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THE FUTURE OF THE PATENT HOTELING PROGRAM AT THE USPTO

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Abstract

To evaluate the US Patent and Trademark Office's current telework program, the Patent Hoteling Program, and make recommendations on its future, our team analyzed data collected by the USPTO and researched similar programs at other public and private companies. From our research and analysis we developed a set of recommendations to enable the future expansion of the PHP, including the structure of a pilot program and identifying the potential risks involved with this expansion.

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Executive Summary

Introduction

The United States Patent and Trademark Office (USPTO) is continually expanding its Patent Hoteling Program (PHP), which in accordance with federal legislation requires employees to physically return to headquarters in Alexandria, VA, one day per week. As the USPTO looks to have this requirement waived by Congress, it seeks evidence that: 1) the program is operating efficiently and effectively, and 2) the USPTO has properly assessed the risks involved with a “full-time” telework program.

While there has been substantial research into the advantages and disadvantages of teleworking, there is very little research on how an effective teleworking model can be implemented or monitored. The need for this research is augmented by a report from TECHWEB (2008c) which found that a discouraging 25% of federal IT decision-makers actually monitor the return on investment from their teleworking programs.

Our project goal was to assess the current PHP and develop recommendations for the USPTO on the future direction of the program. The first task of this assessment was a review of performance data of examiners participating in the PHP collected by the USPTO. This analysis was followed by interviews with telework coordinators of various federal agencies and private companies. These interviews were designed to provide comparison points between the PHP and other telework programs and supplement the conclusions in our assessment of the PHP. These analyses allowed our group to compile a set of future risks the PHP may face and make recommendations.

Results

According to data collected by the USPTO comparing examiners before and after their entrance into the PHP, participating examiners have had a weighted average increase in production unit (PU) output of 0.45 PU per bi-week per person. Similarly, PHP examiners have, on weighted average, worked 1.54 additional hours of overtime per bi-week per person. The net result has been a productivity *gain* of approximately 1 GS (grade scale) 14 examiner for every 11.5 PHP participants.

Further bolstering the strength of the PHP are the comparisons from the interviews with other agencies and companies, which revealed the PHP is significantly ahead of other telework programs in structure, size, and technology.

Based on these results, it seems clear the PHP is ready to move forward to a full-time telework program. However, the USPTO must weigh the risks to the agency associated with this move. We found that these risks are largely dependent upon the overall success of the program, and the downside to the USPTO appears to be from the unlikely failure of the program.

Recommendations

Based on our findings, we recommend the USPTO attempt to implement the following to bolster the benefits of the program and the success of the USPTO:

- *Increased marketing.* Participation amongst lower-level examiners is comparatively weak, and an increased marketing campaign targeting entry-level examiners during the training academy would attract more of these lower-level examiners.
- *Distance learning pilot.* The current training structure of the USPTO will not support the goals of a full-time telework program. In order to adjust to a new training style,

we recommend the USPTO begin with a distance learning pilot that uses remote training for pieces of the overall program.

- *Full-time PHP pilot.* The current structure of the USPTO limits its recruitment pool primarily to the mid-Atlantic region. A full-time telework program would eliminate the need for examiners to live in the DC metropolitan area and increase recruitment capabilities.

1. Introduction

The work model known as “telecommuting” is one experiencing increasing use by companies today as technology in our society advances. Telecommuting is defined as a work and transportation alternative that substitutes traditional commuting with the option of working at home or at satellite work locations, both full and part time. Working outside the office involves a great deal of consideration from both the employer’s and employee’s perspectives, as the differences between working at an office with structured hours and working freely and individually at home or on the road are substantial. The freedom given to a telecommuting employee can be very appealing to some, but the decision to become involved with this type of model is a difficult one. Certain employee characteristics, in addition to the specific nature of the job being completed, must be addressed when deciding whether or not working off-site is best suited for both the employee and employer, and any analysis of an individual telecommuting model requires a general overview of the advantages and disadvantages for both.

The United States Patent and Trademark Office (USPTO), the sponsor of this project, began a new training method for incoming patent examiners designed to handle the enormous growth of employees the USPTO has experienced over the past few years. This has greatly increased the number of employees participating in the agency’s telework program, the Patent Hoteling Program (PHP), and the USPTO has been uncertain as to whether or not the PHP has been operating or being managed effectively as it prepares to expand from a part time to a full-time program. Poor productivity and efficiency, leading to a waste or loss of company resources, could result from these issues during such a change.

There are several potential problems that can arise when dealing with an employee or group of employees involved in a telecommuting model. The communication gap between remote and on-site employees could become an issue as there is less face-to-face time than there would be with all parties working on-site. In addition, many remote employees may face resource deficiencies and, as a consequence, be at a disadvantage to those on-site employees. The logistics of a telecommuting program also limit the amount of supervision and quality control a company has over its employees. A survey completed in 1996 on telecommuting in major industries including manufacturing, finance, and insurance showed that 89% of telecommuting employees surveyed dealt with a highly decentralized work database and an insufficient resource center (Hawkins, A.J., Hill, E.J., & Miller, B.C.,1996). Of those workers, 77% felt the amount of supervision they received and the reviews of their work were not on a par with an acceptable standard. This suggests that the limitations of teleworking can greatly reduce contact between employees and potentially disrupt the traditional work flow.

One of the major problems researchers face is relating past information gathered on telecommuting models with today's technological advances. The explosion of telecommunication technology over the past few years continues to the present day, a growth which has resulted in substantial differences in the impacts of working away from an office. Many of today's businesses have evolved to using electronic based networks, accessed by most members of the organization through computers. Electronic mail, video conference phone calls, and many other types of computer based resources may affect a person's decision to work out of the office. Research done on telecommuting in the 1980's and 1990's could not be expected to anticipate the possible adjustments in a

telecommuting model that advancements in technology have allowed. A model that has been documented and proven to work in the past may not prove to be appropriate today and may not provide suitable alternatives or useful approaches/solutions that can adequately address the needs of the USPTO.

The goal of our project was to analyze the USPTO's telecommuting model and provide practical recommendations on how to proceed with the expansion of the PHP, while improving the synthesis between the program and the goals established by the USPTO's strategic plan. Our objectives were to create these recommendations based on a consideration of several key components including human resources, IT support, communications, resource availability, management, decision making, training, and employee productivity and satisfaction. The information gathered during our interviews with other federal agencies, private companies, and a thorough review of existing USPTO data on the PHP allowed us to make relevant recommendations as to how the agency can prepare for the future. The implementation of these recommendations should improve the overall quality of the PHP and increase efficiency for both employees and the USPTO.

2. Background

According to Stephen Barr of The Washington Post (2007), the USPTO has maintained a strong teleworking program for over a decade and currently has approximately 1,300 patent examiners working 4 days per week from home, a number they hope to raise to 3,000 by the end of 2011. As reported by TECHWEB (2008a), this goal, further outlined in its five-year strategic plan, will be supported by an additional 159 million dollars for fiscal year 2009, an increase of 8%, bringing its total budget to \$2.075 billion from fee revenues. With this additional funding the USPTO plans to hire 1,200 additional patent examiners and expand their teleworking program and electronic infrastructure.

Teleworking is growing in other industries as well. According to an ICMI (2007) survey of contact centers, nearly 30% of contact centers currently have a teleworking program in place and an astonishing 50% of the remaining 70% have plans to establish a program within the next two years. This rapidly growing form of work has stirred controversy in both the academic and professional worlds. While many researchers believe the benefits of telework outweigh the negatives (Becker, 1986; Ferris, Hawkins, Hill, & Weitzman, 2001; Gordon & Kelly, 1996; Cullen, Gaboardi, Kordi, & Schmidt, 2003), there is virtually unanimous agreement amongst researchers (Bailey & Kurland, 2002; Cooper & Kurland, 2002; Hendrickson, 1999; Kraut, 1989; Nilles, 1998; Egan & Kurland, 1999) that pitfalls exist for both teleworkers and the companies that manage them. These pitfalls and the strategies to avoid them have become an issue of intense debate over the last decade, and this section reviews the opinions of many of the field's leading researchers.

First introduced to academia by Nilles (1975), the study of teleworking has grown dramatically over the last few decades, including an explosion of research in the late 1990's and early 2000's consistent with the great Internet boom. Today's research on teleworking is considerably more focused on the implications teleworking programs have on not only the teleworking individual, but on the company as whole, including the employees who choose not to telework.

2.1. What is Teleworking?

As defined by Webster's Dictionary (2008), telecommuting, or teleworking, is work done from home or outside the traditional office setting using a computer and a telephone. Teleworking does not require that an individual work exclusively outside the office, but there is no definitive time quota for an employee to be considered a teleworker by researchers, and this problem will be discussed later in this chapter.

2.1.1. Supplemental Work vs. Telework

Supplemental work, as defined by Venkatesh and Vitalari (1992), is work that is done in addition to a regular office schedule. This includes work done on weekends, evenings, and holidays that is not done when an individual would normally be in the office. They hypothesize that supplemental work is something done primarily by professionals higher in the corporate world who simply have too much work to finish during regular office hours. The difference between supplemental work and teleworking is often disputed and some researchers (Bailey & Kurland, 2002) believe these differences make sampling teleworkers problematic. They examine several issues that

might arise by including supplemental workers in surveys of supposed teleworkers including inevitably skewed data on the opinions about office resource availability, communication, isolation, and job satisfaction.

CDW's (2008) annual survey finds that more than 50% of federal and 20% of private sector employees who consider themselves teleworkers actually telework less than one day per week. These large percentages blur the line between supplemental work and teleworking and further strengthen the argument proposed by Bailey and Kurland (2002).

2.2. Who Teleworks?

There is a lot of disagreement in the academic world about who exactly teleworks. One of the problems studies have encountered is that many teleworkers are hired as contractors and not full-time employees, making their numbers difficult to count. Another methodological problem faced by both Kraut (1989) and Bailey and Kurland (2002) is that sampling techniques and the definition of a teleworker have resulted in varying estimates of the teleworking population. Cyber Dialogue's (2000) 1999 figure of 11.5 million people includes roughly 51 percent men and 49 percent women with an average age of 42 and an average household income of \$45,200.

These numbers are similar to data collected by the United States Department of Transportation (1993) and consistent with a large San Diego sample study done a few years earlier. However, Bailey and Kurland (2002) have found that a California state sample study concluded that teleworkers were nearly 65 percent male and primarily high income professionals, which they found consistent with the data from a Finnish phone

survey that concludes teleworkers are primarily high income, highly educated, male, and independent professionals. The reason for this discrepancy could lie in the definition of a teleworker used by the studies with regards to the supplemental workers discussed earlier.

Bailey and Kurland (2002) believe the Americans with Disabilities Act of 1990 was one of the most important teleworking reforms. The act has required many companies to set up a telecommuting program which provides employment for homebound individuals who would otherwise be unable to work. They argue that this act has had substantial impacts on employees without disabilities in addition to those with them, as companies who set up teleworking infrastructures to comply with the act inadvertently open the door to employees without disabilities.

2.2.1. Teleworking Groups

Despite the many differences in data, many studies seem to isolate a few distinct groups of people who would at least be more likely to telework than the general population. The first of these groups are male professionals. Despite the discrepancies in sampling, several studies (Bailey & Kurland, 2002; Venkatesh & Vitalari, 1992) have agreed that male professionals make up a large portion of the teleworking population. “Male professionals” are usually classified as high income, highly educated, independent professionals who use teleworking primarily as a means of advancing their career. As such, male professionals often cite productivity and efficiency as the major two reasons for teleworking and see it as an opportunity to do more work in less time. Olson and Primps (1984) hypothesized that many companies offered teleworking arrangements to

professionals that were consistent with a job-enrichment perspective, including an expansion of their already high autonomy in the workplace. This hypothesis was later reiterated by Bailey and Kurland (2002) who believe this special treatment may imply that status and power interfere with assessments of who is eligible for telework. The classification of these professionals as predominantly male suggests a somewhat sexist framing of telework research, a topic all but ignored in most studies.

The second of these groups are clerical workers who tend to be older and whose jobs do not require that they be in a physical office. Unlike professionals, Olson and Primps (1984) believe that upper management has largely capped the ability of many clerical workers to telework by limiting promotional opportunities and withholding permanent full-time status, vacation time, and other important benefits. This belief supports the idea that teleworking clerical workers are often older, as these employees will be less likely to seek job-enrichment opportunities. Similar to the preferential treatment of professionals, Bailey and Kurland (2002) again believe these limitations on clerical workers are a large reason why identifying teleworking demographics has become so difficult.

2.2.2. IT Programs and Their Impacts on Who Can Telework

Equally as important to many researchers as “who does telework?” is the question “who can telework?” This framing represents a broader perception of teleworking and attempts to isolate what percentage of eligible teleworkers choose to telework. CDW’s (2008) annual survey concludes that 40% of federal employees and 36% of private sector employees are eligible for a teleworking program. These numbers are significantly

inconsistent with the firm's own 2007 data, which found that a mere 15% of private employees were eligible for telework, while 52% of federal employees were eligible. CDW explains this explosion in private sector eligibility by a dramatic increase in IT support and other advances in the private sector's teleworking initiatives. They estimate that the number of private sector companies who provide IT support to teleworkers has increased by approximately 25% between 2007 and 2008, while the number of federal agencies that provide IT support actually shrunk by 2%.

CDW's survey does not stand alone, however, in its findings regarding the gap between federal and private sector teleworkers. Several researchers including Bailey and Kurland (2002), Gordon and Kelly (1996), and Nilles (1998) have all discovered inconsistencies with the teleworking programs of federal agencies and private companies, a topic that will be discussed later in this chapter.

The numbers reported in CDW's survey differ from a 2007 study done by TeleworkExchange on several government agencies, reported by TECHWEB (2008b), which found that nearly 80% of federal employees are eligible for full-time telework even though, consistent with CDW's data (2008), only 20% actually do. The study also concluded that of the 42% of employees who were unaware of their teleworking eligibility, 90% actually were eligible, and that one-third of the 664 employees surveyed were unaware that their agency even had a teleworking program. Because of this widespread lack of knowledge about teleworking programs, TeleworkExchange and many other researchers believe that federal spending on IT programs will increase dramatically over the next few years in an effort to improve telecommuting programs and achieve the goals set by many federal agencies, including the USPTO.

This belief is consistent with a study conducted by TECHWEB (2008c) which found that 68% of federal IT decision-makers expect telework spending to increase significantly over the next two years. The same study also noticeably found that a discouraging 25% of these decision-makers actually monitor the return on investment (ROI) from their teleworking program, a deficiency which has led to confusion on the advantages and disadvantages of many agencies' teleworking models.

2.3. Why do People Telework?

Bailey and Kurland (2002) describe the two main forces that lead people to telework as a supply and demand relationship. The supply forces come from the employer as they push employees out of the office, often to save on overhead and real estate expenses, to comply with federal regulations, and to operate more efficiently. The demand forces come from the employee and pull a worker out of the office for a variety of personal and professional reasons. One of the most common and well known of these reasons is that teleworking allows an employee to work from home, regardless of the size of the company they work for, which provides for a much greater freedom with regards to flexibility in personal life style. Other examples of these "demand" forces include family care, commuting costs, and personal preference for a quiet work environment.

2.3.1. Employer

Gordon and Kelly (1996) believe there are many advantages and disadvantages of teleworking for employers, some of which can be seen as either strengths or weaknesses depending on the efficiency of their implementation and maintenance. An incentive they

point out many companies have to use teleworking is its use as a recruitment tool. Many potential employees are unwilling to move across the country for a new job, but teleworking allows these people to work for a company without living in its geographical vicinity. This provides a major advantage to companies who are willing to adopt and implement a teleworking model. In addition, Nilles (1998) argues that teleworking provides for a substantially stronger retention rate, an asset valued by companies worldwide. He points out that it is not uncommon for people to move, and a teleworking program allows these employees to remain with that company, eliminating the costs of finding and hiring a replacement.

Bailey and Kurland (2002) believe one of the biggest advantages of teleworking is the reduced real estate and overhead costs incurred by companies who implement it. With fewer on-site employees, companies can sell or lease unnecessary office space and save on utilities and maintenance costs. They also point out that teleworking allows work to continue through circumstances that would typically halt work in the office, such as during snow storms. Sick days would decrease since people could work from their own homes on their own schedules, and the performance and productivity of workers may increase due to limited distractions and higher morale. They conclude by stating that teleworking provides for the possibility of expanding a company without the typical physical limitations imposed by available office space.

Despite these advantages, trust and control is a major factor in a company's decision to implement a telecommuting program. As pointed out by Tomaskovic-Devey and Risman (1993), trust and control are easier to manage in smaller firms where managers are closer to their employees, and as such, firms with large clerical workforces

are less likely to adopt teleworking. Supporting this argument are the results from a study conducted in 1998 (Bailey & Kurland, 2002), which concluded that half of full-time teleworkers were employed in firms with less than 100 employees. The study also concluded that one-quarter of full-time teleworkers were employed by firms of 1000 employees or more, a number that suggests larger firms are not as hesitant to adopt teleworking as Tomaskovic-Devey and Risman would have us believe.

Despite these advantages, there are several disadvantages of teleworking that can be discouraging to employers. Egan and Kurland (1999) argue that the ability to properly supervise and control teleworkers can be difficult considering the amount of time spent working outside of the office. They believe employers may be biased towards thinking teleworkers aren't working to their full potential due to this lack of supervision, a situation that can be frustrating for both the employer and the employee. Another challenge of teleworking involves maintaining the corporate culture of a company, a challenge the USPTO finds imperative (J. Dwyer, personal communication, September 3, 2008). Employees who spend little to no time in the office will have fewer chances to pick up the culture or environment of a company than those who spend their work days in the office.

In addition to this drawback, Egan and Kurland (1999) discuss how setting up a teleworking infrastructure is often costly at first. The hardware required for a complex teleworking system can be expensive, and many managers are hesitant to implement a program without thoroughly considering the benefits of their investment. Interestingly, TECHWEB (2008c) concluded that only 25% of federal IT decision makers, who are

required to implement a teleworking program, actually monitor the return on their investment

2.3.2. Employee

The motivation of any employee to telework stems from his/her interest in the incentives involved with it. Bailey and Kurland (2002) point out that the 1970s oil crisis in the United States gave rise to concern over the gasoline consumption from long commutes and the increased amount of traffic in major cities. This crisis, coupled with recent innovations in the field of telecommunications, provided an ideal situation for teleworking to grow. However, a study conducted by Hawkins, Hill, and Miller (1996) concluded that commuting was not a primary motive for telework, and that the reduction of travel time is actually a relatively small incentive.

Ferris, Hawkins, Hill, and Weitzman (2001) argue that teleworking can improve an employee's motivation and productivity through lesser amounts of stress when compared to working in the office. They also believe that teleworking enhances an employee's ability to care for family members and raise children. Bailey and Kurland (2002) hypothesize that women choose to telework so they can provide child care for their families and are more likely to list family benefits as a motive to telework than men. They refer to a study conducted in Singapore by Yap and Tng (1990) on the teleworking habits of women computer professionals. The study concluded that upwards of 75% of the 459 women who were surveyed chose family reasons as the major incentive for teleworking. However, Kingsman (1987) believes the results of this study are

inconclusive and inapplicable to American employees. Kingsman believes Americans are much more likely to classify their children as a disruption to work than other cultures.

Much like from an employer's perspective, employees also face the disadvantages of teleworking. While teleworking allows an employee to work from a remote location rather than a common office, Bailey and Kurland (2002) believe this can lead to undeveloped office and professional skills and a general loss of the corporate culture and traditional ways of the office place. Another disadvantage of teleworking is the social isolation an employee may feel, as being out of the office consistently may convince them that they don't belong to the organization. In addition, some teleworkers feel a lack of physical presence leads to being overlooked for promotions and salary increases.

Following the advancements in technology over the last decade, teleworking has become easier to manage and understand from a logistical standpoint. However, the loss of person-to-person contact and the ability to network socially have driven many would-be teleworkers back into the office.

2.4. Organizational Impacts

The public sector of teleworking is noticeably different than that of private organizations because public firms that telework have their workers under stricter, more rule orientated guidelines. Private firms are free to follow their own guidelines that are often less traditional when compared to the public management of teleworking. Cooper and Kurland (2002) point out that public teleworkers are organized in a hierarchical manner similar to that of the US government, a set up that does not necessarily lend itself as well to teleworking as a less centralized form of teleworking. They argue that

bureaucratic regulations often impede the potential progress and efficiency of some government teleworking programs.

Federal regulation requires that teleworking government employees be in the office at least one day per week (G. Vidovich, personal communication, October 8, 2008). This burden on the current teleworking model limits how far an employee can live from the office because of the necessary weekly commute to the office. This regulation is not imposed on private companies, however, and as a result private teleworking models are often substantially different from public ones. These differences are often further augmented by the pressure to increase teleworking initiatives and programs, as many government agencies are required to expand teleworking programs to meet federal requirements and strategic plans.

The control mechanisms of private and public companies also differ considerably. Cooper and Kurland (2002) argue that there is a weaker relationship between job performance and extrinsic incentives such as pay, promotions, and job security in public organizations than there is in private companies. They argue that public teleworkers may feel constrained by formal personnel procedures which similarly create a distortion between incentives and performance, and as a result many public teleworkers are less concerned with professional isolation than their private counterparts.

Cooper and Kurland (2002) reviewed a study regarding the effects of teleworking on four companies, two private organizations and two public organizations. The study was performed between 1997 and 1999 and highlighted the differences in professional isolation and employee development between the public and private sectors of teleworking. Both public and private employees agreed that professional isolation was

linked to the developmental activities teleworkers may miss out on, but private employees were far more concerned with the consequences of professional isolation.

Informal learning was a large issue for private employees who were concerned it would affect career enhancement. Public employees were less troubled with this issue again because they felt interpersonal networking played a lesser role in employee advancement and organizational effectiveness. Overall, the study concluded public teleworkers were less likely to associate teleworking as a hindrance to professional development and advancement, a conclusion that minimizes one of the larger barriers of teleworking for government employees like those of the USPTO.

2.4.1. Federal Agencies

According to Cooper and Kurland (2002) technological advancements have helped the federal government, the nation's largest employer, serve the needs of the American public more efficiently and effectively. As reported by the General Services Administration (GSA) (2000), federal employees have long used mobile work technology as a means to complete their duty. In recent years federal telework has become increasingly widespread and common, with legislative mandates as well as new program orientated support and structures. The GSA (2000) defines telework as a work arrangement in which an employee regularly performs officially assigned duties at home or other worksite geographically convenient to the residence of the employee. Telework serves multiple purposes and can have multiple advantages when implemented effectively into an organization.

For federal agencies, telework is of particular interest for its benefits for many reasons. They are able to recruit and retain the best possible workforce. Particularly those newer workers who have an expectation of an advancing technological based workplace as well as any worker who values the work-life balance. Telework helps employees manage possible long commutes and other work-life issues that could possibly have a negative impact on their effectiveness or lead to employees leaving Federal employment. Traffic congestion, emissions, and infrastructure impact in urban areas would all be reduced thus improving the environment. Another big advantage to a federal telework program is the government real estate savings that would occur, and therefore much taxpayer money would be saved. Government functions would be guaranteed to continue in the event of national or local emergencies with functioning telework employees spread out from one centralized location.

Telework arrangements in the federal government are most often part-time as opposed to full-time, although full-time telework does exist, including the teleworking patent examiners at the USPTO. Federal agencies often, at their own discretion, define and use the different types of telework to best fit their specific agency. There are many examples of this different type of “molding to best fit” telework. Federal agencies such as the Federal Deposit Insurance Corporation and the United States Navy have relatively new programs that are still very much on the rise. These programs deal only with a small percentage of the workforce who are generally working out-of-the-office only a couple days per week. By contrast, agencies like the USPTO are managing thousands of employees who are as close to full-time telework as the federal government allows with the requirement to return to the main office one day per week.

2.4.2. Private Companies

According to a national survey of federal government and private-sector employees, telework adoption continues to accelerate in the federal government and outpaces private-sector adoption by a three-to-one margin. Forty-four percent of federal employee respondents to a survey conducted by CDW (2007) indicate they have the option to telework, up 6 percent from 2006, while just 15 percent of private-sector employee respondents have the option. CDW reports this is partially because of an evolving notion of productivity. More and more private companies, however, are leaning toward a pro-telework initiative because the quality of telework technology and security are no longer major concerns. This is due to high-speed internet access, online collaboration tools and data protection.

According to Cooper and Kurland (2002), similar to federal agencies, private companies are attempting to become more cost efficient by implementing telework modules into their operation. Companies such as GeoConcepts Engineering, Southern Maryland Electric Cooperative and Booz, Allen, Hamilton Corp. are introducing and increasing number of employees to the teleworking profession. Engineers and salespeople, for example, are working for these types of companies. Though different in many aspects, the way in which the training, communication, and productivity evaluation of these teleworkers is carried out can still be used to compare and contrast to that of the USPTO telework model.

2.5. Management of Teleworkers

The management of teleworkers is an extremely important factor in a good teleworking program. In federal agencies and most private companies a Telework Coordinator is assigned to be in charge of the entire program. The Telework Coordinator acts as a key contact for policy and program questions. According to Telework.gov (2007), a government-sponsored website that supports employees, managers, and telework coordinators in implementing and maintaining a teleworking program, there must be frequent contact between the Telework Coordinator and the managers, as well as the employees and the managers, to ensure the agency's policy and procedures are correctly utilized.

A telework policy is commonly found in federal Telework agencies (G. Vidovich, personal communication, November 4, 2008). This policy must be met with full compliance by both employees and managers, as it establishes the general parameters that are set by existing legislation as well as anything the agency or company feels necessary to the success of the program. According to Telework.gov (2007), management has the ability to determine who is eligible for teleworking through tenure requirements, grading systems for the employees, or any other means they feel necessary. At the USPTO, eligibility requirements include two full years of service, a minimum of GS 12, and a productivity rating of at least "fully successful" as established by management (G. Vidovich, personal communication, November 4, 2008). Managers are required to maintain good communication between themselves and employees, which offers better insight into an employee's ability to cope with the teleworking structure.

2.5.1. Supervision of Teleworkers

The supervision of remote employees is often challenging for many managers, and the solutions to some of these problems have just begun to be explored. Many researchers believe the measurements of productivity are not equivalent between teleworkers and non-teleworkers, a belief that leads many researchers to take a deeper look at the “justice”, or basic management styles, associated with teleworking. This is conveyed through three main areas of justice in the work environment as defined by Ramsower (1985): distributive justice, procedural justice, and interactional justice. The framing of these areas forms the basic foundation for managerial and employee attitudes towards teleworking, which becomes an important aspect of any telecommuting model.

According to Ramsower (1985) distributive justice is the perception employees have of the potential benefits and incentives available to them. He refers to the study of a specific teleworking model which analyzes how perceptions are related to work productivity and the effectiveness of the work model. The study investigates whether or not teleworking employees receive fair compensation for the work accomplished, which leads to the discovery that a telecommuting model can impact distributive justice primarily in two ways. First, telecommuters can view their choice to telecommute as a reward in itself by not traveling, being at home, etc, in which case telecommuting would have a positive reflection on distributive justice. On the other hand, telecommuters may feel that they are being denied potential promotional opportunities by being physically isolated from their organization. Employees who are not around the office every day may be overlooked or forgotten when important assignments are distributed, and even employees who are rewarded with the chance to telecommute may feel like future

opportunities or promotions may be limited by not being on-site every day. This framing of telecommuting leads employees to develop a more negative view of distributive justice than those who believe teleworking is a privilege.

Ramsower (1985) defines procedural justice as the perception employees have on the fairness of their manager's evaluations rather than the actual distribution of these benefits. This form of justice is a key structural element to a normal work environment, and telecommuting poses a potential adverse effect for it. Proper communication is essential for a positive perception of procedural justice, and Ramsower believes teleworkers often lack this necessary communication. As a result he believes many teleworkers feel their managers evaluate them unfairly, when the problem actually lies in a more general failure to communicate effectively.

On the other side, manager's reactions to the isolating effects of telecommuting discussed earlier may push the structural elements of procedural justice to improve. Supervisors may take extreme precautionary measures with information to ensure that telecommuters are being informed of all important information. Ramsower argues that formalized or standardized rules and procedures are a necessity to reduce the chances of bias in the workplace. With this standardization, goals are more clearly identified and injected into the organizational structure rather than left to the imaginations and opinions of employees. This serves as an assurance to telecommuters that the evaluation of their work is equivalent to the evaluation of in-office employees and turns an otherwise negative perception of procedural justice into a positive one.

According to Ramsower (1985) interactional justice is the perception an employee has of his/her relationship with managers and co-workers. It is the sensitivity employees

have of the respect and trust extended to them by their peers. Ramsower argues that employees who believe their supervisors treat them fairly and with respect feel less of a need for the formal procedures laid out earlier, and from a positive perspective telecommuting acts as a signal to employees that their manager trusts them enough to allow them to telework. However, framed from a negative perspective, teleworkers may be led to believe their supervisors are enforcing the professional and social isolation discussed earlier in this chapter. Similar to the difficulties faced with distributive and procedural justice, interactional justice is more of a perception problem than a physical component of a teleworking model and it must be addressed as such.

2.5.2. Developing Solutions

Researchers (Ramsower, 1985, Bailey & Kurland, 2002) have pointed to formalized communication, job descriptions, and standards as well as measurable outcome-based evaluations as a means of positively influencing a teleworker's perception of supervision. According to Nilles (1998), however, none of the issues or problems should be considered a barrier to teleworking; they simply illustrate how things can go wrong if a teleworking program is not well thought through. In instances where a teleworking model is being implemented in the wrong setting, such as when a task does not translate well to teleworking, these "judicial" problems should be expected. Nilles argues that these instances simply do not lend themselves well to teleworking, and that it is not a viable work alternative. He argues that the only effective method of dealing with these problems is for a company to analyze all possible means and consequences of executing a telecommuting model before implementing it. He also insists that any

company that experiences these problems after implementing a teleworking model must thoroughly review it to ensure that it remains an effective work alternative in the world's ever-changing environment.

2.6. The Impacts of Teleworking

After implementing a teleworking program, the impacts of the work arrangement between employer and employee are felt throughout the company. Employees working outside the confines of the office and away from their employer can have a strange effect on the way certain information is communicated. These impacts cross various components of the company and provide for both negative and positive reactions. These impacts are not limited to teleworkers, however, and an entire organization must adjust to cope with the impacts of a telecommuting program.

2.6.1. Training

The recruitment and training of employees are essential for the success of any telework program. Recruiters look for the best possible workforce that would benefit the company or agency. A top quality many recruiters look for is motivation and high expectations. According to a report (General Accounting Office [GAO], 2004) on the Telework.gov website, agencies look for workers who value the balance between work and life, a balance that is more flexible in allowing employees to meet both personal and professional obligations. There are a few different options of training that are available to teleworking programs that can further supplement this balance. As opposed to traditional one-on-one training, which can be slow and expensive, a classroom style training method

provides the ability to train large numbers of employees or teleworkers at once. The USPTO currently uses this method of training.

2.6.2. Employee Retention

According to Bailey and Kurland (2002) teleworking can reduce the need to relocate workers, and in turn reduce turnover amongst employees, boosting retention rates. With fewer employees in the office companies can sell property or shift employees to create space for storage or additional employees, which can make management happy. Ferris, Hawkins, Hill, and Weitzman (2001) believe this better comfort level will lead to increased productivity amongst office workers, not solely those who telecommute from their homes. This will again lead to increased retention rates amongst these in office employees, creating a “two-fold” benefit package for a company.

2.6.3. Social Costs of Telework

According to Ramsower, (1985) teleworking can often result in so called “social costs”, which are the impacts felt by individuals in the company who choose not to telework. Largely in disagreement with Cullen, Gaboardi, Kordi, and Schmidt (2003) and Ferris, Hawkins, Hill, and Weitzman (2001), Cooper and Kurland (2002) believe these costs are often the result of a shift in the advantages and disadvantages faced by various individuals in the company. For example, some of the more menial on-site tasks will be passed from employees who move out of the office to those who remain behind, which may lead some of the latter to feel resentful towards teleworkers. Cooper also points out that teleworkers who leave the office to eliminate distractions will likely force those

distractions upon employees who remain in the office. As a result the distribution of disadvantages will shift from teleworking employees to non-teleworking employees.

2.6.4. Communication and Isolation

According to Hendrickson (1999) many teleworkers often limit the time spent out of the office for fear of professional isolation, which many believe adversely affects future job development and chances for promotion. Isolation from the office is taken very seriously by teleworking employees and their employers at all times. The issue relates to the social costs of teleworking discussed earlier, and can be seen as a similar shift in advantages from teleworking employees to non-teleworking employees. There are two types of isolation: professional and social. Professionally, employees fear that by not being physically seen and noticed they will not be as frequently considered by managers and human resources when making raises or promotions. Socially, employees feel that they miss the informal interaction with colleagues. Whether telecommuters experience social isolation depends more on whether or not they work directly at home or if they are working at a remote office or work center, where such isolation is less likely. Professional isolation, however, is often felt regardless of the type of telework being done, because telework nearly always requires employees to be geographically distanced from managers and coworkers.

3. Methodology

The primary goal of this project was to provide recommendations to the USPTO on how to improve the synthesis between the Patent Hoteling Program (PHP) and the goals laid out by its Strategic Plan. Our background research, supplemented by guidance from our liaisons, identified several core elements of the program that needed to be investigated further. In order to address these issues and achieve our overall goal our group designed a five step process which isolated measurable objectives and the means by which they would be accomplished. This section describes the major research questions outlined by our five step process and addresses how these questions were answered and assessed.

3.1. Analyzing Existing Research

The first three steps in our process were designed to quantify the benefits or weaknesses of the PHP for the USPTO. They relied heavily on data collected by the USPTO over the previous year and formed the basis for future research we carried out on other companies and government agencies.

The first step in our five step process was to categorize a large set of data previously collected by the USPTO to provide for an easier and more comprehensive analysis later in our project. This dataset consisted of three surveys distributed to PHP examiners, non-PHP examiners, and Supervisory Patent Examiners (SPEs) as well as a large number of productivity, efficiency, and other related numerically measurable statistics. The data were categorized at a primary level by relevance to the other items in the category; for example, all information related to productivity was categorized

together, while all data related to employee morale were categorized separately. The data were then categorized at a secondary level in several different ways including by length of time a respondent had been working in the PHP program and his/her General Schedule (GS), or pay grade, level.

The second step of our five step process was to identify trends amongst the data previously collected, both within certain categories identified in our first step and amongst the different categories. Trends were determined by examining base-percentage changes and by net change on a period-by-period and grade scale level basis using Microsoft Excel.

The third step of our five step process was to quantify the benefits or shortcomings of the PHP using the data compiled in our first two steps. Using USPTO-standard assumptions collected by our group and the results of our first two steps, our group quantified the results the USPTO has seen thus far from the PHP. These calculations were designed to display the production gain/loss the USPTO has seen from the program and not the monetary gain/loss.

3.2. Comparing Telework Models

Step four involved the research and analysis of several federal agencies and private companies using teleworking. This process was designed to provide comparison points between the USPTO's PHP and other companies' and agencies' teleworking models through side-by-side comparisons with information collected from phone interviews with telework coordinators. These comparisons targeted specific components of a teleworking program the USPTO believed to be the most crucial to the future success

of the PHP. They were then used to formulate and construct potential solutions to the obstacles the USPTO is currently facing and further analyzed in step five. In order to make these comparisons, our group utilized references from the USPTO's Senior Advisor to Telework, search engines, and government sites to locate government agencies and private companies using teleworking and gathered contact information for each.

3.2.1. Productivity, Work Quality, and Communication

The first component of the teleworking model our group focused on was the efficiency of the program with respect to productivity, work quality, and the effective communication practices of teleworkers. The USPTO closely monitors examiners' production output and quality with individual biweekly "report cards", and supervisors are able to quickly review and analyze an examiner's progress, productivity, and workflow breakdown over a variety of time periods. This high level of technical and statistical review dictated that we include companies and agencies that focused on measurable outcomes similar to the system used by the USPTO. The companies and government agencies we selected included the Federal Deposit Insurance Corporation, the US Navy, the Defense Information Systems Agency, Southern Maryland Electric Cooperative, and Geo Concepts Engineering, Inc.

Our interview protocol (See Appendix B) was designed to extract information that would address the issues of productivity, work quality, and communication, and allowed us to evaluate the quality of these categories with respect to the other agencies and companies we examined. In the interviews we discussed key issues including workplace trust, self discipline, communication formality, productivity evaluation, work quality, and

disciplinary actions. In addition to gathering this information on various agencies and companies, our group collected this information on the USPTO to supplement the data analyzed in our first three steps and to establish the comparisons mentioned earlier in this section.

3.2.2. Travel Compensation

Another important topic of investigation was the issue of resolving travel time and expense compensation. A major question of the USPTO was to see how other companies dealt with teleworkers returning, if at all, to the headquarters or main office throughout the year. Our interview protocol with other agencies and companies inquired how these required returns to the main office by teleworkers were dealt with, and whether they felt this was a necessary standard. The interview protocol also asked respondents to discuss the compensation given to teleworkers for the travel expenses to and from the main office for these returns and whether travel time was considered part of regular work hours, overtime hours, etc. Such compensation could be considered wasted money and lost productivity for a company. With the possibility of having employees scattered across the country, for the USPTO such losses due to travel could be significantly relevant, and they wanted to have a better understanding of how other agencies and companies were dealing with the problem.

3.3. Determining the Potential Risks of a Full-time Telework Program

The fifth and final step of our project focused on the potential risks the USPTO may face when implementing a full-time telework program. We organized a list of major

risks and elaborated further on each individual section. The list included areas such as information technology (IT), human resources (HR), expenses, personnel, training, and “Plan B” feasibility. Through research and interviews with current USPTO employees and managers we developed several possible courses of action to hedge or offset these potential risks.

The first section partitioned the IT risks into three parts: bandwidth, network security, and equipment distribution/return. We interviewed James Thompson of the Search and Information Resources Administration (SIRA) at the USPTO about IT challenges the USPTO currently faces with the PHP and the potential risks that could develop from the PHP moving to a full-time telework program.

Next we analyzed the HR department’s policies of handling issues and conversations with teleworkers. Through an interview with Jennifer Culver, an employee relations specialist at the USPTO, we discussed challenges that occur in HR, focusing specifically on termination, isolation, and corporate culture amongst PHP participants. We also discussed what these examiners and managers could face if a full-time telework program were established.

To better understand the expenses associated with a full-time telework program we again spoke with James Thompson of SIRA. We discussed the expenses the USPTO currently faces as well as the expenses a full-time telework program may bring. These potential expenses included the cost for return of an employee, the need for more/less office space, and the subsidization of equipment and high-speed internet costs for teleworkers.

The current report card system in place at the USPTO has proven to be effective in closely monitoring the production of its employees. By determining the expected production of its employees and comparing this to actual production on a bi-weekly basis (see Appendix C), the USPTO has been able to ensure the highest quality of work amongst its examiners. While this system will be equally as viable in assessing a full-time telework program, the lack of face-to-face management may affect a supervisor's ability to actively engage and motivate employees. With the success of the USPTO relying heavily on the productivity of its examiners, the ability of supervisors to manage remotely will prove to be a crucial component of a full-time PHP. To assess the impact this transition may have on the USPTO our group used background research and the beliefs of several USPTO managers to aid our recommendations.

Training for both teleworking and non-teleworking examiners has undergone considerable changes in the last few years, as it has moved from one-on-one training to a university lecture-based approach, a move mandated by the overwhelming number of new patent examiners. Despite this adjustment in training policy and increase in the size of the program, the one constant that has remained throughout is the Alexandria, VA, location of the training academy. This constant has fallen under recent reconsideration, however, as the USPTO looks to determine the feasibility of remote officers and/or a nationwide, full-time telework program to conserve real estate and other overhead related expenses.

Our group first reviewed a report conducted for the USPTO by Jones, Lang, and LaSalle in 2007 on the plausibility of establishing remote offices. Next, in order to investigate how other agencies and companies have addressed the issue of remote

training, our interview protocol included several questions structured around training programs. In particular, our group looked to identify any successes in using a Computer Based Training (CBT) program or other remote training methods and how they were implemented and maintained.

In summary, our project centered around three principal objectives: analyzing existing USPTO data, researching alternative solutions by examining other agencies, and determining the potential risks of a full-time telework program for the USPTO. Our five step process was designed to break these objectives into chronological, manageable pieces and accomplish our overall goal of providing recommendations to the USPTO on improving the synthesis between the PHP and the goals established by its Strategic Plan. The results of these methods will be discussed further in the next chapter.

4. Results and Analysis

The goal of this project was to assess the current PHP and provide recommendations to the USPTO regarding the future of the program. This chapter conveys our findings with regards to our major research questions, including a quantitative and qualitative analysis of the current PHP and a risk analysis of its future. It also addresses these findings in the context of our stated goal to provide recommendations to the USPTO on the future of the PHP.

The chapter is divided into three major sections, both for ease of understanding and organizational relevance. The first of these sections reviews numerical data collected by the USPTO with regards to the Patent Hoteling Program and quantifies the benefit, if any, the USPTO has received from the program. The second section contains the results of a series of interviews conducted with various telework coordinators at other federal agencies and private companies with regard to their telework programs and their structures. These findings are then compared to the PHP to support recommendations on improving the program. The final section identifies the potential risks associated with expanding the PHP nationwide on a full-time basis and how these risks may be hedged, dealt with, or largely offset.

4.1. An Evaluation of the Patent Hoteling Program

As mentioned in our methods chapter, the first part of our group's analysis was to review a large set of quantitative data collected by the USPTO designed to determine the efficiency of the PHP and identify potential weaknesses in the program. These data provided measurements on various aspects of the PHP including the demographics of the

program, production output as measured by production units, expectancy percentage, and time claimed breakdowns. This section will analyze these data on a topic-by-topic basis and attempt to quantify the overall strength and the advantages of the PHP for the USPTO, the first objective of our project. It should be noted that with the exception of the demographic data, all data are based on a sample of 1050 examiners who have been in the PHP for a minimum of 6 months.

4.1.1. Program Demographics

The Patent Hoteling Program was first established as a pilot program in 2003 and fully implemented in 2006. Since this implementation, the USPTO has closely monitored the examiners in the program and tracked the number of participants on a biweekly basis. Table 1 displays the most recent distribution of examiners participating in the PHP. Note that the majority of the 1,369 participating examiners are between US civil service grade scale twelve and fourteen (96%) and have been in the program for more than twelve months (68%).

Two examiners not shown in Table 1 whose grade scales were labeled “N/A” and “GS11” have been identified as two separate coding errors in the administrative system (PALM) but are insignificant with respect to the overall number of examiners in the program and do not have an impact on our analyses.

Table 1: PHP Participants by Grade and Length in the PHP (as of 11/13/08)

Length in Program	GS12	GS13	GS14	GS15	Totals	% of Total
< 6 Months	70	47	65	4	186	14%
6 - 12 Months	55	101	93	5	255	19%
1 - 2 Years	1	98	354	15	468	34%
More Than 2 Years	0	10	413	36	460	34%
Totals	126	256	925	60	1,369	100%
% of Total	9%	19%	68%	4%	100%	

The grade scale distribution is easily explained by the USPTO’s requirement of a minimum of GS12 to participate in the program, but the distribution reveals some interesting trends. As displayed by Figure 1, the rate of increase of new GS14s and GS15s appears to be declining considerably, as evidenced by the relatively small number of examiners in the program for less than one year compared to those in the program for more than one year. Equally as noticeable in Figure 1 is the polar opposite trend in the rate of new GS12s. Overall the data suggest the PHP was more appealing to higher level examiners at the outset, but its benefits or appeal appear to be recently shifting more favorably to lower level examiners.

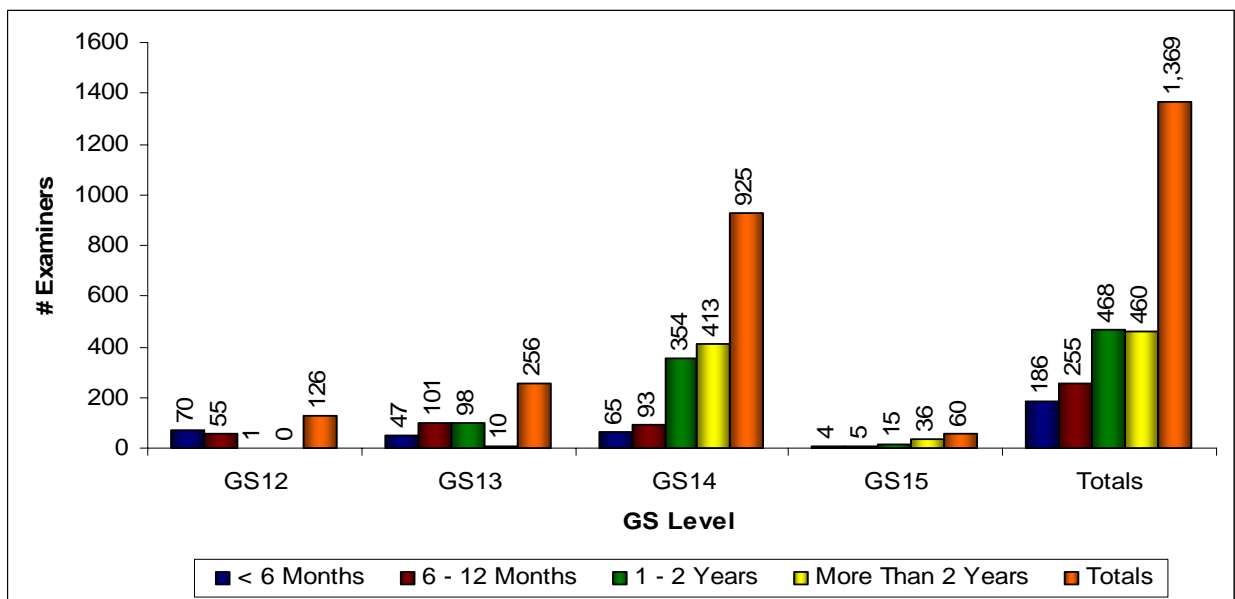


Figure 1: Number of Examiners by GS Level and Length in the PHP (as of 11/13/08)

The seemingly most plausible explanation for this phenomenon is that the original participants were more experienced, higher level examiners, often living farther away in the suburbs with families who needed the PHP to save commuting costs, time, and the flexibility advantages for taking care of children. However, considering most of these examiners would have signed up for the program at the outset, there is a dwindling level

of interest for the PHP amongst the remaining GS14 and GS15 examiners. Simultaneously, many of the younger examiners who originally never considered working from home are experimenting with it as the PHP becomes more established at the USPTO, a growth that may be attributed to a combination of examiner word-of-mouth and an increase in program strength, participation, and marketing of the program.

To sustain the growth of the PHP, a major goal of the program and the Strategic Plan of the USPTO as a whole, the USPTO must be able to convince new examiners that the advantages offered by the PHP will outweigh the disadvantages. In particular, the untapped market appears to be lower level examiners, namely GS12s and GS13s, who have perhaps simply not considered the work-at-home alternative.

4.1.2. Production Units

The USPTO monitors its examiners' production output on a biweekly basis through a measurement known as production units. A production unit can be recorded after a variety of examiner actions, and the USPTO standard assumption states that a patent typically includes two production units from start to finish. They are structured such that the length of time an applicant or lawyer takes to file the necessary work does not affect the examiner's ability to record PUs, as it would if the USPTO simply used patents completed as a measurement of production. This prevents examiners from having their production numbers suffer due to stalling applicants.

As seen in Figure 2, regardless of grade scale level the PHP has resulted in an overall average increase in production units per two weeks, or one pay period. As also displayed by Figure 2, GS14s and GS15s have seen the largest increase in production

from the PHP compared to GS12s and GS13s. This further supports the hypothesis presented in the previous section by showing that higher level, more experienced examiners have seen a larger increase in production from the PHP than younger, less experienced examiners.

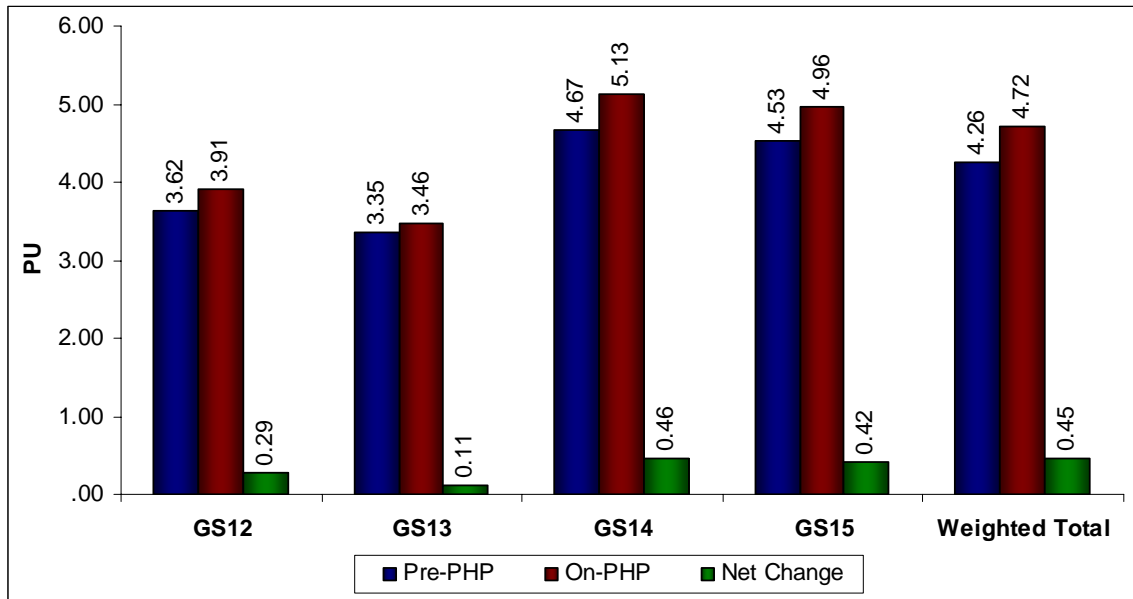


Figure 2: Change in Production Units per Pay Period by GS Level

This weighted total of an increase of 0.45 production units means that for every two weeks, an examiner in the PHP is producing nearly half a patent more than what was being produced by the same examiner prior to the PHP. As a fee-driven organization, this is a very favorable condition for the USPTO, and as we will see later in this section, for the individual examiners as well. The approximate quantitative benefits of the PHP for the USPTO will also be calculated later in this section.

As mentioned earlier, it should be noted that these numbers do not reflect the PHP population as a whole but rather a sample of 1050 examiners, all of whom have been in the program for longer than six months. This will most likely not be perfectly reflective of the new examiners, whose GS distribution is noticeably different from the one used in

this sampling, as demonstrated earlier in Table 1. However, with no plausible means of obtaining these data, our analysis will assume that the weighted total observed here is approximately reflective of the overall population. Further supporting this assumption are the data presented in both Figure 2 and Figure 3, which show that the productivity increase of GS12s and examiners who have been working less than one year is not alarmingly, or even substantially, less than the overall weighted totals. As shown in Table 1, these groups make up the majority of examiners not included in the data reflected by the graphs and calculations presented in this project. Because of this, the minor difference that does exist will result in a slightly aggressive assumption when we perform our calculations later in this section.

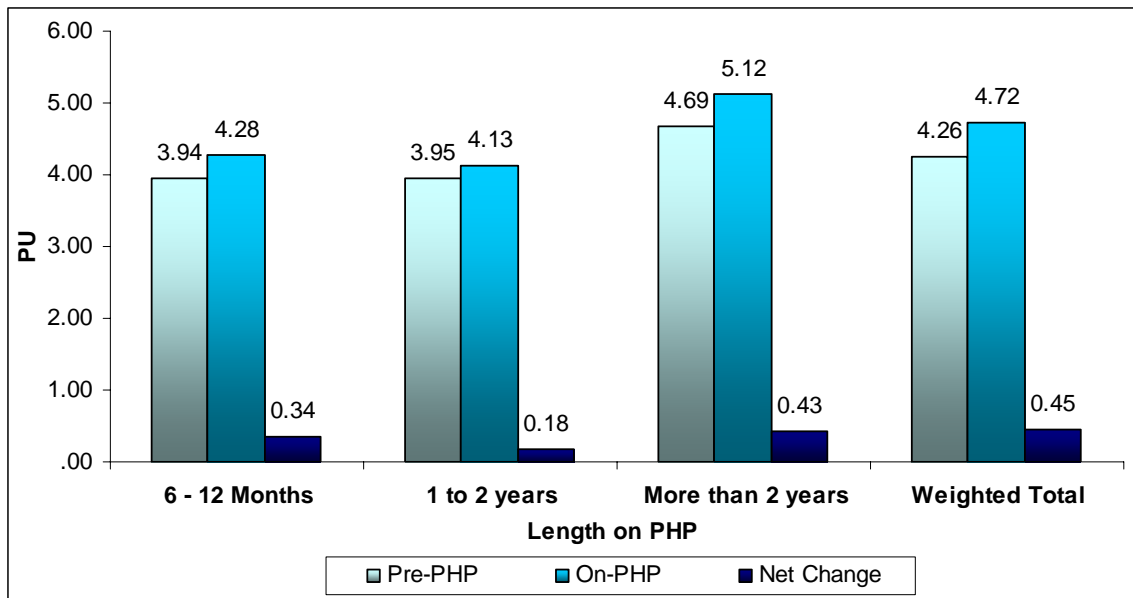


Figure 3: Change in Production Units per Pay Period by Length in the PHP

4.1.3. Time Breakdown

When examiners submit their biweekly time cards for approval by their supervisors they can record their hours in four different categories. The first of these is

considered “Regular” or “Examination” time, which is time spent examining patent applications and completing any associated work. The second is “Holiday/Leave” time, which includes vacation time, sick leave, holidays, administrative leave, and any other type of leave granted by a supervisor. The third is “Other” time, which is time spent “on-the-clock” while unable to perform work-related functions, including time during technical difficulties or equipment failure. The fourth is “Overtime”, which is any time worked in addition to the 80 hour bi-week with the approval of a supervisor.

Figure 4 shows the average time breakdown per pay period, in hours, of examiners prior to the PHP and after joining the PHP. It should be noted that regular time, overtime, and other time all increase while holiday/leave time decreases.

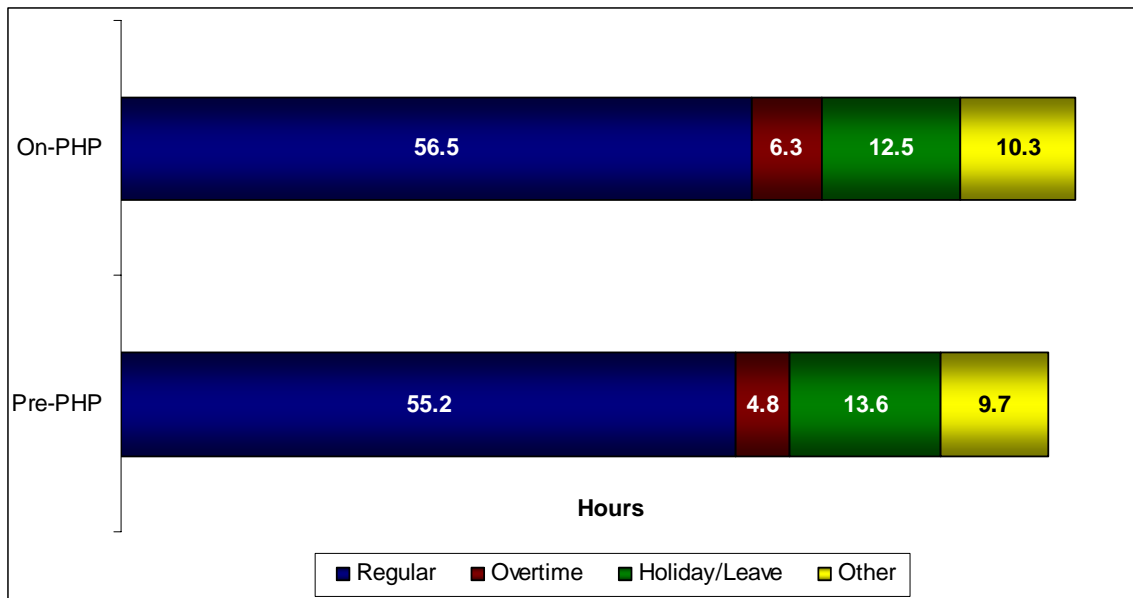


Figure 4: Average Time Breakdown per Pay Period in the PHP

The increase in regular time is most commonly attributed to a removal of distractions from the workplace, while many experts (Bailey & Kurland, 2002; Ferris, Hawkins, Hill, & Weitzman, 2001; CDW, 2007) would agree that the decrease in holiday/leave time is largely a result of an increase in examiners’ willingness to work

while sick or during bad weather conditions. Together these two pieces of data provide evidence to support the claims many researchers make with regard to the advantages of telework. Equally as evident and predictable from Figure 4 is the increase in other time. This increase is often explained by a teleworker's diminished IT support, technical capabilities, and physical isolation. Examiners in the PHP are more likely to experience longer periods of time with broken computers or network problems because IT support staff cannot simply walk over to the computer and examine the problem. This increase in other time is again evidence to support the claims many researchers make with regard to the disadvantages of telework.

These facts aside, the most important piece of data is not the breakdown of time but the change in performance, which we have already shown improves amongst examiners in the PHP. The only significant factor with regard to time left unexplored is the increase in overtime and consequently the increase in salary paid, which to individual examiners is the primary benefit of the PHP. An increase in overtime results in an increase in the amount of salary the USPTO pays out on a biweekly basis. This increase must be justified by an increase in production; otherwise the program is operating at a net loss.

Here we once again must consider the distribution of the population assessed by these data. As shown in Figure 5, the longer an examiner is on the program, the more overtime and the less regular time are claimed as a percentage of overall time. This would imply that the total population would actually average less overtime and more examination time than the data display. This makes the calculations later in this section

slightly conservative, a stance that works to at least partially offset the somewhat aggressive assumption made earlier with regard to production unit increases.

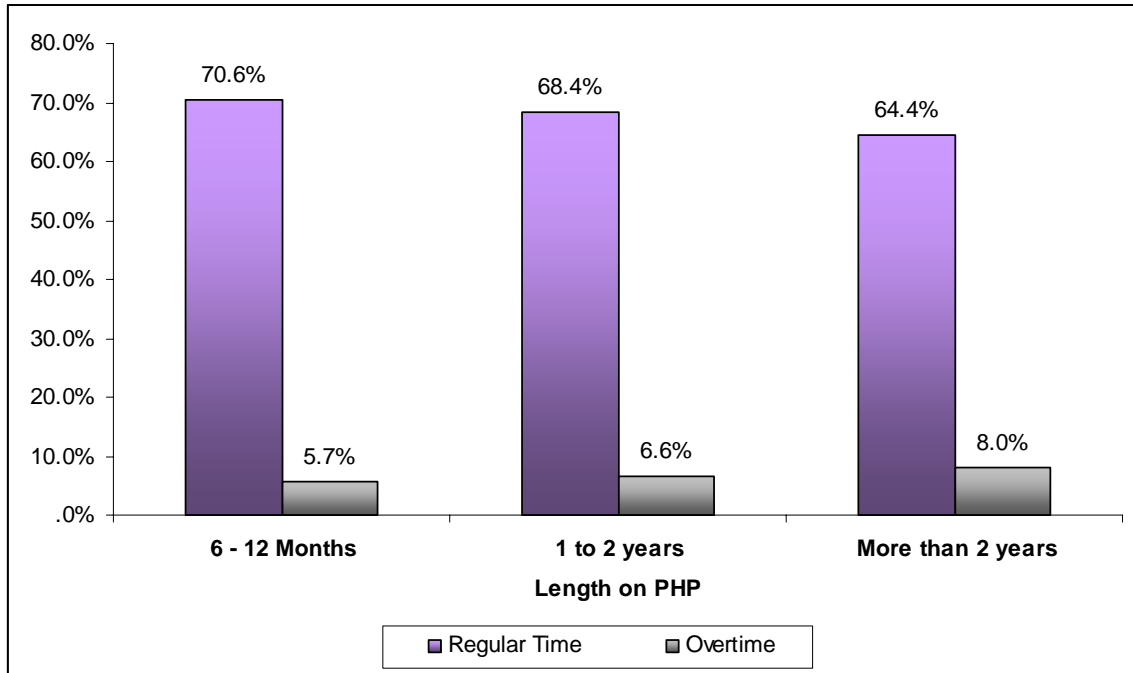


Figure 5: Percent of Overall Time per Pay Period by Length in the PHP

4.1.4. Cost-Benefit Analysis of the Current PHP

As we have already noted, the average increase in production units (PU) per examiner is 0.45 per pay period (PP), a number we will assume applies to the population as a whole. All other assumptions used in this section can be found in Appendix E. Using this assumption, we can calculate the number of production units gained per fiscal year (FY) from all examiners in the program as follows:

$$0.45 \text{ PU/examiner} * 1,369 \text{ examiners} * 26 \text{ PP/FY} = 16,017 \text{ PU/FY}$$

As shown in Figure 4, the average increase in overtime per examiner is approximately 1.54 hours, so we can calculate the overtime added by the PHP as follows:

$$1.54 \text{ hrs/PP} * 1,369 \text{ examiners} * 26 \text{ PP/FY} = 54,821 \text{ hrs/FY}$$

The USPTO's goal for an examiner's exam time, or the time spent doing work-related tasks, is approximately 80% of the overall time spent working. In addition, the USPTO assumes its employees will work 80 hours per bi-week. Using these assumptions, we can calculate the number of hours a full-time examiner (FTE) works as follows:

$$\mathbf{80 \text{ hrs/PP} * 26 \text{ PP/FY} * 80\% \text{ exam time} = 1664 \text{ hrs/FTE}}$$

Based on this calculation, we can calculate the number of examiners we could hire with the funds used to pay the overtime increase attributable to the PHP as follows:

$$\mathbf{54,821 \text{ hrs/FY} \div 1664 \text{ hrs/FTE} = 33 \text{ FTE}}$$

Our remaining analysis will use the productivity assumptions of GS14 examiners, primarily because they make up the majority of the PHP population. The USPTO uses a standard assumption that a GS14 Primary Examiner will produce 104.5 PU/FY. Using this assumption we can then calculate the number of GS14 Primary Examiners it would take to gain the same production increases attributable to the PHP as follows:

$$\mathbf{16,017 \text{ PU/FY} \div 104.5 \text{ PU/FY} = 153.3 \text{ FTE}}$$

Using these two calculations, we can calculate the net gain in the potential work output of GS14 Primary Examiners as follows:

$$\mathbf{153.3 \text{ FTE} - 33 \text{ FTE} = 120.3 \text{ FTE}}$$

Using this result, we can determine how many PHP participants it would require to gain the production output of a GS14 Primary Examiner as follows:

$$\mathbf{1,369 \text{ FTE} \div 120.3 \text{ FTE} = 11.4}$$

This calculation quantifies the approximate advantage of the PHP and tells us that for every 11.4 examiners who participate in the PHP, the UPSTO gains the production output of one GS14 Primary Examiner without any additional cost.

4.2. Research Interviews and Comparisons with other Agencies

Several telephone calls and e-mail conversations with federal agencies and private companies have allowed us to learn about other organization's telework programs. This information has provided us with evidence on where the PHP stands in comparison to these telework programs. These interviews have also demonstrated how certain areas of the USPTO's program could be improved. We spoke to three federal agencies and two private sector companies. The federal agencies we spoke to were the Federal Deposit Insurance Corporation (FDIC), the United States Navy, and the Defense Information Systems Agency (DISA). The private companies we spoke to were the GeoConcepts Engineering Firm and the Southern Maryland Electric Cooperative (SMECo). Our analysis and the results of these interviews and will be discussed in this section.

4.2.1. Eligibility within Telework Programs

Table 2 shows the eligibility and participation rates of the agencies and companies we interviewed. While the rate for the USPTO, in particular the PHP, is not as strong as many of the others, the actual size of the program, shown to be 1,369 in Table 1, is larger than four of the five other programs. Additionally, as evidenced in Table 2, telework is rarely offered to new employees and almost never offered to employees who have received disciplinary warnings or action. Many of the agencies and companies interviewed require an employee to go through a probation period when the employee is first hired, typically extending to the telework eligibility point. This "probationary" period for the USPTO lasts two years and excludes nearly 2500 patent examiners from the PHP.

Table 2: Telework Eligibility and Participation

<u>Category</u>	<u>USPTO</u>	<u>US Navy</u>	<u>DISA</u>	<u>GeoConcepts</u>	<u>SMECo</u>	<u>FDIC</u>
% Eligible	56% of USPTO	Currently offered to 150 office staff	N/A	100% field staff, N/A office staff	N/A	Nearly 100%
% Telework of Eligible	19.5% of patent examiners total (84% of eligible at USPTO)	23% of Navy staffing office	~2500 teleworking employees	8% office staff (2 total), 100% field staff (~25)	22% teleworking employees	72% of employees telework (from internal survey)
Eligibility Restrictions/ Requirements	2 years w/ agency, GS 12 or higher, must live within US	Contract signed with supervisor	Contract signed with supervisor	6 months w/ company	1 year w/ company, separate home office w/ high speed internet, escape plan for home office, not on probation	Cannot be on probationary or trial period

4.2.2. Returning to the Office

Of the six agencies and companies interviewed in this section, including the USPTO, the FDIC was the only agency with full-time teleworking employees. However, the telework coordinator for the FDIC believes the number of full-time teleworkers is extremely low, and many of these employees are actually field agents or examiners who frequently stop into branch or field offices while traveling. The remaining companies and agencies require teleworking employees return to the office on a weekly basis for a variety of reasons, as noted in Table 3.

Both private companies believed the nature of their job requires employees to be physically present in the office for various reasons, and neither program permits employees to telework more than 3 days per week. Similarly, the Navy, DISA, and most of the FDIC use program structures that do not permit full-time telework, although none mentioned job tasks as reasoning for this requirement. Common to all five, however, was the general belief that most employees should return to the office on a weekly basis given the current state of their programs.

The USPTO, by contrast, is aggressively pursuing a full-time telework program. The current PHP only requires employees to return to agency headquarters one “day”, more specifically only one hour, per week, the minimum permitted by federal law. Looking to have this regulation waived for the agency, the USPTO appears to be the only company or agency actively investigating the possibility of a full-time, nationwide telework program.

Table 3: Telework Return Policy

Category	USPTO	US Navy	DISA	GeoConcepts	SMECo	FDIC
Required to Return?	1 day per week	Program only 1-2 days per week	Program 3 days per week max	Program 3 days per week max	Program 3 days per week max	No, however frequency ranges from 5 days per week to a few days per month
Reasons for Return	Federal law	Program structure	Program structure	Fear of isolation, prefer face-to-face contact, job requirements	Nature of business	Management has right to request employee return to office for office coverage or training

4.2.3. HR Issues and Equipment Responsibility

The tasks associated with Human Resources, including handling promotions, troubleshooting payroll problems, or setting up healthcare benefits may become complicated if an employee is not physically present. In particular, sensitive issues such as informing employees of disciplinary action, termination, etc., may be more difficult to handle without face-to-face contact. All the agencies and companies we interviewed believed these sensitive issues are best dealt with in person, as seen in Table 4, and many believed even the less important HR issues are better handled in the office. This is similar to the USPTO’s HR policy, which only handles non-sensitive issues remotely.

Similar to HR policy, most of the companies and agencies interviewed handle the distribution of equipment in the same manner. Table 4 shows that three of the six, including the USPTO, provide employees with a laptop and a fourth provides one at a partially subsidized cost. Both DISA and the USPTO reimburse employees for high speed internet costs, and SMECo and the USPTO provide employees with a company phone. The USPTO also provides employees two monitors and a printer with fax and

copy capabilities. While providing this equipment costs the USPTO more than many other companies and agencies spend, it allows examiners to transition seamlessly from the office to home, as the setups are identical. The ease of this transition is most likely a partial contributor to the success of the PHP demonstrated in the first section of this chapter, and is also a major goal of the PHP.

4.2.4. Training Policies

Another important focus of our project was to examine how other companies and agencies train employees. One of the primary goals of expanding the PHP is to allow the USPTO to recruit examiners without requiring them to move to the DC metropolitan area for training. To accomplish this, the USPTO must design a remote training method for its examiners to replace the training academy currently in place in Alexandria. The patent examiner training program, which began several years ago to accommodate the mass hiring of examiners at the USPTO, involves approximately 160 individual modules, nearly all of which are currently completed on site. To transition to a solely remote training program, these modules must be integrated with a distance learning technique such as computer based training (CBT) or on a CD ROM.

However, as seen in Table 4, none of the companies or agencies we interviewed used remote training for job-related training; only small recurring pieces such as ethics and security refresher courses were done remotely. Considering none of these companies or agencies reported problems or difficulties, however, these pieces do provide some evidence that remote training is a plausible alternative, one that most likely needs further exploration in its application to the business community.

Table 4: Equipment Responsibility, HR, and Training Policies

Category	USPTO	US Navy	DISA	GeoConcepts	SMECo	FDIC
Equipment Responsibility	Provided, maintained, and replaced by agency, installed by employee	Provided with software for security card reader, all else on employee	Partially reimbursed for high speed internet costs, provided laptop	Given a laptop, have opportunity to buy for half price after 1 year	Provided laptop and company phone	N/A
HR Policy	Usually addressed on site, occasionally done virtually	No problems to date, would be handled in person	Dealt with at discretion of employee, sensitive items handled in person	Same as for non-teleworkers, handled in-office	Usually addressed on site, small issues may be done remotely	Sensitive issues addressed on-site, non-sensitive issues done remotely
Training Policy	Provided through academy at USPTO headquarters	Training for job done at office, telework training provided through internet and use of a CBT	Recurring training done in person, some voluntary training offered as CBT	All trained at headquarters, field staff then assigned a mentor in the field	Provided on site through mentoring, teleworkers CAN and MUST be trainers/mentors	In-person Corporate university. CDs and CBTs may be used for small pieces of training

4.2.5. Telework Model Benchmarks

The telework models institutionalized by the agencies and companies interviewed largely base their success on the performance and morale benefits to teleworking employees, effectiveness of communication, and the recruitment benefits to the company or agency. These three areas can serve as benchmarks for a program's success and provide insight into the strengths and weaknesses of a teleworking model.

While the performance of an employee can be measured by many different means depending on the nature of the business, as seen in Table 5, the USPTO's quantitative bi-weekly assessment provides substantially more advanced and accurate measurements than the subjective assessments of the other companies and agencies interviewed. These performance measurements allow the USPTO to closely monitor individual examiners and maintain an acceptable level of production and quality amongst its PHP participants. These internal controls lay out definitive conditions for telework eligibility and prevent declining performance that may not be noticed as easily under a subjective work review.

Many researchers also agree the morale of an employee is directly related to his/her production. Simply stated, if employees are more comfortable and content with their work conditions, they will do a better job. According to a survey carried out by the USPTO in 2007, 82% of PHP participants have seen either a "large increase" or "small increase" in morale, while less than 37% of non-PHP examiners have seen some increase. While exact numbers are not readily available from the remaining companies and agencies interviewed, all five consistently believed teleworking has resulted in a net increase of employee morale, as seen in Table 5.

Table 5: Performance and Morale Changes

<u>Category</u>	<u>USPTO</u>	<u>US Navy</u>	<u>DISA</u>	<u>GeoConcepts</u>	<u>SMECo</u>	<u>FDIC</u>
Telework Performance Measurement	Biweekly report card; charts workflow, production, quality, and customer service	Subjective, up to discretion of supervisors	Subjective, at discretion of supervisors	Subjective, no number based production data	“Workforce Management”: Can record and track number of calls taken each day, also can pull recordings of calls for quality analysis	Subjective
Performance Changes?	Moderate increase in quality and production	No	Supervisors find equally if not more productive	No particular changes	Seen ~1-2% increase in volume of calls taken by teleworker, no noticeable drop in quality	73% of managers agreed/strongly agreed there has been an increase in the performance of teleworkers
Morale Improvement?	For members of PHP yes, for employees not in PHP a small decrease	Yes	Yes	Yes	Yes	Yes

As noted in Table 6, the companies and agencies we interviewed have not seen noticeable problems in communication between teleworking employees and the main office. Additionally, most telework coordinators with whom we spoke had outlined a specific communication policy with their employees in a telework agreement or company-standard policy. Similarly, the USPTO has outlined communication guidelines in its telework agreement that all PHP participants must sign prior to joining the program. However, the 2007 USPTO survey mentioned earlier also found that only 60% of PHP participants believe they are proficient at using agency collaboration tools and only 32% believe the tools are the most frequent means of contact between employees.

Also noticeable from Table 6 is the lack of support telework programs are receiving from managers, a critical piece of any telework model. Managerial resistance is considered by many researchers to be one the largest barriers to telework. With the exception of the FDIC and the UPSTO, all the companies and agencies we interviewed believed there was a lack of support and participation amongst managers for one reason or another. In contrast, the USPTO has set up a separate managerial telework program that currently allows managers to work from home for up to 16 hours per bi-week. Even stronger is the FDIC's figure that 63% of managers telework, which is substantially higher than the other companies and agencies by comparison.

Another important characteristic of a telework program is its potential use as a recruitment tool with new hires, as evidenced by Table 6. All six companies and agencies interviewed believed a telework program either positively impacts recruitment or has no effect, an observation that may seem fairly obvious given the benefits discussed earlier in this section.

Table 6: Communication, Management, and Recruitment

<u>Category</u>	<u>USPTO</u>	<u>US Navy</u>	<u>DISA</u>	<u>GeoConcepts</u>	<u>SMECo</u>	<u>FDIC</u>
Effective Communication?	Room for improvement	Yes	Yes	Yes	Yes	Yes
Communication Policy	Virtual meetings and collaboration tools	Virtual collaboration tools	Must have office phone forwarded to home phone when out of office	Formal guidelines laid out in Telework Agreement	Phone provided by company connects to the company call center, provides for seamless communication	N/A
Management Telework Policy	Allowed to telework, maximum of 16 hours per bi-week	Middle management not totally on board with program, too many meetings and other typically in person tasks	Not as strong as DISA would like, but no extra restrictions placed	One of the teleworkers is middle management, teleworks 1 day per week	No management participation due to nature of business	63% of managers telework
Recruitment Advantages?	Yes	Advertising it as one but not a large enough program to provide any real advantages at present	Yes	To an extent, displays that the company is willing to understand difficulties in travel, family, etc.	Not used as such, company is plenty competitive	Yes

4.3. Full-time PHP Risk Analysis

There are many risks that could affect the USPTO in the future as the PHP looks to expand full-time. While a federal requirement currently obligates employees of federal agencies to return to their main office one day per week, the USPTO is looking to have this requirement waived to expand the PHP to a full-time program. However, the deployment of this full-time telework program carries plenty of potential risks in areas including information technology, human resources, expenses, personnel, and the program's risk of failure. This section will attempt to assess how exposed the USPTO is to these risks and how it may be affected by them.

4.3.1. Human Resources Risks

In an interview our team conducted with Jennifer Culver, an employee relations specialist at the USPTO, we discussed a few Human Resources (HR) challenges that may arise from the implementation of a full-time teleworking program. These challenges included how to deal with the declining production of an employee, termination of an employee, isolation of an employee leading to a loss in morale, and the diminishing of an individuals' understanding of the corporate culture. Our interview with Ms. Culver also investigated the current PHP system and what HR's current involvement is.

According to Ms. Culver, PHP participants do not call upon the HR department often unless they need assistance on information about scheduling problems, company policies, and general questions about the program, all of which are currently handled remotely. HR is less commonly needed during an administrative situation, when an employee has either a performance or conduct problem, which is currently handled in

person. To date, there have been a few problems with employees that fail to meet or abuse the one day per week requirement set by the Office of Personnel Management (OPM) and the General Services Administration (GSA). A manager will contact HR when this situation occurs and human resources staff will investigate the problem and discipline the employee accordingly. If the employee is found guilty of taking leave in order to skip their one day per week requirement regularly, the employee may be suspended. If an employee is suspended for 14 days, he/she will be consequently removed from the PHP and become ineligible for reinstatement for up to 12 months.

The handling of the declining production of an employee often depends on the seriousness of the situation. Generally, with smaller problems, a phone call or email will fix the situation between the patent examiner and his/her manager. However, if the performance of the employee is deemed unsatisfactory or there is a conduct issue, the USPTO may recall the employee to the main office to discuss the employees' unacceptable production. Furthermore, the USPTO may issue a written warning that recalls the employee to the main office for a 14 week period. If the problem persists, the employee may be terminated.

The implementation of a full-time telework program poses a risk to this system in two ways. First, HR issues once dealt with in person must now be handled remotely. However, according to Ms. Culver, the termination of an employee on a full-time teleworking program could be conducted via email, letter, or phone call without much difficulty. Secondly, and more importantly, the established warning and removal process may be complicated by the USPTO's inability to easily call employees to headquarters. If employees are hired under the condition that they will telework, the USPTO would likely

be responsible for the costs of bringing employees back to Alexandria, even if for disciplinary reasons. This leaves the USPTO highly exposed to any abuse of the system, and the burden is not a reasonable one for the USPTO to shoulder. It is therefore likely that the warning and removal process would require a reconstruction or reconsideration.

With a full-time telework program a patent examiner may go months without returning to the main office or seeing other co-workers. This lack of a traditional work setting exposes employees and the USPTO to one particular risk. Teleworking full-time may lead to a feeling of isolation by the employee, and the morale and sense of pride might fade, ultimately leading to a loss of the corporate culture established by the USPTO. While the easiest and most simple solution to maintaining a sense of community with teleworking employees would be to encourage communication amongst employees who work remotely, it may require the USPTO have employees return to the main office, most likely annually or semi-annually. However, the costs associated with this would likely be the responsibility of the USPTO, and the associated travel time would result in lost production and a two-fold loss to the agency.

4.3.2. Information Technology Risks

In an interview with James Thompson of the USPTO's Search and Information Resources Administration (SIRA), we discussed the Information Technology (IT) risks related to the current PHP model and what risks the USPTO may face if it transitioned to a full-time telework program. Assumptions provided by Mr. Thompson regarding IT may be found in Appendix E.

The IT sector of the USPTO already faces bandwidth problems, and this limitation will certainly need to be addressed in order to support an entire network of teleworkers across the country. Other problems that the IT department would need to solve are the dangers to their network's security and equipment issues.

Bandwidth issues at the USPTO primarily relate to challenges in the allocation, flow, and consequent congestion of network traffic. These challenges will need to be managed effectively to control the overwhelming number of employees vying for network resources, and the USPTO has already been frequently running at over 100% of its bandwidth capacity. Proper bandwidth management, involving a strengthening of the protocol of individual usage already in place at the USPTO, could limit the abuse of the network. However, increasing the bandwidth allowance of the USPTO within the federal government, a process the USPTO has already initiated, is the only solid long-term solution to the rapidly growing employee base. According to Mr. Thompson, these bandwidth issues do not generally relate to the physical location of employees, and the transition to a full-time PHP would have minimal to no effect on the usage of the UPSTO.

The USPTO's network security could also be in danger if the proper precautions are not taken to prevent hackers from attacking the system. These precautions, including saving confidential information solely to the network and not individual hard drives, are already in place for the current PHP, and the transition to a full-time PHP should again have minimal to no impact on network security.

The distribution of equipment may prove to be another challenge to the USPTO as it attempts to prepare for a full-time telework program. Currently PHP employees are

responsible for equipment installation and physically pick up and drop off equipment at agency headquarters. However, this method of delivery would be impractical for a full-time telework program and would most likely need to be replaced by shipping the equipment. Equipment repair could be accelerated if the USPTO sends out new pieces of equipment upon request and the employee then returns damaged equipment in the same packaging. Equipment return could also be a problem if the employee is terminated from a remote location or pulled off the program. A possible solution to ensuring the return of the workers' equipment is to require an initial deposit on the material and return the deposit after the return of the equipment. Equipment could be returned and mailing expenses reimbursed to avoid hesitation from a terminated employee. Ms. Culver stated that upon termination of a current PHP participant, they are given a certain date by which their equipment must be sent back to headquarters. Also, the removal of access to the network can be easily done remotely to guarantee that they can not access the confidential information that used to be available to them.

4.3.3. Expense Risks

In an interview with James Thompson of the USPTO's Search and Information Resources Administration (SIRA), we discussed the expenses related to the current PHP model and what risks the USPTO may face if it transitioned to a full-time telework program. The exact dollar assumptions provided to us by Mr. Thompson and used in this section can be found in Appendix E.

According to Mr. Thompson, the distribution and maintenance of equipment may cause only minimal concern for the USPTO. Currently, PHP employees are provided a

laptop, two monitors, a printer, a router, a flash drive, a security card reader, and subsidized for their home high speed internet costs that result in a combined first year cost of approximately \$6,300 plus shipping costs per person. Additionally, replacement costs after the first year would total approximately \$2,500 plus shipping costs annually per person. While this may seem alarming, the USPTO estimates that office space for employees in Alexandria costs the USPTO approximately \$10,000 to \$15,000 annually per person, resulting in a large net gain for the agency. Currently, the USPTO assumes shipping will cost the agency approximately \$220 every time it sends new equipment, a figure that will undoubtedly increase if employees decentralize from the Alexandria campus. However, even if this assumption were doubled to \$440 it does little to affect the overall gain experienced by the USPTO, as it would only be expected to occur every couple of years.

4.3.4. Personnel Risks

The managerial and administrative staffs of the USPTO are required to be in contact with teleworking employees regularly to assure production consistency. With a full-time telework program, managers must be capable of managing their employees without face-to-face contact. Managers must be comfortable with not being able to see their workers, and they also must be able to keep in contact through email, phone calls, and the use of the collaboration tools such as the web-cam. However, this risk may be already largely hedged by the current performance measurement system in place which would allow managers to stay on top of an examiner's production output and quality without physical contact. Further supporting this theory are the results of an internal

USPTO survey conducted in 2007 which concluded that 77% of supervisors did not believe it was more difficult to manage PHP examiners than non-PHP examiners, reflecting most supervisors' ability to easily transition to managing a nearly virtual, distributive workforce.

Managerial resistance is not the only personnel risk involved with a full-time telework program, however. It is not unreasonable to assume that some employees enjoy the one day per week they currently spend at USPTO headquarters and may be hesitant to have this capability stripped from them. This may require that the USPTO simply remove the *requirement* and not the *ability* to return to the office at least one day per week. Additionally, employees who may one day be hired under the condition that they telework may find they would prefer to work full-time *in* the office. This would require either the employee or the USPTO shoulder the cost of relocation or the termination of the employee, and these risks must be considered in any full-time telework program structure.

4.3.5. Training Risks

Training will only be affected by the new full-time telework program once the USPTO also waives the two year requirement to telework. If the requirement is not waived, then the on-site training currently in place may be continued. If the two year tenure requirement is waived, however, and employees are hired strictly to telework, then a distance learning course must be developed. As seen earlier in our interviews with other agencies and companies, this is not common practice in the business world today and will require careful consideration and planning. Options may include a CD tutorial or an

online course, upon which the availability of someone to answer questions the trainee may have must be considered. Another potential solution involves an accelerated training course for patent examiners that would be held on site. This training could establish the basics and later be supplemented by online classes or CD tutorials to finish the training. This option would probably require the USPTO pay employees for travel, rent, and per diem during their stay in Alexandria, however. Another option that has already received consideration from the USPTO is the establishment of remote offices (RO) in different regions. These ROs could offer training similar to that in place at agency headquarters but would again require the USPTO purchase, lease, or rent office space and pay relocation costs for trainers.

4.3.6. Program Performance Risks

The success of a new full-time telework program will rely heavily on the continued excellence of the teleworkers' production without having to return to USPTO headquarters every week. With employees capable of living far outside the Washington, D.C. area, it will open up doors to potential recruits who did not consider working for the USPTO because of geographical distance. However, the consequences the USPTO and its employees will face if the program fails to meet its expectations are substantial. It is likely that the old program would have to be reinstated upon the full-time PHP's failure, and the particular consequences for the distant teleworkers will be severe. They will likely face the decision to either relocate to the D.C. metropolitan area or to leave the agency. Additionally, the USPTO may face the decision to shoulder the burden of relocating these employees or losing a large chunk of its workforce, which would result

in having to hire an enormous volume of new examiners, again primarily from the highly saturated mid-Atlantic region, and training them, a process that could cost the USPTO millions of dollars in expenses and application fees from lost production.

5. Conclusions and Recommendations

This chapter uses the analysis from our Results and Analysis chapter to accomplish our group's goal of providing the USPTO with recommendations on the future direction of the PHP. It briefly summarizes the conclusions of our analysis and uses these conclusions to support the recommendations we have made.

Similar to the organization of our previous chapter, this chapter is divided into three sections. The first of these uses numerical data collected by the USPTO to make recommendations on how to improve the PHP and increase its associated advantages. The second section uses the highlights of a series of interviews with telework coordinators to make recommendations on improving the PHP based on the practices of other federal agencies and private companies. This section will also draw a conclusion of the overall strength of the PHP with regard to these other telework programs and the data analyzed in the first section. The final section will make a series of recommendations regarding the potential shift of the PHP to a full-time nationwide program. It will address the risks associated with a full-time telework program and make recommendations on how to hedge these risks. This section will also make recommendations for a full-time pilot program and remote training pilot program.

5.1. PHP Benefits to the USPTO

Our earlier analysis of the data collected by the USPTO on the PHP has revealed that for every 11.5 examiners that join the program, the USPTO essentially gains the productivity of 1 GS14 examiner for free while the program participants average more overtime and thus more pay. This "win-win" scenario is extremely beneficial for both

sides and emphasizes the need for the USPTO to encourage and initiate further growth of the program.

While examiners at a GS14 and GS15 level have shown the greatest increase in both production and overtime hours, examiners at lower levels have also shown an increase in both categories. However, the rate of increase in GS14 and GS15 participation has slowed substantially, and while the participation rate amongst GS12s and GS13s has grown, it remains comparatively weak. In order to further capitalize on the benefits the PHP offers to both the USPTO and its examiners, the USPTO must find a way to encourage more examiners to join the program. This effort will be most efficiently conducted if it is split into two approaches.

The first approach is designed to target GS14 and GS15 examiners who have been working at the USPTO for several years but are reluctant to leave the office. These examiners are likely to avoid the PHP because they either fear the transition to working at home or have established the habit of working at a centralized office. While it is unlikely that the USPTO will be able to do much to convince those examiners who prefer the traditional office setting to voluntarily join the PHP without extensive incentives, it *can* further influence those who simply fear the transition cheaply by further marketing certain aspects of the program. In particular, the USPTO could offer a voluntary seminar or training session similar to the three modules already in place for new PHP examiners. The focus of this training session should be on how to properly set up a home office and make the home-to-office transition, as well as on the use of the USPTO's collaboration tools.

The second approach is designed to target GS12 and GS13 examiners who have most likely not considered working from home or don't see the need to do so. The USPTO should increase the marketing of the PHP and its benefits to these examiners at an early point in their career, most importantly during the months spent at the Training Academy. The emphasis of these benefits should fall heavily on the increased flexibility offered to participants and the observed trend that PHP examiners work more overtime. If the USPTO aggressively pushes the PHP at an early stage it is likely to pick up a number of new examiners who might never have considered working from home and bolster the participation of lower level examiners.

These recommendations, however, rely upon several assumptions about USPTO employees' resistance to joining the PHP. While these assumptions are the most reasonable our group can make without physically speaking to examiners, further research or investigation into the reasoning behind many examiners' unwillingness to join the program should prove useful for developing more targeted solutions.

5.2. Recommendations Based on External Interviews

Based on our interviews with other companies and agencies about their telework programs and plans for future expansion, we have concluded the PHP has room for improvement in three specific areas. The first of these is the USPTO's comparatively weak use of agency-specific collaboration tools, a communication measure many other agencies and companies have already implemented and promote heavily. Strong communication will be essential to the overall health of a fulltime, distributive workforce, and the USPTO must find a way to bolster the use of these tools to ensure communication

lines remain open. Secondly, the USPTO's HR policy of handling sensitive issues exclusively on-site will not prove practical if the agency must absorb the cost of bringing employees from around the country back to Alexandria. Our group has made several recommendations on improving these two issues and they will be discussed in the next section.

The third area of the PHP our group has identified that needs improvement is the training of new examiners. Currently, the USPTO trains examiners exclusively on-site at agency headquarters, a training style that is not consistent with the USPTO's goal of moving towards a distributive workforce and a fulltime PHP. In order to recruit more examiners from outside the mid-Atlantic region, the USPTO must be able to train new employees without requiring they travel to Alexandria for the training period, a process that would require the USPTO or employee cover the various expenses related to the stay. To most effectively accommodate this goal, our group has developed a remote training pilot program that will allow the USPTO to eventually train examiners exclusively virtually.

The remote training pilot program should follow a "start small, build up" philosophy designed to slowly transition the USPTO from its current training style to a remote one. Starting as soon as possible, the USPTO should isolate a portion of the 160 modules used during the training academy that can most easily be conducted remotely. The USPTO must then develop an online tutorial designed to convey the information in these modules normally taught by a trainer and provide these tutorials to new examiners in the training academy. The examiners should be thoroughly tested on the material

learned upon completion to ensure that the tutorials are working as effectively as the in-person training normally received.

Upon becoming comfortable with the results of these few modules, the USPTO should then add to the online regiment of modules and repeat the process. The number of modules added each time should depend upon the timeframe the USPTO has for an exclusively virtual training program and the ease with which the modules can be converted to the new format. For example, if the USPTO hopes to have a completely virtual training program within five years, it must add approximately eight modules to the remote training pilot every three months.

For further information on remote training techniques and styles, the USPTO should seek guidance from universities that use distance learning as a means of teaching. Many universities and colleges across the country already have established remote training programs which may prove very helpful for the USPTO in its mission to transition to an online training program. The USPTO's University Outreach program will provide a good starting block for this communication.

Despite these few challenges for the PHP, however, it appears evident that the USPTO's program is substantially more advanced and mature than other programs. The standardized, uniform structure of the PHP and the program's detailed quantitative performance metrics far surpass that of any company we researched. These measures allow the USPTO to closely and accurately monitor its teleworkers and the program in general. Additionally, nearly all of the companies and agencies we interviewed allowed teleworkers to work up to only three days per week from home, while PHP participants return to the main office only one day per week, the maximum allowed by federal law.

Additionally, the USPTO already provides all necessary equipment for teleworkers and takes on the responsibility of maintaining and updating this equipment as it sees necessary. The USPTO has also seen definitive proof of production and morale increases amongst its teleworkers, two benefits most companies and agencies only speculate they receive, and the USPTO's executive and managerial staffs seem to support and understand the importance of a full-time, nationwide PHP. With this overwhelming amount of evidence of the PHP's advanced and mature status, it appears evident that the USPTO is ready to begin preparations for a full-time PHP and a distributive workforce, a process we will discuss in the next section.

5.3. Hedging the Risks of a Nationwide PHP

As the USPTO prepares to expand its Patent Hoteling Program, it must first receive congressional approval to remove the requirement that employees must return to agency headquarters at least one day per week. Upon receiving this approval, our group recommends that the USPTO establish a Nationwide PHP (NPHP) pilot program that will allow the USPTO to examine the potential of a full-time telework program.

The NPHP must be designed to address the risks our group has isolated and analyzed. The easiest of these risks to address include the IT, HR, and expense related risks we have identified. The distance an examiner lives from Alexandria bears very little impact on the USPTO's network security, which is already one of the agency's top priorities. Additionally, bandwidth is dependent upon the number of employees at the USPTO, not their location relative to Alexandria, VA, and the USPTO is already seeking ways to expand its bandwidth capabilities. According to Ms. Culver, HR is already

capable of handling nearly all issues remotely, including both sensitive and non-sensitive topics, and our analysis of NPHP related expenses has shown that the program will continue to save the USPTO substantial amounts of money compared to the costs of office space in Alexandria and the surrounding D.C. area.

However, some risks will require the NPHP be structured to minimize their impacts. To ensure the USPTO will have enough data to make relevant and accurate decisions on the future of the PHP, the agency needs a measurement system in place at the outset of the NPHP. To collect this information, our group is recommending the USPTO repeat the study it performed on the 1050 PHP examiners, analyzed earlier in this report, with the new pilot participants. The duration of the NPHP needs to be long enough such that the USPTO can gather enough data and information on the program, and our group is recommending the NPHP be at least 24 months in length. This would give the USPTO two fiscal years of data to compare the NPHP with the current PHP or traditional office examiners. To provide control groups to compare the NPHP to, our group is recommending the USPTO additionally track the performance of a roughly equivalent sample of examiners who will remain in the current PHP program and of examiners who are in neither program.

The NPHP needs approximately 100-150 participants to ensure the data collected is accurate and reflective of a more general population, and participants can be selected based on GS level and then seniority within that GS level, as is custom at the USPTO. Additionally, all participants should live *outside* of a 75 mile radius of the Alexandria, VA, headquarters to ensure, as much as possible, participants will not return to the office when they feel they can not perform a task remotely. The goal of this pilot is to establish

a program that will recruit examiners from around the country, and the data collected will not be accurately reflective of this potential population if participants return to the office frequently.

In addition to measuring the performance of participants, our group recommends the USPTO monitor or track the communication between participants and other employees, supervisors, applicants, etc. As mentioned in the previous section, communication is crucial to the success of a telework program, and the USPTO needs to ensure that strong communication exists. The most logical means of accomplishing this would be to add a tutorial on the use of agency collaboration tools to the PHP training program already in place.

Additionally, the USPTO's current warning system for PHP examiners, which first removes examiners from the program before termination, would not be suitable for a nationwide PHP. While not relevant for the pilot program, our group recommends the USPTO begin structuring a warning system for future PHP participants that does not involve the USPTO removing examiners from the program and having them return to Alexandria.

In the event that the USPTO does not believe the NPHP is performing to an acceptable standard, a fallback plan should be in place before the outset of the pilot. Our group recommends the USPTO stipulate in the NPHP agreement with examiners that if the USPTO cancels the program for any reason, examiners will be again responsible for returning to the main office one day per week at their own expense. This will prevent the USPTO from having to absorb relocation costs that could be associated with the termination of the program.

Already on the forefront of telework, our group believes that if the USPTO establishes a pilot program using the recommendations provided in this chapter it will succeed in accomplishing its goal of establishing a nationwide, distributive workforce. This will allow the USPTO to hire examiners outside the saturated mid-Atlantic market and, ultimately, assist the USPTO in its goal of hastening the patent application process.

References

- Bailey, D.E., & Kurland, N.B. (2002). A Review of Telework Research: Findings, New Directions, and Lessons for the Study of Modern Work. *Journal of Organizational Behavior*, 23(4), 383-400.
- Barr, S. (2007, April 16). Trying to Telework it Out. *The Washington Post*, p. D4.
- Becker, F.D. (1986). Loosely-Coupled Settings: A Strategy for Computer-Aided Work Decentralization. *Research in Organizational Behavior*, 8, 199-231.
- CDW. (2008). 2008 CDW Telework Report: *Feds Stuck in Second Gear; Private Sector Puts the Pedal to the Metal*. Retrieved from the CDW Website: <http://webobjects.cdw.com/webobjects/media/pdf/2008-CDW-Telework-Report.pdf>
- Cooper, C.D., & Kurland, N.B. (2002). Telecommuting, Professional Isolation, and Employee Development in Public and Private Organizations. *Journal of Organizational Behavior*, 23(4), 511-532.
- Cullen, K., Gaboardi, E., Kordi, N., & Schmidt, L. (2003). *Work and Family in the eWork Era*. Omaha, NE: IOS Press.
- Egan, T.D., & Kurland, N.B. (1999). Telecommuting: Justice and Control in the Virtual Organization. *Organization Science*, 10(4), 500-513.
- Ferris, M., Hawkins, A.J., Hill, E.J., & Weitzman, M. (2001). Finding an Extra Day a Week: The Positive Influence of Perceived Job Flexibility on Work and Family Life Balance. *Family Relations*, 50(1), 49-58.
- Fisher, K. (2001). *The Distance Manager*. New York: McGraw Hill.
- Gordon, G. E. & Kelly, M. M. (1996). *Telecommuting: How to Make It Work for You and Your Company*. Englewood Cliffs, NJ: Prentice-Hall.
- General Services Administration. (2000). *Evolution of Telework in the Federal Government*. Retrieved from the Telework.gov website: <http://www.gsa.gov/graphics/ogp/EvolutionteleworkPDF.pdf>
- Hawkins, A.J., Hill, E.J., & Miller, B.C. (1996). Work and Family in the Virtual Office: Perceived Influences of Mobile Telework. *Family Relations*, 45(3), 293-301.
- Hendrickson, A. (1999). *Managerial Issues for Telecommuting*. Hershey, PA: Idea Group.

- Khosrowpour, M. (1999). *Success and Pitfalls of Information Technology Management*. Hershey, PA: Idea Group.
- Kraut, R. (1989). Telecommuting: the trade-offs of home work. *Journal of Communication*, 39, 19-47.
- Olson, M.H., & Primps, S.B. (1984). Working at home with computers: work and non-work issues. *Journal of Social Issues*, 40, 97-112.
- Nilles, J.M. (1975). Telecommunications and Organizational Decentralization. *Communications*, 23(10), 1142-1147.
- Nilles, J. M. (1998). *Managing Telework: Strategies for Managing the Virtual Workforce*. New York: John Wiley & Sons, Inc.
- Ramsower, R.M. (1985). *Telecommuting: The Organizational and Behavioral Effects of Working at Home*. Ann Arbor, MI: UMI Research.
- Risman, B.J., & Tomaskovic-Devey, D. (1993). Telecommuting Innovation and Organization: A Contingency Theory of Labor Process Change. *Social Science Quarterly*, 74, 367-385.
- Salomon, I., & Shamir, B. (1985). Work-at-Home and the Quality of Working Life. *The Academy of Management Review*, 10(3), 455-464.
- TECHWEB. (2008a). Patent Office to get Funding Boost under Bush's Budget Proposal. Retrieved from LexisNexis Academic database.
- TECHWEB. (2008b). Most Federal Workers can Work from Home, But Don't. Retrieved from LexisNexis Academic database.
- TECHWEB. (2008c). Federal Spending Telework Expected to Increase. Retrieved from LexisNexis Academic database.
- Telework. (2008). *Webster's New Millennium™ Dictionary of English, Preview Edition (v 0.9.7)*. Retrieved October 12, 2008, from Dictionary.com website: <http://dictionary.reference.com/browse/telework>
- United States General Accounting Office. (2004). *Human Capital: Key Practices to Increasing Federal Telework*. Retrieved November 8, 2008, from Telework.gov website: <http://www.gao.gov/new.items/d04950t.pdf>
- United States Patent and Trademark Office. (2003). *21st Century Strategic Plan*. Washington, DC: U.S. Government Printing Office.

USPTO. (2007a). *Our Business: An Introduction to the USPTO*. Retrieved from the United States Patent and Trademark Office Website: <http://www.uspto.gov/web/menu/intro.html>

USPTO. (2007b). *Organizational Structure*. Retrieved from the United States Patent and Trademark Office Website: <http://www.uspto.gov/web/menu/offices.html>

Venkatesh, A., & Vitalari, N.P. (1992). An Emerging Distributed Work Arrangement: An Investigation of Computer-Based Supplemental Work at Home. *Management Science*, 38(12), 1687-1706.

Appendix A: Sponsor Description

The United States Patent and Trademark Office (USPTO) was formed over 200 years ago with the purpose of promoting progress in science and the useful arts. The USPTO's goal is embodied in its vision, which states "the USPTO will lead the way in creating a quality-focused, highly productive, responsive organization supporting a market-driven intellectual property system for the 21st Century" (USPTO, 2007a). Its mission is "to ensure that the intellectual property system contributes to a strong global economy, encourages investment in innovation, and fosters entrepreneurial spirit. The USPTO promotes industrial and technological progress in the United States and strengthens the national economy by administering the laws relating to patents and trademarks, advising the Secretary of Commerce, the President of the United States, and the administration on patent, trademark, and copyright protection, and advising the Secretary of Commerce, the President of the United States, and the Administration on the trade-related aspects of intellectual property" (USPTO, 2007a).

According to the USPTO website (2007a), the USPTO employs over 7,000 full-time staff to support its major functions and reports directly to the Department of Commerce through the presidential appointed Under Secretary of Commerce for Intellectual Property and Director of the United States Patent and Trademark Office Jon Dudas. It is split primarily into two divisions: the Patent organization and the Trademark organization, each headed by its own commissioner. The current Commissioner for Patents is John Doll. The Patent organization is further split into three branches each headed by a deputy commissioner: resources and planning, examination policy, and operations. As noted by the USPTO (2007b), the operations branch, currently headed by

Deputy Commissioner for Patent Operations Peggy Focarino, contains all “Technology Centers” of the USPTO, including Technology Center 2100, where our project will be hosted. The USPTO (2007a) is a public and profitable organization that has been funded by fees from patents and trademarks since 1990 and has a fiscal year 2009 budget of approximately 2.075 billion dollars.

Proposed in 2002 and finished in February of 2003, the USPTO (2003) submitted to Congress for approval its 21st century strategic plan built to help achieve its vision and accomplish its mission as described earlier. This plan was designed to improve upon three key areas, or “themes”, as directed by Congress. These included becoming a more agile organization, enhancing quality through workforce and process improvements, and accelerating the processing time through focused examinations. The USPTO predicted that implementation of this plan would result in, among other things, making geography and time irrelevant to business, having employees recognized as expert decision-makers, and strengthening the USPTO’s ability to be recognized as one of the most efficient intellectual property organizations in the world.

The USPTO has been recently expanding its telecommuting program, partially in response to its rapidly growing employee base. With more telecommuting employees each year, the USPTO has found itself unaware of whether or not it is properly managing these workers. The potential consequences of improper management could include decreased production, decreased employee retention, and a general lack of enthusiasm amongst USPTO employees, all of which would work against the strategic plan recently implemented.

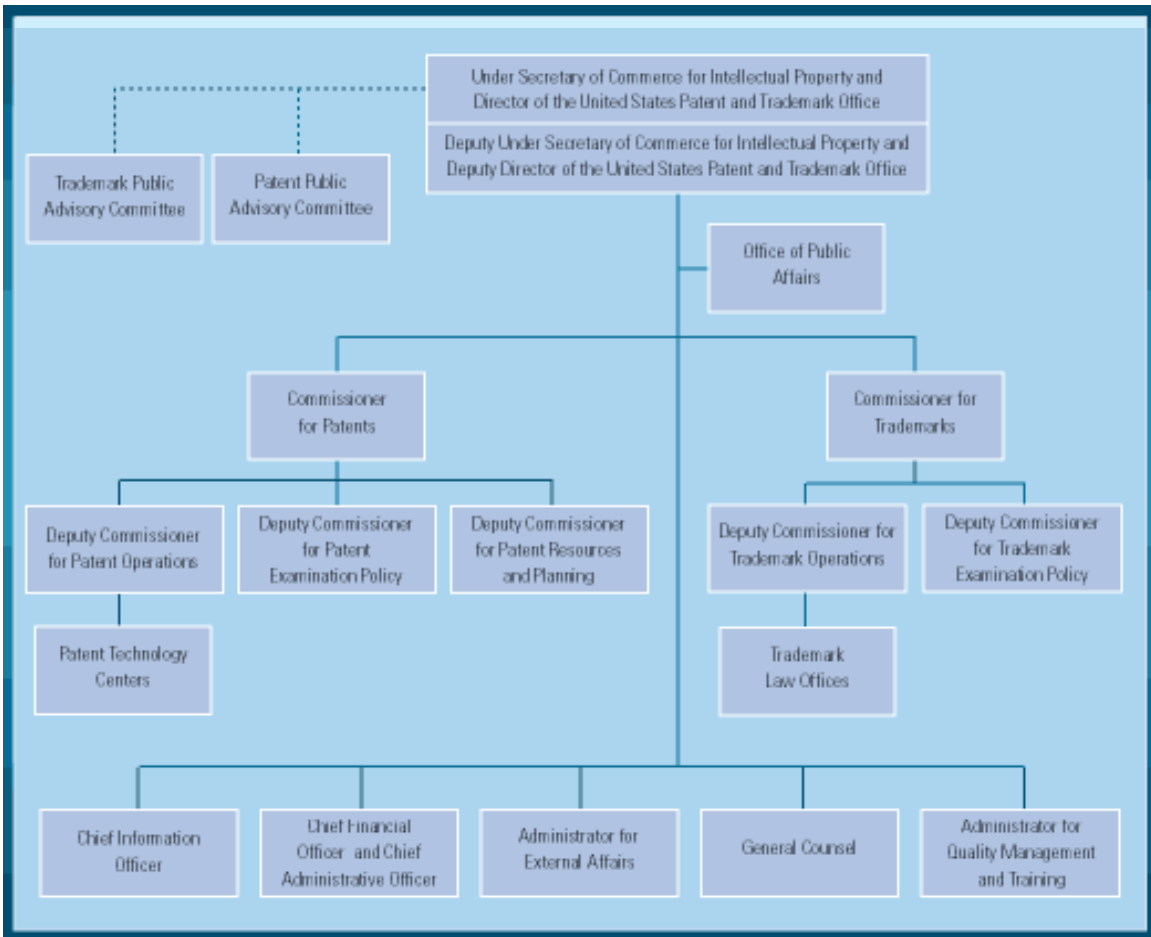


Figure 6: United States Patent and Trademark Organization Chart
 Source: USPTO, 2007b

Appendix B: Federal/Private Company Telework Phone Interview Protocol

1. How long has your agency/company had a telework program?
2. Approximately what percentage of your agency/company is eligible for telework? Approximately how strong is participation amongst eligible employees?
3. What are the minimum eligibility requirements for telework? Is telework participation required or voluntary?
4. Is there a tenure requirement?
5. Is there a restriction on how far teleworkers can theoretically live from the main office? How far do they typically/actually live from the main office?
6. What incentives, if any, are provided for teleworking (i.e. bonuses, pay raise, etc)?
7. How often are telework employees required to return to the main office?
8. Does your agency/company believe there is a *need* for telework employees to return to the main office? If so, how often and for what purposes does your agency/company believe they should return?
9. If telework employees do return, who is responsible for the costs as, for example, travel and per-diem?
10. Does your agency/company have regional offices that teleworkers can access?
11. Can the requirements for returning to the main office be fulfilled by returning to regional offices? If so, how often/for what requirements?
12. Where/how are telework employees provided training on new and existing work topics? Does your company/agency employ the use of computer based training or live web broadcasts? If so, are these successful?
13. Does your company/agency require trainees to return to the main office for all or part of the training process?
14. Is the necessary technical equipment provided to teleworking employees? If so, how is it maintained/installed and at whose expense?
15. How do you measure the performance of telework employees?
16. Does this differ from your measurements of non-telework employees? If so, how?

17. If there is a problem with an underperforming telework employee, how are Human Resource issues addressed (i.e. remotely or on-site)? If in person, where would this take place?
18. Do middle/upper managers telework? If is so, to what extent do they telework?
19. Have you noticed a difference in the performance of teleworking employees compared to non-teleworking employees? In what respects?
20. Do you believe effective communication exists between teleworking employees and the main office? What steps do you take to ensure effective communication/collaboration takes place between teleworking employees and the main office? What tools are used?
21. Do you believe the availability of telework helps your agency/company recruit new employees?
22. Do you believe the morale of employees has changed since the start of the telework program?
23. What do you believe are the largest benefits of the telework program and why?
24. What do you believe are the biggest obstacles or barriers to telework that your agency/company faces? How does your agency/company currently address or plan to address these issues?

Appendix C: Production and Expectancy Calculations

There are two different formulas that measure the production quota system. One of the formulas is for a newly hired examiner with a GS-7 or lower and the other formula is for experienced examiners with a GS-9 or higher.

New Examiner Production Equation (GS7 or below):

$$((2N+D)/3) = BD$$

Experienced Examiner Equation (GS9 or above):

$$((N+D)/2) = BD$$

Where N represents a new case and the first action taken, D represents a disposal or the final action taken, and BD represents balance disposal, which determines the amount of work expected by the examiner, or docket expectancy.

Docket expectancy is found by determining the difficulty of research and complication of the technology. The ratio of the examiner's real hours worked in a bi-week is divided by the cases completed is the docket.

$$\textit{Examiner's Docket} = \textit{Actual Hours Worked}/BD$$

Each examiner has a different docket expectancy, depending on their GS level and technology center, to compare the real production with the expected production. Different technology types have different docket expectancies and when divided by a

docket expectancy factor, which is based off of a GS-12 in the same field, the USPTO can determine the adjusted docket expectancy.

$$\text{Actual Expected Docket} = \text{Expected Docket} / \text{Docket Expectancy Factor}$$

Table 7: Docket Expectancy Factor by GS Level

<u>GS</u>	<u>Factor</u>
5	.55
7	.7
9	.8
11	.9
12	1
13	1.15
14	1.35

Source: USPTO Career Website

For example, if a GS14 examiner deals with four new cases and allows two cases within a pay period, his BD equals $(4 + 2)/2$, or 3. If the examiner worked 78 hours in the pay period, then his docket is $78/3$, or 26 hours/BD. If a GS12 in his field is allowed 31 hours/BD, then this examiner's adjusted docket expectancy is $31/1.35$, or 22.97 hours/BD. Given these conditions, the examiner's expected production percentage for the pay period is $22.97/26$, or 88.3%.

The production of an individual examiner is evaluated regularly, and in order for an examiner to receive a promotion to a higher GS level the employee must be as productive as the average between their current GS level and the higher GS level for six months.

Appendix D: Glossary of Abbreviations at the USPTO

PHP (Patent Hoteling Program):

- The PHP work arrangement is designed to help employees improve working standards by reducing commuting costs and daily travel time. PHP participants can remotely access USPTO automated systems, online resources, and other information from an alternative worksite. PHP participants can also remotely reserve office space one day per week in a "hotel office suite" located at USPTO headquarters to conduct in-person business activities. The PHP work arrangement allows employees more options in selecting work locations and schedules to better manage work and family responsibilities. Learn more about new PHP services and obtain helpful telecommuting information through continual updates on the PHP website.

PELP (Patent Examiner Laptop Program):

- The patent examiner laptop program arrangement is designed to give the full-time teleworkers a chance to earn overtime at home. They sign up for the program and receive a laptop. This laptop is then used only when the examiner has gone passed his required hours for that particular bi-week and is wishing to gain some overtime hours. The laptop can be used anywhere outside of the office and is therefore considered a way of teleworking without actually being in the office.

PU (Production Unit):

- A means to measure output of the Office in terms of an application from the time of filing to disposal of that application. Keeping in mind it does not have to be the same application because a first action may be done one year yet the final disposal of the application may not occur for many years. So the PU is simply a measurement unit equivalent to two counts wherein a count is a first office on the merits, abandonment, allowance, examiner's answer, or the filing of a request for continuation in the same application.

FTE (Full-Time Examiner):

- Full-time patent examiner analyzes and reviews possible patent applications and works a minimum of 80 hours a bi-week. Their jobs are reviewing patent applications and assess if they comply with the basic format, rules and legal requirements, determine the scope of the protection claimed by the inventor, research relevant technologies to compare similar prior inventions with the invention claimed in the patent applications, and communicate the examiner's findings to patent practitioners/inventors with reasons on the patentability of applicant's inventions. Patent Examiners are responsible for the quality, productively, and timely processing of patent applications, which is the basis of their performance evaluation.

GS (Grade Scale):

- The GS level of a patent examiner depends on how qualified the specific patent examiner is at his job. As time goes on the higher up the GS scale they will go

through a series of exams and reviews. The higher the GS you are the more money you will make and the responsibility will be greater in less time. The GS scale ranged from GS 5,7,9,11,12,13,14,15.

BD (Balance Disposal):

- Determines the amount of work expected by the examiner, or docket expectancy
Docket expectancy is found by determining the difficulty of research and complication of the technology. The ratio of the examiner's real hours worked in a bi-week is divided by the cases completed is the docket.

PTP (Patents Telework Program):

- The Patents Telework Program (PTP) is an ongoing work arrangement that allows eligible employees under the Commissioner for Patents in the POPA bargaining unit to work at an alternate work site during paid work hours to conduct their officially assigned duties without diminished employee performance. As used herein, "alternate work site" is defined as a location in the employee's home designated by the employee as the location they will use to perform their official USPTO duties, or another location approved by the Agency. The PTP will be evaluated on an ongoing basis.

GPS (Generic Performance Standards):

- The generic performance standards (GPS) are the primary basis for assigning element ratings in the Department of Commerce. The GPS are to be applied to each critical (and non-critical) element in the performance plan.

FY (Fiscal Year):

- The period used for calculating annual financial statements and performance measurements. The USPTO's fiscal year begins October 1st.

PP (pay period):

- Uniform two week periods. The fiscal year is composed of 26 pay periods. The USPTO measures performance at the shortest level by pay periods.

Appendix E: Assumption Sources and Calculations

Table 8: Expense Assumptions

<u>Equipment</u>	<u>Initial Cost</u>	<u>Cost Frequency</u>
Laptop	\$2500	Every 3-4 years
2 Monitors	\$1670	Every 5-7 years
Printer	\$550	Every 5 years
Router	\$110	One time
Security Reader	\$80	One time
Flash Drive	\$120	One time
Reimbursement for ISP	\$110	Monthly
Shipping Cost Per Person	\$220	Unknown

Source: James Thompson, SIRA

First Year Expense Calculation Excluding Shipping (Per Examiner):

$$\$2,500 + \$1,670 + \$550 + \$110 + \$80 + \$120 + (\$110 * 12) = \$6,350$$

Annual Expense Calculation Excluding Shipping (Per Examiner):

$$(\$110 * 12) + (\$2,500 / 3) + (\$1,670 / 6) + (\$550 / 5) = \$2,541$$

Table 9: Other Assumptions

<u>Category</u>	<u>Assumption</u>
Equipment Failure Rate	2% - 5%
% Examination Time	80% of total
Average Expected Docket (GS12)	21.5 hrs/PU

Sources: James Thompson, SIRA; Greg Vidovich, TQAS

Annual Exam Time per Examiner

80 hrs * 26 PP * 80% exam time = 1664 hrs/FY exam time

Average Expected Docket per GS14 Examiner

21.5 hrs/PU / 1.35 = 15.93 hrs/PU average expected docket

Average Production Output per GS14 Examiner

1664 hrs/FY exam time / 15.93 hrs/PU = 104.5 PU/examiner/FY