:** Space and related facility cost savings are the critical benefits generated by these telework initiatives. There is also an emphasis on improved customer service by making employees more available and accessible to clients.
- **Success:** Top-down leadership, in some cases involving mandates is necessary for these programs to generate the support necessary to create organizational change. Integrated planning processes involving all key support departments is necessary to develop and provide the infrastructure to support this kind of change in the long-term. Central to this support is the technology platform to enable employees to work effectively remotely. Detailed accounting of costs and measurement of results is necessary to justify the significant expenditure of resources for the program.
- **Example:** IBM is one of the early and most visible examples of an organization undertaking an initiative to significantly change work practices to generate cost savings and improved customer service. The organization conducted some pilot programs and transformed its entire sales force to mobile workers. This included equipping these workers with the technology platform and education they needed to be successful. There is ongoing support for teleworkers. Through annual surveys and cost accounting, the benefits of the initiative have been tracked in detail. The program continues to grow into all areas of the organization.

Work Focus

Organizations with successful telework initiatives in this category are responding to opportunities to improve the way work is done in order to meet important business goals. The emphasis is not on cutting costs, but on providing innovative work options that result in a competitive advantage.

- **Characteristics:** Telework is part of an effort to improve work processes by using integrated workplace strategies. This involves offering a full range of workplace settings in a strategic manner to achieve new ways of working and optimum workplace performance. The functions of the telework initiative become integrated into work support functions such as information services, facility management, and human resources. The services that support telework are offered to all employees. It is just part of doing business.
- **Benefits:** The fundamental benefits are improvements in work processes, reduced product and service delivery cycle times, higher product quality, and improved customer service. Improved work processes also generate employee benefits, such as increased employee satisfaction and improved recruitment and retention.
- **Success:** Existing organization culture, work processes, and employee characteristics are central to success. These organizations are predisposed to work innovation as a result of a culture that encourages accountability and trust, network-based work processes, and employees that really want to work in a flexible, innovative work environment. Leadership from the top is often an important catalyst, but success is driven from the bottom up.

- Example: Relatively young, progressive, and growing high tech firms fit into this category. ConneXt, which creates information systems and service solutions for energy providers, is one example. Over a relatively short period of time, the company has created a telework center that provides a variety of work options for its mobile and remote work force. About 70 percent of the organization's employees work remotely full or part-time. Telework quickly has become part of the organization work culture. For example, software development staff utilize different work options depending on what phase of development they are in. It has become a way for the company to accommodate rapid growth and it is viewed as a competitive advantage.

Telework is undergoing an evolution. Early programs tended to focus on commute trip reduction and on employee benefits as noted in the first two categories. The next generation of programs focused on generating significant cost savings and improved customer service through a more integrated approach to work transformation. We believe the evolution will continue to initiatives that focus on opportunities to improve work processes that lead to more competitive, best practice organizations. For these organizations, telework becomes transparent - it is just how they do business. Many successful initiatives that began in the former categories will ultimately evolve to the later category as telework becomes institutionalized. Younger companies, by the nature of their work and their cultures will start in the work focus category. We believe the driver for this evolution will ultimately come from employees that embrace the opportunities for working differently and drive the continued innovation. Employee support functions will respond to this employee demand and help to institutionalize the changes in work processes across the organization.

Travel Implications of Telework

Early interest in telework was generated from the idea that telecommunications could be substituted for the commute to work. Because commuting is viewed as a routine trip purpose performed in well-defined time-slots, it seems very amenable to substitution by telecommunications. Many early evaluations of telework programs showed net travel reduction benefits from telework. However, there is a growing awareness that on a macro scale, the travel benefits from telework may be limited. This issue was raised as early as 1994 in research conducted by John Niles.

"Because of the popularity and effectiveness of telecommuting as a work practice, telecommunications is becoming embedded primarily as a transportation substitute in the thought processes of transportation researchers and government planners. But a closer examination of the U.S. experience over the last few decades does not reveal a natural evolution of telecommunications substituting for travel. Both grow together, one feeding the other. Travel per household is rising, urban congestion is increasing, and latent demand for travel emerges clearly when new road capacity is opened up, even as the National Information Infrastructure is expanding. This report provides additional, cautionary perspectives on the idea that telecommunications is a force for reducing the need to travel. As telecommunications volumes build independently of direct substitution for transportation, an opposite effect occurs, namely travel stimulation" (Niles 1994)

More recent work supports these ideas. There are four main relationships between telecommunications and travel: substitution (*elimination* or *reduction* of one by the other), generation (use of one *stimulates* or *complements* the use of the other), modification, and neutrality (Mokhtarian and Salomon, 1997). The most common research approach used to evaluate telecommunications impacts on travel involves the evaluation of specific applications on a micro scale. However, the short-term nature and narrow boundaries of this research tends to emphasize the short-term and more easily measured substitution effects while underestimating the longer-term and more indirect stimulation effects (Mokhtarian and Salomon 1997). Even though these studies are unanimous in showing net travel reductions from telework, "it is certain that the long-term, system-wide effects of telecommuting will be less positive than is suggested by the results from the short-term, small-scale studies conducted to date" (Mokhtarian 1999)

Regarding this issue of substitution versus complementarity³ the recent millennium paper on telecommunications and travel states

³ Complementarity is the situation where the use of telecommunications and travel complement each other. This is the case when one cannot occur without the other - for example face-to-face communication cannot be accomplished without travel. Or the use of one might encourage the use of the other - for example telecommunications might make one aware of an event to travel to. Or the use of one might improve the efficiency of another - for example using the phone to schedule appointments.

"For some researchers, this "debate" has been settled, and complementarity has "won." That is the preponderance of evidence seems to suggest that, when the scope of inquiry is sufficiently broad, the net impact of information/communication technology is to generate more communication, including new travel. Nevertheless, even if complementarity is accepted as the "right" answer qualitatively - and there are those who would contest that claim - we are not yet able to produce quantitative assessments of that effect" (Mokhtarian 1999).

While many advocates of telework believe that it still provides travel reduction benefits, many of the key informants interviewed for this research believe that these travel reduction benefits are limited and are at best secondary benefits. Gil Gordon perhaps states this sentiment best - "...the problems that create much of our traffic and air pollution go far beyond the daily commuting to work. I still believe that telework definitely can help remove some cars from the road and some pollution from air, but I am not convinced that doing so will have much of an effect overall" (Gordon 1999).

The nature of travel patterns is continuously changing. The nature of work is also changing. What are the implications of these changes on the travel benefits of telework? We believe there is a need to adjust our perspectives on how telework can provide transportation benefits. In the remainder of this section we consider some different perspectives and suggest how telework can be viewed as a potential transportation solution.

Traditional View

The traditional view of telework considers the relationship between telecommunications and travel as one of substitution. The work commute trip is a fixed trip with little variation. It is a trip between home and the main office that occurs at specific times, takes specific routes, and uses specific modes. This type of trip lends itself well to substitution from telecommunications. There are easily identified travel and trip reduction benefits from this substitution.

"All the empirical studies are unanimous in finding that total distance traveled by telecommuters decreased markedly on telecommuting days. The change in non-commute trips and distance was sometimes positive and sometimes negative, but essentially statistically negligible" (Mokhtarian 1997). As noted above, many believe these findings are limited by the scope of the research and their inability to account for the effects of complementarity. However, we believe that as work and travel changes, the context for the relationship between telework and transportation changes, perhaps taking us beyond the issue of substitution versus complementarity.

New Perspective

When one considers changes in travel, changes in work, and changes in the application of telework we believe that the relationship between telework and travel and the benefits of telework should become more focused on the issue of modification. In this case

telecommunications may alter the time, mode, destination, route, or other characteristics of a trip that would have been made regardless (Mokhtarian 1997). Depending on the nature of the modification, substitution or generation of travel may be the ultimate outcome. From this perspective, the transportation benefits of telework need to be viewed as a tool for travel demand management. We believe the following trends in travel, work, and telework support this view.

Travel Changes

Travel patterns are changing. There are ongoing and significant increases in travel. Household travel increased 78% from 1983 to 1995 (Hu and Young 1999). Reliance on personal vehicles continues. Ninety-one percent of trips to work were in personal vehicles and 80% of trips were single occupant vehicles (Hu and Young 1999). There has been a very slight decline in vehicle miles traveled to work as a percentage of total household travel over the period from 1977 to 1995, but the percentage increased from 1990 to 1995.

Traffic congestion in urban areas is increasing. In 1982, almost two-thirds of peak-period travel in 68 urban areas was uncongested. By 1997, this had dropped to about one-third of peak-period travel (Schrank and Lomax 1999). Managing travel demand is one way to deal with congestion. Telework provides the opportunity for individuals and organizations to more effectively manage their travel to avoid congestion.

Work Changes

Work trends point towards more flexible and decentralized forms of work. As Frank Becker of the Workplace Studies Program at Cornell University notes, "the one, single, indisputable fact of the workplace that we can see today and that will transform the office of tomorrow is mobility" (Becker 1997). He goes on to note that the fundamental concept here is people doing significant amounts of work in different places. The concept of work as a place becomes less meaningful. The amount of work done in the same central office location will decline. This has fundamental implications for travel and for how we view the travel benefits of telework. The fixed commute trip to work becomes less common and using telecommunications to eliminate this trip becomes less relevant. Instead, more flexible work suggests the ability to manage work-related travel.

Telework Changes

As part of this research, we interviewed 19 teleworkers at three organizations with successful telework programs. This sample is very small and limited, but we believe it does provide some insights on how we might view changes in telework. In this sample, four were full-time teleworkers with the rest being a mix of informal and part-time teleworkers.

Almost all the part-time teleworkers had fixed commute patterns to the main office that did not vary significantly. However, only 4 of the 15 part-time teleworkers teleworked on a regular schedule (usually once/week) in the way that telework is traditionally viewed.

The rest teleworked informally or on a more flexible basis. For example, several teleworkers in Arizona teleworked only on air quality alert days. Another teleworked two hours early each morning from home in order to see his children off to school and avoid rush hour traffic. Another teleworked after hours to provide on call technical support. Others teleworked informally on an as-needed basis or during non-traditional work hours. In many of these cases, telework was being used in a very flexible manner. We believe these results are consistent with data that suggest the growing use of telework on an informal basis. These applications of telework differ from the more traditional forms of telework (working from home to avoid a commute trip) that form the basis for much of the research on the travel benefits of telework.

The four full-time teleworkers present very different travel patterns from part-time teleworkers. One of the three could be considered mobile, although this person is in community relations, not sales. The travel for this person varies week-to-week, depending on the meetings she has. She does come into the central office on a regular basis. The other three full-time teleworkers are remote workers with very little need to travel. On a day-to-day basis they have no work related travel. In some instances they may travel to the main office for training or major meetings, although this was rare. Clearly, these individuals have very different travel patterns from the traditional perspectives of teleworker travel. Relative to a typical worker, these four teleworkers appear to have dramatically lower work-related travel. The travel of full-time teleworkers needs further study. Daily travel savings could be offset by periodic trips to the main office, particularly if these trips are frequent and cover large distances. In the case of these four teleworkers, this did not appear to be the case. Likewise, full-time teleworkers could generate more local trips during the day. This did not seem to be the case for two of the full-time teleworkers who kept regular work hours during the day, but the others seemed to have more flexible schedules.

It is also important to consider how telework can be a solution for organization-level transportation problems. Our research has noted how the Arizona Department of Environmental Quality used telework in a targeted way to reduce travel on air quality alert days. Likewise, organizations could use telework to respond to local congestion problems during certain time periods or to travel problems due to special events, bad weather, or emergencies. Organizations that are telework capable have much more flexibility to respond to local transportation problems and provide employees with more options for when and how often they travel to the main office location.

Research Implications

We believe there is a need to reexamine the nature of the travel benefits from telework. Changes in travel, the nature of work, and the application of telework make traditional perspectives of telework and the associated travel reductions less relevant. As stated in the millennium paper on telecommunications and travel,

Much previous research in this area has been colored by either the assumption or the desire that information/communication technology (ICT) will serve as a solution to

some of the transportation problems facing society. It has become clear, however, that businesses and individuals themselves do not always see ICT in the same terms. The focus of future research should first be to improve our knowledge of fundamental relationships (or lack thereof) between ICT and transportation; armed with that basic knowledge we can then better identify opportunities for ICT to provide transportation solutions as well as meet other important needs (Mokhtarian 1999).

Future research needs to consider and understand the implications of changes in the application of telework. This requires broader studies on a number of dimensions. Rather than looking at individual applications of telework, research must consider multiple organizations in different regions. Sample sizes need to be large enough to consider and account for different forms of telework. Studies need to have long enough time frames to identify changes in the nature of telework and its application over time. Research needs to consider the context for telework and travel and should consider how organizations and the nature of work are changing. The range of influences on travel and telecommunication choices needs to be considered.

In particular, new measurement methods need to be developed for capturing the potentially complex travel patterns of the next generation of teleworkers. We believe efforts to combine global positioning systems with microcomputers into packages that can be used for personal travel surveys offer much promise (Wolf, et al 1999).

We believe that telework offers a great deal of potential for providing future transportation options. However, in order to take advantage of these options, there is a need to better understand the implications of telework on travel in order to provide new perspectives on telework as a transportation solution and to correct commonly held perceptions of telecommunications as a simple substitute for travel.

Implications for Telework Initiative Support

This section is aimed at organizations that promote, encourage, and support the development of telework initiatives. This report has attempted to raise a variety of issues related to successful telework initiatives and to how telework will evolve in the future. In this section we highlight three important areas that provide a context for the application of telework, we offer some recommendations for groups encouraging and promoting telework, and we conclude with some suggestions for public sector roles for supporting telework.

Context for Telework

We believe that organizations promoting, encouraging, and supporting the development of telework initiatives need to consider the application of telework in the context of three important issues: the changing nature of work and improving work processes, creating organizational change, and providing travel flexibility. In order for telework to achieve its full potential to provide social benefits, we believe it must be viewed in the context of these three issues.

Changing Nature of Work

The changing nature of work provides a context for how telework will evolve and be applied in the future. In fact it will become increasingly difficult to differentiate telework from a variety of other developments and innovations in the workplace that will change how business is conducted and work is carried out (European Commission 1999).

Efforts to encourage and support telework must recognize and understand this broader context for telework. Fundamentally, this affects both how one views the motivations and benefits of telework as well as the scope of telework initiatives. The motivations and benefits of telework need to be viewed in the context of ***improving work processes*** that create best practice organizations. Simply cutting costs, having satisfied employees, or meeting travel reduction goals are very limited perspectives that limit the potential of telework. The scope of telework needs to integrate these issues in a way that results in improved work processes and best practice organizations. Those in the telework community cannot limit telework to a narrow definition that views the benefits of telework in the context of traditional ways of working.

Organizational Change

Successful telework involves ***organizational change***. Changing the way employees do work is a long-term change process. Telework is one aspect of creating more effective work processes and best practice organizations. Successful telework initiatives make a commitment to creating organizational change through visible upper management support and linking the initiative to the organization business strategy. They plan for creating organizational change in an integrated way by accounting for technology, human resource, cultural, and facilities issues. They allow for the evolution and growth of telework by adapting to changes in technology, providing ongoing support, training, and outreach, and

planning for expansion. Performance is measured both to demonstrate program success and to make improvements. As telework becomes institutionalized, the difference between teleworkers and conventional workers begins to disappear. We believe that telework needs to be viewed in this broader context of creating long-term change in work processes which result in more competitive, best practice organizations.

Travel Flexibility

Telework enhances flexibility, dispersion and mobility. The travel implications of telework need to be understood in this context. Views of telework as a substitution for travel to the office are limited and as telework evolves are becoming less relevant. We believe that telework has a much greater potential to provide transportation benefits as a transportation demand management strategy rather than a travel reduction strategy. Clearly, there is a need to better understand the travel implications from growth in telework, but we believe efforts to encourage and promote telework need to better recognize the travel flexibility benefits it offers.

Individuals and organizations that are telework capable have some flexibility in terms of how and when they make work-related trips. This flexibility increases with their capability to telework and do work from a location remote from the main office. This means that work travel can be conducted at different times of the day to avoid congestion. Or travel can be avoided on certain days when major events may cause congestion, when emergencies may limit travel, or when air quality is especially poor. This work travel flexibility can be coupled with intelligent transportation systems to more effectively manage travel. Organizations impacted with local traffic congestion problems have a mechanism to respond through the travel flexibility that telework provides.

Recommendations

Those groups in the telework industry supporting and encouraging the development of telework initiatives in organizations have tended to focus on providing information and education type services and demonstration programs to get traditional telework initiatives started. The motivation behind many of these efforts was to provide travel and employee related benefits. This emphasis needs to shift to consider the work change, organizational change, and travel flexibility issues noted above. We offer the following recommendations for groups that promote, encourage, and support the development of telework initiatives.

1. View telework in the context of changing and improving work processes. Telework supports improved work processes that result in best practice organizations.

Telework® Improved Work Processes® Best Practice Organization

Telework is one of many innovations occurring in the workplace. Thus telework cannot be viewed as a standalone activity, but must be integrated with other

- innovations to improve work processes. These innovations include technology, workplace design, management and human resource processes, communication, etc. Fundamentally, it must be recognized that telework does not provide any benefits unless it improves the effectiveness and efficiency of work processes. Thus any efforts to develop telework must strive to improve work processes.
2. Strive to create organizational change. Long-term, successful telework initiatives require organizational change to evolve and grow. Groups in the telework community that encourage and support organizations in their efforts to develop successful telework initiatives need to provide resources and tools that help create organizational change over the long-term. This suggests a shift in focus from getting programs started to supporting the evolution of successful programs in the long-term. The emphasis shifts from tools that are largely informational in nature to more sophisticated educational/interactive type approaches. Examples might include interactive web sites, information/ communication tools that allow sharing of experiences and successful models, “circuit riders” that can offer targeted and tailored assistance as needed, and support (tools, education, information/experience exchange) targeted to professionals within organizations that support telework. Examples of this shift in emphasis also include businesses that can establish long-term relationships with clients and can offer a full range of telework and work management services that can be tailored to client needs.
 3. Recognize telework as an effective transportation demand management tool. Telework provides individuals and organizations flexibility in how and when they travel. Organizations promoting and encouraging telework as a transportation solution need to demonstrate how the targeted use of telework can be used to improve the efficiency of the transportation system and benefit organizations and individuals through more effective use of their travel time. Transportation programs need to be developed that send the right signals to travelers and organizations about when they travel in order to allow the use of telework to change travel patterns.

Public Sector Roles

Public sector organizations were some of the earliest promoters of telework programs, largely as a way to provide travel-related social benefits. These public sector organizations have provided telework information and education, and have conducted demonstration programs. These efforts were aimed at raising awareness about telework and getting telework initiatives started in public and private sector organizations. Currently, awareness of telework is high. We believe efforts to encourage and develop telework need to move away from raising awareness and getting telework initiatives started towards supporting the long-term change in organizations necessary for telework to be successful. This later role may not be best suited for public sector organizations and we are seeing a number of new private businesses emerging to fill this role.

However, we do believe there are some important roles the public sector can play in supporting telework. In many cases, these roles will involve public/private sector partnerships. We suggest the following roles for public sector organizations to consider.

1. **Public Policy:** What public policy is necessary to support the application of telework in ways that meet important social goals? Potential areas for consideration include:
 - **Labor Laws:** Labor laws regarding such things as working conditions and workers compensation developed many years ago for more traditional ways of work need to be reviewed and revised to reflect new ways of work.
 - **Zoning and Business Use Laws:** Laws and local ordinances need to be reviewed to clarify the development of non-traditional work locations in places such as homes.
 - **Telecommunications Regulation:** Regulations need to ensure access to high quality telecommunications services at competitive prices in order to allow for more widespread adoption of telework.
2. **Public Sector Telework Initiatives:** Public sector organizations can work to lay the groundwork for telework in government organizations, which currently is quite limited. This will allow the public sector to set an example, develop partnerships with the telework industry, and respond to public demands to improve the quality of government services. Efforts to promote telework in the public sector can be part of good government or quality improvement initiatives.
3. **Social/Economic Benefits:** The public sector must ask how telework can be used to respond to social and economic needs. This is important for developing the political support and resources to proactively take advantage of the potential benefits telework offers. We suggest some of the following social needs as areas where telework can provide some solutions.
 - **Rural Economic Development:** In economically depressed areas, telework can be used to provide employment opportunities that otherwise would not be available.
 - **Traffic Congestion:** As congestion increases in urban areas it is becoming a significant political issue. Telework provides travel options that support efforts to more effectively manage travel.
 - **Urban Planning:** Telework can be used as a tool to address a variety of urban problems such as transportation, housing, and development in depressed areas.
 - **Small Business Development:** Telework can be an important tool for developing successful small businesses. Small businesses are a key area for job growth.
4. **Research:** Research provides the basis for proactively applying telework to meet social needs. Research needs to be conducted on the implications of growth in telework on transportation and on how work is done and business is conducted.

Demonstrations need to be conducted and evaluated of the application of telework to meet social needs.

We believe the public sector plays a critical role in encouraging the application of telework in a way that provides social benefits. Future efforts by the public sector need to shift from broad information/education campaigns to more targeted activities with specific outcomes. Telework will continue to grow and evolve, even without public sector action. However, only through proactive action and collaboration will we be able to fully take advantage of the social benefits telework can provide.

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