

# Tech Report 2000: Telecommuting with SAS Saves Gas

## The SAS® Application Developer's Guide to the Virtual Office

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### Abstract

Due to advances in technology, economic necessity, and corporate acceptance, telecommuters have grown in number significantly over the last few years. This trend will continue, but obstacles do remain for the trek toward widespread virtual offices. This paper will address the technical, social, economic, and SAS-related issues that all telecommuters or managers of telecommuters must consider before committing to the virtual office environment.

SAS software includes many tools that make SAS application development in the virtual office possible, but SAS Version 8, as well as other software and hardware advances, are changing our virtual world.

### Introduction

The Internet has revolutionized the world of communications and business--- not to mention family life. One of the most appreciative benefactors of this E-comm revolution, is the telecommuter. Although many of us were telecommuting long before the widespread availability of Internet access, we all see the simplicity, increased efficiency, and improved communication that the Internet has given the lonely closet worker.

In this live presentation, we identify the pros and cons of telecommuting and summarize the technologies that are available to support it. We attempt to describe the technique as it relates to SAS developers or SAS applications, but we also discuss many of the new technologies that are independent of SAS software.

During the live presentation, we will present telecommuting from two different perspectives. One view is from the small company, Meridian Software, Inc., whose entire business model relies on the virtual office, while the other is from a larger company, STATPROBE, inc., whose office-based business offers selective telecommuting and supports remote offices. Both of these models present challenges from a technical as well as human resource perspective.

As part of the Emerging Technologies section, we attempt to forecast how telecommuting practices will evolve. Our written forecasts are somewhat conservative, but we will really stick our necks out at the live presentation. Due to the breadth of this topic, we needed to skim over some important topics, but many of these were discussed in the paper presented by Eric Brinsfield at the 1997 PharmaSUG Conference in a paper entitled *SuperSasaPharmalisticTelecommutosis*<sup>1</sup>

Portions of that paper have been incorporated into this paper, but the technology has changed significantly and so has our discussion.

### Definitions

Before we proceed, we must clarify some terms. For this discussion, assume the following definitions.

Telecommuting or teleworking is the act of working at a location that is different from the business office while connecting back to that business office over a phone line or some other electronic communications link. Most people view telecommuting as an individual activity that is performed from home. A remote or satellite office that houses multiple employees is not usually included in the telecommuter group. Today, however, the distinctions are fading from a technology standpoint.

The term "virtual office" is used to describe an office of more than one employee that appears and functions as if all employees are working together in the same physical location, when in fact they are distributed in many different locations (quite frequently, individual homes). This term should not be confused with "virtual company", because the virtual office can be a real company with full-time employees. The term virtual company is usually applied to a collection of companies or individuals that act, temporarily, as a single unit or company, and does not relate to telecommuting.

Hotelling is a technique used to support frequent returns to the mother ship. The main office maintains a set of offices or cubicles that can be used by any telecommuter that needs to work onsite for a day or so. The workspace may provide docking bays, network connections, printers, and

other desired peripherals. This capability provides one of the most ideal telecommunication arrangements.

### **Advantages of Telecommuting**

Most of the following arguments for telecommuting could also serve as arguments against, but for now assume the best.

#### **Personal Reasons**

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- Pleasant working environment

Your working environment is very important and requires some serious thought. Most people consider working in your own home very seductive, but spend very little time or money ensuring that their work environment is ergonomic and comfortable. If you are going to spend 8 to 10 hours a day sitting in a chair, you should splurge on an expensive work chair. Make sure you have room to spread out and work efficiently. Create a dedicated, quiet place to work.

- No traffic

Avoiding the daily commute is one of the greatest benefits of telecommuting. By staying home, you have more time for working, avoid the stress of driving, start the day more relaxed, and decrease the probability of involvement in an automobile accident. Depending upon your insurance company, you may get an insurance discount.

- Fewer interruptions

When you work at an office, you are at the mercy of many roaming, stir-crazy employees. If you happen to be an interesting person, you may find everyone taking a break at your desk. When you work at home, you do not have that interruption, but you may have different interruptions that you must avoid. Those temptations are discussed later.

- Fewer meetings

At many companies, you get invited to meetings, because it is easy and everyone wants to be polite (assuming you would be insulted if you were not included). By working at home, you only get invited to meetings that are really important for you or the organization.

- More flexibility

Flexibility is a great thing. If you are not fighting a deadline and you do not feel like working or your efficiency is dwindling, you can stop for the

day. Of course, this assumes that you are not charging your employer or you at least make up the time later. You can run errands when most people are in their office and not on the road. You can work extra long hours when you need to make a deadline without living in the office or dreading the dark parking lot.

Warning! Flexibility is a dangerous thing. Too much flexibility may let you talk yourself out of working everyday. Avoid the temptation by setting a strict schedule. Do not deviate from your work hours unless you have very good reasons.

- Increased productivity

By working at home alone, you can manage your work and concentrate on completing your projects. With the right attitude, environment, and equipment, your productivity will soar.

- Better lunches

One again, this advantage depends on the individual. If you have good leftovers or spend the time shopping for nutritious lunch food, you may experience a culinary benefit to working at home. On the other hand, some companies offer better cuisine than you may scrounge up out of your refrigerator.

- More options for exercise

If you like to exercise, you will need to schedule your workout just like you do your work day. At home, you can exercise in a spare bedroom, at a nearby spa, or even by working in the garden. Whether you gain or loose weight by working at home will depend on your will power, the resident temptations, your activity pattern, and whether you care. In any case, do not ignore your health when working at home.

#### **Corporate reasons**

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- Increased productivity

For all of the reasons listed above, your employer or client will benefit from the increased productivity. Most honest people want to be productive and yearn for new knowledge and recognition. Results provide the best metric for employee performance, not physical appearance in the cubicle.

- Potential to work more hours

Many employees must drop everything and

head home at a specific time in order to catch their car pool, pick up their kids, or beat the traffic. If you work at home, you can continue until you reach a more appropriate stopping point or you can continue working later in the evening. In any case, you are set up to produce even when it snows.

- Reduced demand for resources: facility, healthcare, other operating costs

From a pure economic standpoint, corporations benefit more as a larger percentage of the employees and contractors work at home, because of reduced demand for office space and parking space. Whether the company saves on equipment will depend on the situation. Obviously, if the employee or contractor provides their own equipment, the employer saves. Telecommuting technology does, however, impose some expense.

- Reduced office politics

If you are the only one in your office, politics loses its interest. Telecommuters tend to join in office politics less than employees who work in a company office. As a telecommuter, you determine if you have a window office, not the corporate hierarchy.

Unfortunately, an unevenly bestowed privilege to telecommute can lead to more political unrest. Employees remaining onsite may resent or mistrust the telecommuter.

- Improved ability to recruit and retain skilled workers.

"It's (telework) absolutely the No. 1 way to retain employees. It's not a perk, it's a business strategy," says Deborah Tucholski, the manager of the telework program at Arthur Anderson.<sup>2</sup> Reduction in turnover means a reduction in recruiting fees. These fees can run up to 25% of a recruit's annual salary! Some estimates state that it takes a year to replace lost high-tech talent when you include the time needed to find recruits and get them up to speed.

- Sharper management skills.

Managing telecommuters teaches you how to evaluate an employee's potential for telecommuting. In addition, it teaches you how to maintain open lines of communication (voice-mail and e-mail) and how to set clear and specific goals. By setting clear and specific goals, the manager feels more comfortable assigning the tasks to the employee and can

focus on other business goals.

### **Global reasons**

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- Avoiding the Crowd

The world population is now 6 billion. If policies remain unchanged this number is projected to double by the year 2050. Given the fact that most people tend to congregate in urban areas, telecommuting may not be optional much longer.

- Reduced contribution to pollution

Less driving means less air pollution and less demand for oil, whose extraction may lead to habitat destruction or water pollution. Reduced need for parking means less runoff from hardened surfaces. It seems obvious that telecommuting is environmentally friendly.

We may find some less obvious side effects that are not good for the environment, but it is hard to imagine any at this point. Some people may argue that telecommuting encourages urban sprawl or the movement of people into remote areas, which would lead to increased forest destruction and longer distances to travel for non-work related purposes. At this time, most telecommuters do tend to stay within reach of good telephone and electrical service, so there is a limit to how remote we can go.

- Reduced need for more highways

Continuing our logic of reduced driving, we would need fewer highways to move large masses of people. Unfortunately, the population still seems to be growing faster than the number of telecommuters.

During the live presentation, we will evaluate additional pros and cons from the perspective of the virtual office telecommuter versus the office-based telecommuter.

### **Disadvantages of and Obstacles to Telecommuting**

One of the biggest reasons that telecommuting is not more widespread is that management cannot visualize how it can work. Many of the concerns are justified, while some are not. In any case, the feasibility really depends on the people involved.

- Ethics and honesty

Trust is probably the most important attribute that must be earned by the potential telecommuter. If you have not demonstrated

your ethical integrity and honesty or you just do not have it, don't be surprised when you are not approved for telecommuting.

Managers, on the other hand, need to give credit and reward those who are reliable and honest. If you believe in McGregor's<sup>3</sup> Theory Y, you should understand that most employees will work hard, even when off site.

- Control and access

Managers typically feel that they will lose control of the employee or project, if they are not physically in the same building. If you have clearly defined the objectives and your employees are truly empowered to get the job done, how often do you really need to see their faces. Telecommuters are always a phone call or email away. You can check their work regularly, if you establish source management policies and monitor results.

- Communication between team members

Team projects used to be almost impossible for telecommuters, but today with thoroughly designed projects, well defined procedures, and the continual improvements in groupware, distributed teams achieve as much as centralized teams, if not more. Telecommuters must make the effort to communicate whether by phone or other means. The act of bouncing ideas off a peer is important, so make the effort to call other team members or coworkers. If they are busy, they will let you know.

- Cost

I have already addressed most of the cost issues. The biggest problem lies in the telecommuting technology. Several studies have suggested that supporting mobile users is very expensive and time consuming, but mobile users tend to be non-technical employees in sales or other disciplines. Telecommuting SAS programmers, on the other hand, are not usually mobile and tend to be more technical, so need less hand holding.

- Security

Pharmaceutical data is extremely sensitive. So security is a big factor for telecommuters who handle clinical trials data. Fortunately, most pharmaceutical companies have budgeted sufficient amounts of money to utilize the most advance security systems and firewalls. Do not assume that gaining access is a trivial matter, but you can assume that if a connection exists, they have a secure gateway for passage.

- Fairness

Touching again on the topic of politics, the option to telecommute can strain morale if that privilege is not bestowed evenly, or at least fairly. Obviously, not everyone wants to telecommute, but even those people may resent those who are working from home. Unfortunately, not everyone deserves or is qualified for the privilege, so it may be very difficult to implement a fair policy.

- Technology

During the live presentation, we will evaluate technology from the perspective of the virtual office telecommuter versus the office-based telecommuter.

## Personal and Psychological Considerations

Working at home is not as simple as most people imagine. You must be mature, responsible, and driven. If you do not enjoy your work, forget it. Before embarking on the short commute from your kitchen to your in-home office, consider the following points:

- Home alone syndrome

I am not suggesting that burglars are a problem, but rather that not everyone is cut out to work home alone. Many people dream of working at home, only to find that they are more gregarious than they realized. Be prepared and look for the symptoms. Before giving up, try to schedule lunches with friends or meetings with your manager or team once a week.

- Motivation and focus

Avoid boredom at all cost, because it leads to a lack of motivation and focus. Try to accept responsibility for non-critical projects as well as critical, so if your critical project is deadlocked due to factors outside your control, you can work on the non-critical project. Diversity is also the key to survival.

Otherwise, use the down time to learn new skills. If you are a contractor, go off the clock and study the latest features in SAS, read trade journals, plan your next project, or any number of valued activities. At all cost, be productive or you will lose interest in working.

- Scheduling and time management

As I stated earlier, you must schedule your work hours. You cannot start at a different time every day and expect to work full time. Optimize your errands by taking care of all your outside business in one trip rather than four. Take the time each morning to plan your day. If you set some goals each morning, you will feel much better about your accomplishments at the end of the day.

- Distractions and family

First, establish your office in a separate room that can be sealed off from family members, who may be at home. You cannot work in a room where others are watching television or kids are playing.

Working at home requires a commitment from family members. They must agree that when you are working, you are not available for conversation or assistance with household issues. You should not assume responsibility for all errands and household chores, just because you are home.

Also, do not be deluded into thinking you can work at home and care for babies or small children at the same time. If you have small children, use day care or, if they stay at home, make sure someone else is watching them. You can work at home with older children, as long as they realize you are only available for emergencies.

- Learn hardware and software support

As SAS programmers, we have all been spoiled by the availability of hardware and software support personnel. When you are working at home, you must learn to solve problems yourself. Understand the internals of your PC and your operating system. Develop a working knowledge of your communications protocol and software. If you do not make this effort, you will find yourself dead in the water at the most inconvenient time. You may even risk losing your privilege to telecommute.

- Education by osmosis hits an impermeable membrane

One of the advantages of working in a group is learning from coworkers. When you work home alone, you do not automatically receive this type of input. You do not have to lose this sharing, but you do have to make the effort to make it happen. You may have to spend more time

going to evening user group meetings or just calling coworkers to discuss technical issues.

In addition, you will need to proactively seek out new knowledge through technical journals and books. With telecommuting comes a responsibility to compensate for displaced benefits.

- The call from Ben and Jerry

Don't believe the old saying, "If nobody sees you, the calories don't count". If you do not have the willpower to stay away from the ice cream or cookies, you should consider not buying any or at least finding something less damaging to munch on. Locating your office on a different floor from the kitchen is often sufficient to discourage frequent visits.

## Non-SAS Technology

### Current technology

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The methods utilized for telecommuting usually depend on the work you are doing and the available types of connections. For example, if you simply work at home without connecting to the office, then take your completed work back to the office with you. Setup is quite simple. On the other hand, if you always telecommute, you may need to learn how to optimize information and data transfer through fast Internet connections or client-server strategies.

Over the past 9 years, Meridian Software has used almost every telecommuting technique available. In the beginning, we dialed into our client's mainframes using terminal emulation. We could develop offline using our own machines, but eventually had to upload and test. In the days before widespread TCP/IP availability, those connections involved SDLC or standard asynchronous dial-up sessions.

Today, the TCP/IP protocol has changed everything, due to its ease of use and its widespread acceptance by all vendors. We can connect to a distant Windows NT server, a Unix server, or even an IBM mainframe, all using TCP/IP. For example, we log onto a Georgia client's MVS mainframe from North Carolina by dialing a local CompuServe number to access a secure virtual private network (VPN). Once connected, we can use any IBM 3270 terminal emulator that supports TCP/IP. Other clients permit us to come directly through the Internet.

Telecommuting is more feasible today because most companies have installed routers, firewalls, and security that supports the remote user. Using email, Internet connections, point-to-point tunneling

(PPTP), and remote access services (RAS), the telecommuter is as accessible as all other employees.

In many software applications, we utilize non-SAS database management systems, such as Oracle or Microsoft SQL Server. Most DBMS vendors offer a workstation or single user version that enables you to simulate your production database environment for development purposes without connecting to your main office or client's system. The availability and affordability of these technologies have increased the feasibility and efficiency of telecommuting software developers. For more details on these techniques, refer to the SESUG presentation, *SAS Client-Server Development: Through Thick and Thin and Version 8* by Brinsfield<sup>4</sup>.

### **Future trends**

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Probably the number one technical trend that will facilitate more telecommuting is the continual increase in communication speed and bandwidth. Terminal emulation over a 56K modem is refreshing, but RAS or remote control over an ISDN line is almost like being there. With the introduction of ADSL, cable modems, and wireless data transmissions, telecommuters will eventually see no difference between working on or off site.

Once the high-speed connections are available, telecommuters can not only transfer data, they can utilize telephony and other IP based services to improve team communications. Software product developers are all racing to offer the newest and greatest portable solutions, which will also benefit the telecommuters even if we are not always mobile.

With advances in personal digital assistants and the decreasing prices of laptops, the cost of telecommuting continues to plummet. According to InformationWeek, Dataquest Inc. estimates the number of notebooks sold worldwide will almost double in four years. Clearly, technology will not be the biggest hurdle to future telecommuters. Only management, policies, and your personality will really get in the way of future telecommuting and even then, software will probably come to the rescue through innovative groupware and network based videoconferencing.

With advances in high-speed communications and perfection of security tools, remote connectivity will become the norm rather than the exception. With the incorporation of GPS into all portable computers, managers will have no problem figuring out where you are, or at least where your laptop is (stolen or on the beach).

Other trends for the future:

- Telecommuting programs will continue to embrace the alternative office (AO) / facility reconfiguration movement.
- Work anywhere, anytime.
- New partnerships and/or combined programs between telecommuting programs and other "tele" programs (tele-medicine, distance learning, etc.)
- Management will begin to realize that a telecommuting program can and will benefit their organization. However, the program must be set-up so that it is beneficial to all parties (proof of concept type of initialization).

During the live presentation, we will also discuss the following future trends:

- Broadband wireless
- "Smart Phones"
- Software applications based on Java applets and the CE operating environments
- Sun's JINI (Java-based distributed computing environment)
- Mobile IP
- VoIP
- VPN
- Application service providers
- Corporate portals.

### **SAS Technology**

#### **Current technology**

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Once you establish a TCP/IP connection, you can take advantage of many remote connectivity features in SAS. With that connection most of the SAS tools are independent of the non-SAS hardware and software choices you make, although a faster connection will have a direct impact on the performance of SAS remote processing.

If you telecommute by developing software on your own system and then delivering the final product or updates personally or via email, most of the following SAS features may not be of interest to you. But, if you need to access databases or data that is not feasible to transfer to your system or you are developing a fat client server application using SAS/AF or you are developing thin client server applications using SAS/IntrNet, you will find the following discussion interesting.

Regardless of whether you are using a direct dial-up connection, a VPN, or PPTP over the Internet, you can run a SAS/Connect fat client on your workstation that talks to the SAS/Connect host on the other end of the connection, if the host also has SAS/Connect software. If the remote node is on your network and the node name is 8 characters or less, you can just use that name. If the remote node is somewhere in the Internet and you must use an IP address, then you need to encode the IP address in a macro variable, as shown below.

```
%let dbhost=99.999.99.1;
options remote=dbhost comamid=tcp;
signon;
```

Once the connection is established, you can perform any of the standard SAS/Connect tasks, but be careful what you ask SAS/Connect to do. Again, refer to Eric Brinsfield's client-server paper for more details.

### Version 8

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SAS Version 7 and 8 have provided several enhancements that will make remote processing, and therefore telecommuting, more efficient. As a quick summary, note the following new features:

- SAS/CONNECT
  - Asynchronous Remote Submits - you don't have to wait for your remote submit to finish processing before you get control of your local session anymore.
  - Wildcards (\*) are now available in the UPLOAD and DOWNLOAD procedures
  - Remote Object Services
  - %SYSLPUT is now a full macro statement in Version 8, permitting you to create macro variables on the remote host from the local host.
  - Parallel processing through MP Connect
  - Autosignon - which automatically checks for a connection when you attempt to access the remote. If the connection was lost, SAS automatically signs on again.
  - Additional security features and encryption
  - Use of the Output Delivery System to format output for return to the local host
  - For more advanced applications, the Messaging Services that were introduced in Version 6 are improved.
- SAS/Access
  - With the support for long variable names, SAS/Access now offers more transparent

access to databases. The improved LIBNAME engine for relational databases permits direct access without access descriptors and options for DBMS data locking.

- Joins are automatically passed to the DBMS for processing thereby reducing transfer of data across your connection.
- SAS/IntrNet was improved and SAS Integration Technologies was introduced offering even more options for remote users and telecommuters.

### Future trends

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- SAS software will quickly move into the middle tier and third tier of three tier client-server applications. Thin clients will be used to access the power of SAS on the application server.
- As traffic in the Research Triangle Area of North Carolina grinds to a halt and Jim Goodnight runs out of room to construct building Z, more SAS employees will begin to telecommute. Consequently, the tools and support from SAS Institute for telecommuting will improve.
- SAS/AF, SCL, and SAS/EIS will fade into the background and SAS Institute will develop more JAVA and ActiveX classes that application developers can use in their thin client applications. The best GUI features we used in SAS/AF will reemerge in these classes.
- SCL will continue to evolve, providing powerful background functions, parallel processing, and messaging services.
- The live presentation will offer more projections for future telecommuters.

### Bibliography

- <sup>1</sup> Brinsfield, Eric 1997. *SuperSASapharmalisticTelecommutosis*, Proceedings of PharmaSUG 97 Conference
- <sup>2</sup> Fister, Sarah, 1999. *A Lure for Labor*, Training, February 1999, pgs 56-62.
- <sup>3</sup> McGregor, Douglass, 1960. *The Human Side of Enterprise*. McGraw-Hill, Inc. pp. 45-57.
- <sup>4</sup> Brinsfield, Eric 1999. *SAS CLIENT-SERVER DEVELOPMENT: Through Thick and Thin and Version 8*, Proceedings of SESUG '99 Conference

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