



UNITED STATES PATENT AND TRADEMARK OFFICE

The Patent Hoteling Program Is Succeeding as a Business Strategy

FINAL REPORT NO. OIG-12-018-A
FEBRUARY 1, 2012

U.S. Department of Commerce
Office of Inspector General
Office of Audit and Evaluation

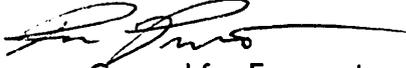
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February 1, 2012

MEMORANDUM FOR: David Kappos
Under Secretary of Commerce for Intellectual Property
and Director of the U.S. Patent and Trademark Office

FROM: Ron Prevost 
Assistant Inspector General for Economic
and Statistical Program Assessment

SUBJECT: *The Patent Hoteling Program Is Succeeding as a Business Strategy*
Final Report No. OIG-12-018-A

We have attached our final report related to our audit of USPTO's Patent Hoteling Program (PHP). This audit, part of the Office of Inspector General's Fiscal Year 2011 audit plan, determined how USPTO measures productivity for its PHP participants and whether USPTO's data indicate improvement in productivity; the extent that USPTO has achieved its stated cost savings for the PHP program, including real estate savings; and the extent that USPTO policies and their implementation provide adequate management controls over the PHP. Our report presents the findings and recommendations of this audit, conducted under the authority of the Inspector General Act of 1978, as amended, and Department Organization Order 10-13, dated August 31, 2006.

We found that PHP participants review 3.5 more patent applications per year than their nonparticipating (but eligible) counterparts, and we attribute the additional output to PHP participants' allocating a greater proportion of their time to examining patents. We also found that while USPTO achieves real estate cost savings from PHP, it has not calculated more comprehensive savings and costs for the program. Our analysis showed that USPTO avoids costs of approximately \$1,710 per PHP participant in the first year in the program and avoids costs of approximately \$3,385 per PHP participant in each subsequent year, mainly due to real estate savings. We also found that the additional applications reviewed by each PHP participant can result in an additional \$13,373 in expected future revenue for USPTO over a 14-year period. Finally, we found that USPTO's policies for managing PHP comply with applicable telework laws and provide reasonable controls and assurances that the program operates effectively and efficiently.

Our report includes three recommendations to USPTO to (1) conduct a more comprehensive calculation of costs and savings from PHP; (2) work with the Department of Commerce to compare best practices from PHP that could aid Department telework programs; and (3) ensure that internal controls are in place to allow only eligible patent examiners to participate in PHP and documentation is maintained.

Your January 18, 2012, response concurs with our draft report's recommendations and outlines steps USPTO is taking to address these issues. We also received verbal technical comments and made changes as appropriate. In accordance with Department Administrative Order 213-5, within 60 days of the date of this memorandum, please provide us with an action plan that responds to all of the report recommendations.

We thank USPTO personnel for the assistance and courtesies extended to my staff during the review. If you have any further questions or comments about the report, please feel free to contact me at (202) 482-3052 or Jill Schamberger, Project Manager, at (571) 272-5561.

Attachment

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Report In Brief

FEBRUARY 1, 2012

Background

The U.S. Patent and Trademark Office (USPTO) offers a variety of telework options for its employees—from 1 to 5 days a week. The largest of these is the Patent Hoteling Program (PHP), where employees work from home at least 4 days a week and reserve office space for when they need to be present at USPTO. At the end of fiscal year 2011, more than 2,600 patent examiners were participating in PHP. Goals of PHP include reducing space and cost requirements while improving employee retention and job satisfaction.

Why We Did This Review

PHP is considered one of the leading government telework programs, yet no comprehensive and independent review of the program's costs and benefits has ever been completed. Because, by law, participation in telework programs should not result in diminished federal employee performance, we specifically looked at the productivity of PHP participants. Also, because USPTO's management challenges include addressing the backlog of about 700,000 patent applications, we sought to determine if PHP can help reduce this backlog in a cost-effective way.

U.S. PATENT AND TRADEMARK OFFICE

The Patent Hoteling Program Is Succeeding as a Business Strategy

OIG-12-018-A

WHAT WE FOUND

PHP participants review more patent applications than do examiners working at headquarters. Although both groups review patent applications at the same rate, PHP participants spend more time examining applications because they use less sick and administrative leave and charge less time to administrative tasks. As a result, the average PHP participant spends 66.3 more hours a year examining patents than does the average in-house examiner; this translates to reviewing about 3.5 more patent applications a year.

USPTO avoids real estate costs through PHP but has not calculated a comprehensive cost analysis of the program. Whereas USPTO reported that it avoids \$15.88 million annually in real estate costs by having PHP, we estimated that this amount is approximately \$16.84 million as a result of the program.

Although PHP incurs additional costs, mainly for IT infrastructure and hoteling support services, these costs are significantly offset by avoided real estate costs as well as revenue generated from the additional patent applications reviewed.

USPTO has adequate controls over the patent hoteling program in key areas; however, close to 2 percent of a random sample of participants lacked documentation to support eligibility in the program.

WHAT WE RECOMMEND

We recommend that the Under Secretary of Commerce for Intellectual Property and Director, USPTO:

1. Conduct a more comprehensive calculation for costs and cost avoidance related to PHP in order to obtain more accurate estimates of the cost and benefits affiliated with this program.
2. Work with the Department of Commerce to compare best practices from the Patent Hoteling Program, which could aid telework programs within the rest of the Department.
3. Ensure that internal controls are in place so that only eligible patent examiners participate in PHP and appropriate documentation is maintained.

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*COVER: Detail of fisheries pediment,
U.S. Department of Commerce headquarters,
by sculptor James Earle Fraser, 1934*

Introduction

The U.S. Patent and Trademark Office’s (USPTO’s) telework programs are part of an agency business strategy to meet its mission of issuing patents and awarding trademarks. USPTO currently offers a variety of telework options for its employees—from 1 to 5 days a week. The largest of these telework programs is the Patent Hoteling Program (PHP), in which more than 2,600 patent examiners were participating at the end of fiscal year 2011. Goals of PHP include reducing space and cost requirements associated with increased hiring, while improving employee retention and job satisfaction.

PHP is voluntary for eligible, participating patent examiners. USPTO provides equipment and remote access to all relevant systems; in return, the patent examiners work from home at least 4 days a week and relinquish their office space at USPTO headquarters. Before participating, patent examiners must meet certain requirements (see table 1) and complete a 1-week training course. USPTO began PHP in January 2006 with 500 GS-14 and GS-15¹ patent examiners. Since then, USPTO expanded eligibility to include GS-12 and GS-13 patent examiners. Expansion of the program currently is limited—to about 500 additional patent examiners each year—because of infrastructure constraints, such as having the requisite training courses and ensuring system capacity.

“Hoteling” is a telework option where employees work from home at least 4 days a week and reserve office space electronically for when they need to be present at USPTO.

Table 1. PHP Participation Requirements

GS-12 or above	‘Fully Successful’ or higher performance rating	Not suspended for disciplinary or adverse personnel action within the last 12 months
Worked at least 2 years at USPTO	Passed the Certification Exam, the Registration Exam, or have Partial or Full Signatory Authority ^a	Not currently under an oral or written warning for performance

Source: USPTO

^aA Certification Exam is taken before promotion to GS-13 to ensure that the examiner has the knowledge, skills, and abilities to perform to the standards of this grade level. A Registration Exam is administered to attorneys and agents; those who pass are allowed to represent applicants with prospective or immediate business before USPTO in the preparation and prosecution of patent applications. An examiner with permanent or temporary Partial Signatory Authority may sign nonofficial actions, while a primary examiner with Full Signatory Authority is delegated to represent the Commissioner and sign all actions, including allowances.

¹The federal government categorizes jobs, level of work, and pay using the General Schedule (GS). The higher the GS number, the higher the experience and pay.

USPTO's PHP is considered one of the leading government telework programs, yet no comprehensive and independent review of the program's costs and benefits has ever been completed. Because, by law, participation in telework programs should not result in diminished federal employee performance, we specifically looked at the productivity of PHP participants. Also, because USPTO's management challenges include addressing the backlog of about 700,000 patent applications, we sought to determine if the Patent Hoteling Program can help reduce the backlog in a cost-effective way.

This audit's objectives were to determine 1) how USPTO measures productivity for its PHP participants and whether USPTO's data indicate improvement in productivity; 2) the extent that USPTO has achieved its stated cost savings for PHP, including real estate savings; and 3) the extent that USPTO policies and their implementation provide adequate management controls over PHP. Using USPTO data, we analyzed the production levels of PHP participants and the costs and savings associated with PHP. We also reviewed and tested policies and internal controls relevant to the PHP. For more details on the scope and methodology of our audit work, see appendix A.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Findings and Recommendations

I. PHP Participants Review More Patent Applications Than Do Examiners Working at Headquarters, but There Are No Differences in Efficiency

A cornerstone of any telework program is that the teleworker must be no less productive at home than in the office.² USPTO collects production data, such as the number of patent applications that an examiner reviews.³ It also sets production targets for the number of patent applications to be reviewed, based on an examiner's experience level and the patents' complexity. Using this and other USPTO data, we built statistical models that measure the effect of PHP participation on production and efficiency, while accounting for other influences such as performance rating, grade level, and technology center.⁴ We tested the reliability of the data, and while there were some limitations (see appendix B), we found the data to be reliable for use in our models. Based upon our analysis, we found that PHP participants review more patent applications than their nonparticipating counterparts, but PHP participants are no more efficient at reviewing applications.

A. *PHP participants review more patent applications*

Based on our model, we found participation in PHP to be statistically significant in explaining why these examiners spent more time examining patents. Specifically, we found that the average PHP participant spends 66.3 more hours⁵ a year examining patents than a PHP-eligible examiner working at headquarters. In other words, an average PHP participant reviews about 3.5 more applications⁶ annually—or 4 percent—than a full-time examiner working at USPTO headquarters.⁷

We found that the average PHP participant allocates a greater proportion of time to examining patents. PHP participants use less sick and administrative leave and charge less time to other activities not directly defined as examining patents. However, except for sick and administrative leave, among the various other activities not directly defined as examining

² See Department of Transportation and Related Agencies Appropriations Act of 2001, Pub. L. No. 106-346, § 359, 114 Stat. 1356, 1356A-36 (2000); 5 U.S.C. § 6502(b).

³ USPTO measures examiners' production by the number of applications they review. Examiners earn partial credit for delivering a preliminary decision on the patentability of an application's claims. They earn the remaining production credit after the review of an application is closed—because an applicant agreed with the examiner's decision, abandoned the patent claim, or because the applicant exhausted the opportunities to persuade the examiner and the examiner issues a final rejection.

⁴ USPTO organizes various areas of technologic expertise into technology centers. USPTO currently has nine technology centers, including Communications, Chemical & Materials Engineering, and Computer Architecture and Software.

⁵ Based on our model, examiners did not work 66.3 more hours of overtime; they allocated 66.3 more hours to examining patents out of the total time they worked.

⁶ USPTO estimates that on average, an examiner eligible to participate in PHP spends 18.84 hours reviewing an application.

⁷ Our analysis indicates that the average examiner working from headquarters at GS-12 level or above spends 1,604 hours a year examining patents, and reviews approximately 85 patent applications per year.

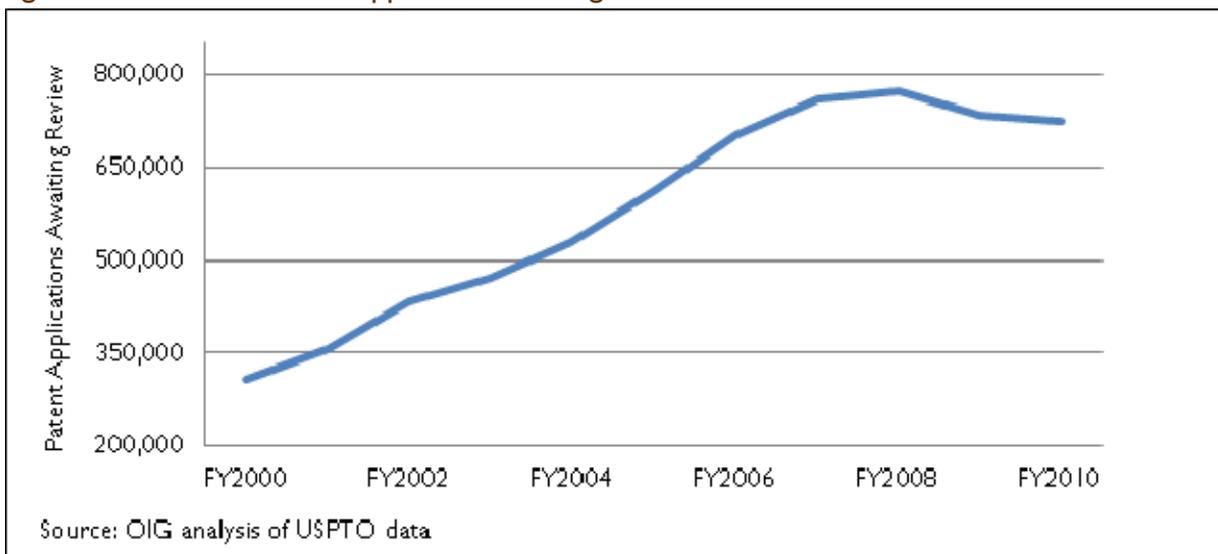
patents, no single activity differed substantially between PHP participants and PHP-eligible participants who worked at headquarters.

B. PHP participants are no more efficient at reviewing patent applications than their counterparts who work at headquarters

Our second model tested whether there was a significant difference in examiner efficiency, as measured by the time it took PHP participants and eligible nonparticipants to review a patent application. As in the other model, we accounted for such variables as grade level and performance rating. We also controlled for USPTO's production targets, which are based on technology area and the patent examiner's experience level. We found no significant difference in the average efficiency of PHP participants and eligible examiners working at headquarters. However, we did find that USPTO's production targets had a statistically significant and substantial effect on the amount of time it actually took to review applications (see appendix B).

Although increased production was not a primary goal of PHP, our analysis found that the additional hours that a PHP participant devotes to examining patents could contribute to reducing the current backlog of patent applications. Our model estimates that a PHP participant removes 2.6 more *new* applications⁸ from the backlog each year than an examiner working at headquarters; therefore, approximately 2,600 PHP participants would review about 6,700 *additional* patent applications in a given year. Given the current backlog of about 700,000 patent applications (see figure 1), these additional reviews could have a small but nonetheless positive effect on reducing the backlog.

Figure I. Increase in Patent Application Backlog from FY 2000-2010



⁸ To assess the impact of PHP on the backlog, USPTO estimates that 73 percent of the applications any examiner reviews are being reviewed for the first time, while the remaining 27 percent are applications that were refiled by the applicant. We found that the average PHP participant reviews about 3.5 more applications annually; thus, our model estimates that a PHP participant will review 2.6 more new applications each year.

2. USPTO Avoids Real Estate Costs Through PHP but Has Not Calculated a Comprehensive Cost Analysis for the Program

USPTO has not provided a complete representation of the costs and savings associated with PHP. USPTO understated the real estate costs it avoids and did not adequately account for additional costs of supporting the program. We calculated a more comprehensive comparison of the cost of supporting PHP participants with the cost of full-time examiners at the agency's offices. We found that USPTO's cost avoidance is \$1,710 per PHP participant in the first year. In subsequent years, USPTO annually avoids costs of approximately \$3,385 per PHP participant because of reduced real estate expenses such as rent, taxes, and utilities. USPTO's cost avoidance in the first year is less than subsequent years due to additional costs incurred such as information technology (IT) setup and equipment costs to support a PHP participant.

A. *Avoided real estate costs understated*

USPTO has reported that because of its telework programs, it avoids approximately \$19.88 million annually for office space costs. Of this amount, approximately \$15.88 million in real estate costs are avoided annually because of the Patent Hoteling Program. USPTO avoids this real estate cost because PHP participants relinquish their offices, thus freeing up office space and mitigating USPTO's need to acquire additional office space.

However, our analysis found that USPTO understated this \$15.88 million in avoided real estate costs. We estimated that USPTO avoided approximately \$16.84 million annually. This difference is due to USPTO omitting additional costs of \$2.22 million for hoteling suites as well as omitting avoided costs of \$3.18 million for common space such as hallways and cafeterias.⁹

B. *Additional and avoided costs associated with PHP*

USPTO accounts for most of the real estate costs it avoids as a result of PHP, but the program also incurs as well as avoids other costs. As shown in table 2, additional costs include computer equipment, support services, and reimbursement for Internet service providers (ISP); avoided costs include real estate taxes as well as transit benefits, which are not paid to PHP participants.

⁹ The amount of common space needed is represented by a rentable/usable (R/U) ratio: the percentage of space in a building that is not usable plus a pro rata share of the building's common areas, expressed as a percentage of usable area. USPTO's current R/U ratio at the Alexandria, Virginia, campus is 1.2.

Table 2. Comparison of FY 2010 Costs per Patent Examiner for PHP and Non-PHP Participants

Cost Category	PHP	Non-PHP (at USPTO)	First-Year Difference (using PHP as base)	Subsequent-Year Difference (using PHP as base)
Real estate, taxes, utilities	\$1,075	\$9,835	-\$8,760	-\$8,760
IT setup	1,050		+1,050	n/a
Equipment ^a	4,880	4,255	+625	n/a
Virtual infrastructure ^b	4,450		+4,500 ^c	+4,500
Hoteling support services ^c	1,675		+1,675	+1,675
Transit benefits	230	1,100	-870	-870
ISP reimbursement	70		+70	+70
Total	\$13,480	\$15,225	-\$1,710	-\$3,385

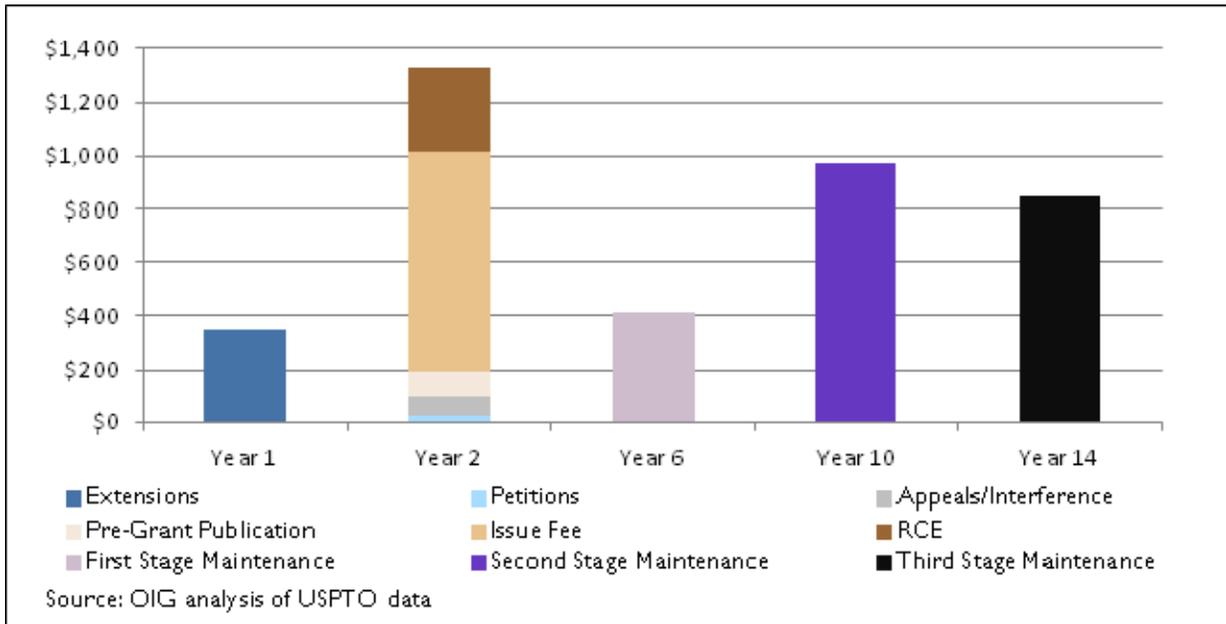
Source: OIG analysis of USPTO data
^aEquipment includes computer, dual monitors, printer, webcam, keyboard, speakers, and miscellaneous equipment.
^bVirtual infrastructure costs are dynamic and reported on as incurred in 2010; however, USPTO is currently transitioning to a universal laptop program that will decrease these costs in the future.
^cHoteling support services include telework depot, engineer, VPN, storage, and backup.

3. Reviewing Additional Applications Generates Revenue That Offsets PHP Costs

While USPTO incurs additional costs to support PHP, mainly for IT infrastructure and hoteling support services, our analysis found that these costs are significantly offset by costs avoided by PHP and the expected future value of the extra applications reviewed by PHP participants. The expected future value for a patent application takes into account that any patent application USPTO reviews will generate revenue from a series of fees collected for reviewing and, if approved, for issuing and maintaining the patent.

As shown in figure 2, the expected future revenue for a single patent application reviewed by any patent examiner, whether in PHP or not, is \$3,924. Given that our model found that a PHP participant reviewed an additional 3.5 applications per year, USPTO could receive, for each year worked by a PHP participant, an additional \$13,373 in future revenue. Because different fees are collected over time, the expected future revenue from these applications would be realized over 14 years.

Figure 2. Expected Future Revenue for a Single Patent Application Reviewed by a Patent Examiner



4. USPTO Has Adequate Controls over the Patent Hoteling Program in Key Areas

USPTO’s policies for managing the PHP comply with applicable telework laws and provide reasonable controls and assurances that the program operates effectively and efficiently. The applicable laws, guidance, and USPTO policies address a variety of areas, including eligibility to telework, training, reimbursement for phone/Internet expenses, and remote access to the agency’s IT systems. We did not, however, test the adequacy of the IT policies.

To implement the PHP, USPTO developed a program that complies with key federal statutes related to telework.¹⁰ The program addresses employee eligibility and participation, work schedules, the application process, and selection criteria. We reviewed a random sample of active PHP participants (see appendix A) and found that almost all met eligibility requirements for entering the program and USPTO had appropriate documentation to support their eligibility. Less than 2 percent of the participants sampled lacked documentation to support eligibility or to show that an exemption had been made for their participation. This indicates that fewer than 40 PHP participants would lack documentation to support their eligibility in the program.

We examined USPTO’s controls over its Internet service provider (ISP) reimbursement policy for PHP participants and found that USPTO has adequate controls in place to prevent

¹⁰This includes section 359 of the Department of Transportation and Related Agencies Appropriations Act for 2001, Pub. L. No. 106-346, which requires each executive agency to establish a policy under which eligible employees may telework without diminishing employee performance.

improper payments to PHP participants for these reimbursements. Under this policy, the agency is permitted to pay PHP participants either a full or partial reimbursement for ISP used at their homes for official USPTO purposes. The program allows for reimbursements of up to \$100 per month. In FY 2010, 354 PHP participants, or approximately 17 percent, opted to receive this reimbursement, which cost USPTO a total of almost \$152,000. Automated controls are in place for the ISP reimbursement system to ensure, among other things, that

- only eligible PHP participants are able to submit reimbursement claims;
- claims do not exceed the \$100 monthly maximum; and
- required documentation is attached to the claim.

In addition, the ISP Reimbursement Facilitator reviews every reimbursement claim to ensure it complies with USPTO policy and performs weekly reconciliations to ensure payment accuracy.

We also reviewed USPTO's remote access policies to reduce security risks to USPTO systems and data. We did not identify any deficiencies in the policies when comparing them against government-wide guidance.¹¹ However, we did not test the policies' adequacy and therefore cannot attest to the security and effectiveness of the systems that support PHP.

Conclusion

While USPTO had not completed a comprehensive analysis of the costs associated with the Patent Hoteling Program, our analysis found that the program provides USPTO with a cost-effective tool for meeting its business strategy and mission. We found that PHP participation increases production and can remove a small number of additional applications from the backlog of patent applications, thus providing a possible means to help reduce the patent backlog. USPTO's production measurement and data systems provide the PHP with the means to assess its operations in detail. While these features may not exist to this extent at other agencies, the Patent Hoteling Program's overall design, policies, and controls provide a framework for other telework programs to consider.

Recommendations

We recommend that the Under Secretary of Commerce for Intellectual Property and Director, USPTO:

- I. Conduct a more comprehensive calculation for costs and cost avoidance related to PHP in order to obtain more accurate estimates of the cost and benefits affiliated with this program.

¹¹ Federal agencies are required to be in compliance with the National Institute of Standards and Technology's (NIST's) information security standards for improving the security of federal information and information systems (NIST Special Publication 800-53, revision 3, August 2009. *Recommended Security Controls for Federal Information Systems and Organizations*).

2. Work with the Department of Commerce to compare best practices from the Patent Hoteling Program, which could aid telework programs within the rest of the Department.
3. Ensure that internal controls are in place so that only eligible patent examiners participate in PHP and appropriate documentation is maintained.

Summary of Department and OIG Comments

In responding to our draft report, USPTO concurred with all of our recommendations. We have included USPTO's complete response as appendix C. Separately, the agency verbally provided technical comments that we addressed in the report where appropriate.

Appendix A: Objectives, Scope, and Methodology

The audit's objectives were to determine: 1) how USPTO measures productivity for its PHP participants and whether the data show improvement in productivity; 2) the extent that USPTO has achieved its stated cost savings for the PHP, including in real estate; and 3) the extent that USPTO policies and their implementation provide adequate management controls over the PHP. We used USPTO data to analyze the production levels of PHP participants and their office equivalents, as well as costs and savings associated with PHP. We also reviewed and tested policies and internal controls relevant to the PHP. We conducted our work in accordance with generally accepted government auditing standards between March and November 2011 at USPTO headquarters in Alexandria, Virginia.

To assess production levels for participants, we obtained USPTO data on all examiners eligible to participate in the program. We built statistical models to determine whether hoteling increased production and decreased the amount of time an examiner charges to nonexamining time. We collected data for production, performance ratings, time and attendance. We tested the reliability of the data, and limitations with the data are addressed in appendix B. The data came from January 2006—the official launch of the program—through March 31, 2011, and included information on many examiners from before and after the examiner joined the program. See appendix B for detailed descriptions of the models used for our analysis.

To determine if USPTO achieved its stated cost savings, we obtained data on PHP's costs from fiscal years 2008-10. The costs included real estate, equipment, and support services. We compared costs for an employee who is in PHP versus the costs of that same employee working at USPTO. We discussed the relevant costs with federal telework officials at the Office Personnel Management, General Services Administration, and Defense Information System Administration. In accordance with auditing standards, we verified these costs with USPTO and source documentation. We did not examine costs or savings to USPTO related to other factors such as attrition, retention, employee satisfaction, and environmental effects.

To determine the extent to which USPTO policies and their implementation provide adequate management controls over the PHP, we assessed USPTO's telework policies with applicable laws and regulations, verified participant compliance with PHP eligibility rules and training requirements, assessed internal controls associated with USPTO's ISP reimbursement program, and reviewed USPTO's IT security policies, with a focus on remote access.

We assessed current telework policies as well as the various eligibility requirements that have been in place since the program began in January 2006 for compliance with applicable laws and regulations, including section 359 of the Department of Transportation and Related Agencies Appropriations Act for 2001, which requires each executive agency to establish a policy under which eligible employees may telework.¹² To verify compliance with eligibility rules and training

¹²Pub. L. No. 106-346, § 359, 114 Stat. 1356, 1356A-36 (2000).

requirements, we selected a representative random sample of 201 active participants in the program.¹³ Using electronic records from various USPTO sources, we verified whether each individual in the sample was eligible to participate in PHP according to the program requirements in place at the time they entered the program and whether each of these individuals completed required training for the program. We tested the reliability of the data, and while there were some limitations (see appendix B), we found the data to be reliable for this work.

To assess the internal controls associated with ISP reimbursement, we met with the appropriate agency officials and reviewed the reimbursement process and automated controls. We also reviewed USPTO's IT security policies, with a focus on remote access, and met with USPTO officials responsible for enforcing these policies. We did not test the adequacy of these policies and therefore cannot attest to the security and effectiveness of the systems that support PHP.

¹³ According to USPTO data, there were 2,344 active, full-time patent examiners in PHP as of March 31, 2011.

Appendix B: Quantitative Methodology

We developed two econometric models to explain how participation in PHP affects the number of patent applications an examiner reviews and the examiner's efficiency. Because other factors can influence how much time examiners spend reviewing patents, and how efficiently, our models controlled for these factors. To test the robustness of the model results, we created multiple models using different specifications and measured the effects on a biweekly and annual basis; we found our results to be consistent.

Data sources used in both econometric models

For both models, we collected data from several USPTO business systems to track production and examiner characteristics from the program's inception in January 2006 through March 31, 2011. The data for our models came from PHP participants and patent examiners who were eligible to participate in PHP but did not to participate.¹⁴ The variables and data sources used in our models are shown in table 3.

Econometric model specification and methodology: Do PHP participants spend more time examining patents?

We developed this model to test whether PHP participants spend statistically significantly more time examining patents than those who are eligible but do not participate in the PHP program. We employed a fixed-effects model¹⁵ to control for effects specific to individuals and time periods. We controlled for several variables in our analysis because multiple factors could influence how much time an examiner spends reviewing patents. The additional variables contained in the model are described in table 4.

Our regression model can be expressed by the following formula:

$$Y_{it} \text{Examining Hours} = B_0 + B_1 i_{it} \text{PHP_Participation} + B_2 i_{it} \text{Satisfactory_Rating} + B_3 i_{it} \text{Grade} + B_4 i_{it} \text{Technology Center} + u_{it}$$

- i represents the dummy variable added to control for effects specific to the individual.
- t represents the dummy variable added to control for effects specific to the biweekly period.

¹⁴ The models include all patent examiners at GS-12 and higher.

¹⁵ Fixed-effects regression is a statistical method that controls for stable characteristics of individuals/entities, such as work habits, and time periods to eliminate a large potential source of bias.

Table 3. Variables and Data Sources Used in Both Econometric Models

Variable	Description	USPTO Data Source
Hours spent examining patents	USPTO tracks the time an examiner spends reviewing patents in a separate charge code.	<i>Data Warehouse.</i> Collects and stores information from various business systems, including time and attendance records and performance ratings.
Production units	USPTO measures examiners' production by the number of applications they review.	<i>Patent Application and Locator Monitoring System (PALM).</i> Tracks, monitors, and reports on patent applications received by USPTO, including examiner production.
PHP participation	USPTO tracks when examiners take the training session to join PHP and when they leave the program. From these dates, we determined whether an examiner was participating in PHP for each biweekly period in our scope.	<i>Telework Central.</i> Contains information from examiners who apply and are accepted into PHP, including when they join and leave the program.
Grade	GS-level	<i>PALM</i>
Technology center	The technology center lists the overall organization unit where the examiner works. These organizations are grouped by broad technology areas, such as Chemical and Materials Engineering and Biotechnology and Organic Chemistry.	<i>PALM</i>
Individual fixed effects	This is a dummy variable ^a for each examiner based on their examiner identification number.	<i>PALM, Data Warehouse</i>
Expected efficiency	USPTO has a standard schedule that identifies how many hours an examiner should take to review a patent application. The expected efficiency variable identifies how many production units USPTO expects examiners to complete in an hour, given their grade and technology area.	<i>PALM</i>
Satisfactory rating	Examiners are rated on a five-tier scale. To be eligible to participate in PHP, individuals must achieve a satisfactory rating. A satisfactory rating is a 3 or higher out of 5.	<i>Data Warehouse</i>
Time period, fixed effects	This is a dummy variable ^a for each biweekly time period in the data sets.	<i>PALM, Data Warehouse</i>
^a A dummy variable takes the value of "0" or "1" to indicate the absence or presence of a characteristic.		

Table 4. Additional Variables in Model: Do PHP Participants Spend More Time Examining Patents?

Type of Variable	Variable Name	Description / Other information
<i>Dependent Variable^a</i>	<i>Hours spent examining patents</i>	The time (in hours) charged to examining patents on a biweekly basis. USPTO tracks time spent examining patents separately in their charge codes.
<i>Primary Variable of Interest</i>	<i>PHP_Participation</i>	Participation in PHP is coded as '1' when the examiner is enrolled in PHP during the biweekly period and as '0' otherwise.
<i>Other Explanatory Variables Controlled for:</i>		
	<i>Grade</i>	As examiners progress up the GS scale, they may be required to spend more time helping train new examiners and in other non-examining activities. The grade of the examiner could thus potentially negatively affect how much time they devote to examining patents.
	<i>Technology center where the examiner works</i>	The technology center lists the overall organization unit where the examiner works. These organizations are grouped by broad technology areas.
	<i>Satisfactory rating</i>	To be eligible to participate in the PHP program, individuals must achieve a satisfactory rating. We controlled for the effect of individuals who did not receive a satisfactory rating by creating a dummy variable coded as '0' when the employee did not receive a satisfactory rating (1 or 2) and '1' when the employee received a satisfactory rating (3 or above). No rating data were available for biweekly observations for FY 2011 because the annual performance period was not yet complete when we obtained the data.
	<i>Individual fixed effects</i>	Controls for fixed effects unique to the examiner, such as established work habits. The model assumes that there is something unique about each person that could explain how much time they spend examining patents.
	<i>Time period fixed effects</i>	We included a dummy variable for each biweekly period because certain periods, such as around holidays, could have a significant effect on the amount of time an individual devotes to examining patents. USPTO implemented changes in the overall performance measurement system in spring 2010. The time period fixed-effect variables also control for this change.
^a The dependent variable is the outcome that will be measured. We measure whether the primary variable of interest and other explanatory variables explain the outcome/dependent variable at a statistically significant level.		

Main Results

As shown in table 5, the model estimates that a PHP participant spends 2.55 more hours per pay period examining patents than does a non-PHP participant. Since there are 26 pay periods each year, we estimate that a PHP participant spends 66.3 more hours examining patents over

the course of a year than does a non-PHP participant. We also found that examiners spend less time examining patents as they progress up the GS scale. This is consistent with our expectation that examiners at higher grades may devote more time to other activities such as training new examiners and substituting for supervisors.

Table 5. Statistical Significance of Results of Model to Test Hours Devoted to Examining Patents (N = 378,270)

Variable	Coefficient	Standard Error ^a
PHP Participation	2.5582	0.1080
GS-13	-2.8369	0.1186
GS-14	-4.4951	0.1763
GS-15	-30.6352	0.8316
Satisfactory Rating	0.5459	0.1942

^aResults are statistically significant to 1 percent.

Robustness Tests

To ensure that the results were not a function of PHP employees working more hours than non-PHP employees, we re-ran the above model with percentage of time spent examining as the dependent variable. These results were consistent with our hypothesis that PHP participants spend a larger share of their time examining patents than do non-PHP participants. We also tested annual versions of the model, where we aggregated biweekly pay periods by individual and year (fiscal and calendar). In these specifications, PHP remained a strong, significant predictor of the total number of hours and percentage of time spent on examining patents.

Econometric model specification and methodology: Are PHP participants more efficient?

This model to test examiner efficiency shares many specifications with the previous model. We also used a fixed-effects model to control for effects specific to the individual and time period. The primary variable of interest in this model remains participation in the PHP program. This model includes the explanatory variables of grade and satisfactory rating that were described in the previous model description.

In addition to the variables described in table 6, we also included the following explanatory variables as in the other model: Satisfactory Rating, Individual Fixed Effects, and Time Period Fixed Effects.

Table 6. Additional Variable Descriptions in the Efficiency Model

Type of Variable	Variable Name	Description/Other information
Dependent Variable	<i>Examiner Efficiency</i>	We measured efficiency by the amount of production units an examiner produced per hour during a biweekly period. USPTO measures examiners' production by the number of applications they review. Examiners earn partial credit when they deliver their preliminary decision on the patentability of an application's claims and the remaining production credit after the application is closed.
Primary Variable of Interest	<i>PHP_Participation</i>	The primary variable of interest in this model is participation in PHP, coded as '1' when the examiner is enrolled in the PHP program during the biweekly period and as '0' otherwise.
Other Explanatory Variable	<i>Expected Efficiency</i>	USPTO uses an established schedule to identify how many hours an examiner should need to review an application based on the technology of the application and the grade of the examiner. To make it simpler to interpret the effect of USPTO expectations, we used the expected efficiency defined as the amount of production units USPTO expects an examiner to complete in an hour.
Other Explanatory Variable	<i>Grade</i>	As examiners progress up the GS scale, they may become more effective at examining patents. USPTO does expect more efficiency from individuals at higher grades, but we wanted to control whether there was an additional effect related to the grade of the examiner. This variable was included in the previous model, but the expected effect is different.

Our regression model can be expressed in the following formula:

$$Y_{it} \text{Examiner_Efficiency} = B0 + B1_{it} \text{PHP_Participation} + B2_{it} \text{Satisfactory_Rating} + B3_{it} \text{Grade} + B4_{it} \text{Expected_Efficiency} + u_{it}$$

- The dependent variable in this model is the number of production units earned in a pay period divided by the time spent examining patents.
- i represents the dummy variable added to control for effects specific to the individual.
- t represents the dummy variable added to control for effects specific to the biweekly period.

Main Results

As shown in table 7, our results found no statistically significant differences in efficiency between the two groups. The model did estimate that the Expected Efficiency Rate established by USPTO was a statistically significant and a substantial factor in explaining the actual efficiency of the examiner. To interpret the magnitude of the effect of USPTO expectations, we would say that, holding all other variables constant, a 1 percent increase in the expected

efficiency would result in a 0.72 percent increase in the actual efficiency. Thus, our model estimates that actual efficiency is highly sensitive to the expectations established by USPTO.

Table 7. Statistical Significance of Results of Model to Test Efficiency (N = 374,690)

Variable	Coefficient	Standard Error
PHP Participant	0.0003	0.0005 ^b
Expected Efficiency Rate	0.7236	0.0748 ^a
Satisfactory Rating	0.0068	0.0010 ^a
GS-13	0.0008	0.0007 ^b
GS-14	0.0043	0.0013 ^a
GS-15	0.0164	0.0052 ^a

^a Results are statistically significant to 1 percent.

^b Results are not statistically significant.

Robustness Tests

To ensure that the results were not due to anomalies introduced by measuring efficiency on a biweekly basis, we also tested annual versions of the model where we aggregated biweekly pay periods by individual and year (fiscal and calendar). Consistent with the results described in our report, PHP participation is not a statistically significant factor in predicting efficiency on an annual basis.

Limitations of our econometric model and data

We used data collected and recorded by USPTO for our models. Relying on this data presented three major limitations to our analysis. First, because we relied on self-reported data submitted into time and attendance records, we cannot confirm the actual number of exam hours and nonexam hours that an examiner worked in a biweekly period. While there may be instances where examiners did not accurately portray how they allocated their time, there is no basis for assuming that inaccuracies are more prevalent in the groups of examiners participating in the PHP versus examiners working from headquarters.

Second, there is no independent source of information on examiner production and time spent examining patents other than the data that are entered into USPTO's electronic systems. Thus, we could not perform tests to trace each transaction to paper documentation. We assessed the reliability of our data by conducting numerous electronic tests to ensure the data appeared complete and accurate.

Finally, we did not test the IT security internal controls of each data system, and no published reports on data quality existed for these systems during our analysis. We reviewed the overall

data entry policies with system users to ensure that there were segregation of duties. However, we did not conduct an extensive test on the overall IT security.

Given these limitations, we have no evidence that any potential inaccuracies or tampering would be more likely to occur with PHP participants versus eligible patent examiners who do not participate in PHP. We used the same data that USPTO management relies on to make management decisions. Therefore we believe that the data is sufficiently reliable to assess the differences between examiners in the PHP program and those who work at headquarters.

When interpreting our productivity analysis, it is important to recognize the limits of generalizing our model's results to other workplaces. USPTO has unique features, such as explicit, measurable performance expectations and extensive tracking of production. While our results explain the effect of the PHP program from January 2006 to March 31, 2011, the results of our work will need to be replicated in other hoteling programs before it is appropriate to generalize these findings to other workplaces.

Appendix C: Response to OIG's Draft Report



UNITED STATES PATENT AND TRADEMARK OFFICE

UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND
DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

JAN 18 2012

MEMORANDUM FOR Ron Prevost
Assistant Inspector General for Economic and
Statistical Program Assessment

FROM: *Margaret A. Focarino*
Margaret A. Focarino
Commissioner for Patents

SUBJECT: Response to Draft Report: *"United States Patent and Trademark
Office: The Patent Hoteling Program is Succeeding as a Business
Strategy"*

Executive Summary

Thank you for your review of the United States Patent and Trademark Office's (USPTO) teleworking program policies and implementation process. We appreciate the effort you and your staff have made in reviewing the Patent Hoteling Program (PHP), including the associated cost savings and business strategy for over 2,600 participants through fiscal year 2011. We have carefully considered the three recommendations made in the subject draft report.

The USPTO believes our implementation and progress in this teleworking program is recognized as a model for other Federal agencies to consider as a best practice. We are proud of the contributions made thus far from our participants, which we believe will assist in achieving our strategic goals and mission.

Our response to each recommendation is discussed in detail below. We have no technical comments to provide for this report.

Response to Recommendations

IG Recommendation that the Under Secretary of Commerce for Intellectual Property and Director of USPTO (I): Conduct a more comprehensive calculation for costs and cost avoidance related to the PHP in order to obtain more accurate estimates of the cost and benefits affiliated with this program.

USPTO Response:

The USPTO concurs with this recommendation. The USPTO has recently undertaken an assessment of the costs and cost avoidance associated with the PHP as part of the Cost Benefit Analysis for the Telework Enhancement Act Pilot Program that has recently been approved by the General Services Administration. We will review the data we have collected as it applies to

the entire hoteling program as well as reassess our findings in other areas of cost and cost avoidance in light of the findings of this Inspector General (IG) report. We appreciate the feedback provided by the IG. The information will be helpful as the USPTO seeks to continually improve our telework programs.

IG Recommendation that the Under Secretary for Commerce for Intellectual Property and Director of USPTO (2): Work with the Department of Commerce to compare best practices from the Patent Hoteling Program, which could aid telework programs within the rest of the Department.

USPTO Response:

The USPTO concurs with this recommendation. The USPTO works regularly with the Department of Commerce (DOC) on departmental and bureau-specific telework program issues and implementation. We have frequent informal interaction with various departmental and bureau staff members in addition to both hosting and participating in more formal events.

To date, the USPTO has held two telework workshops specifically designed for DOC organizations. These workshops were developed in response to the numerous questions received by the USPTO regarding the lessons learned from USPTO's telework and hoteling programs. The goal of each workshop was to better educate DOC telework points of contact with regard to gathering/evaluating pertinent telework data, creating bureau telework policies and telework Web site, communicating telework information bureau-wide, developing data-collecting tools, and designing an infrastructure to support robust telework initiatives.

Workshop attendees included representatives from DOC -- International Trade Administration (ITA), Census, Economic Development Administration (EDA), National Oceanic and Atmospheric Administration (NOAA), and National Institute of Standards and Technology (NIST). Agenda items included an overview of telework at the USPTO, a discussion of the enterprise-wide telework policy, telework tools, gathering and analyzing telework statistics, developing a telework Web site and communicating information agencywide, a demonstration of the telework database, developing an IT infrastructure to support a telework strategy, the Office of Personnel Management (OPM) Telework Data Call, and Q&A panels on emerging Federal telework program issues.

The USPTO looks forward to continuing our work with departmental colleagues in the furtherance of telework throughout DOC. We have committed to planning and hosting quarterly departmental telework workshops going forward and will continue to be available to consult on an individual basis, as needed.

IG Recommendation that the Under Secretary for Commerce for Intellectual Property and Director of USPTO (3): Ensure that internal controls are in place so that only eligible patent examiners participate in PHP and appropriate documentation is maintained.

USPTO Response:

The USPTO concurs with this recommendation. Patents is in the process of reviewing the eligibility, sign-up procedures, and records retention procedures for the PHP. We will ensure that there are procedures in place to fully reflect the eligibility information for all PHP participants.

Conclusion

In closing, we thank the Assistant Inspector General for Economic and Statistical Program Assessment for providing us with this report. We are confident in our abilities to meet the recommendations in a timely manner as we maintain our efforts to make the PHP a successful business strategy. We look forward to working with your office in the future to help the USPTO address the challenges it faces in achieving its teleworking goals.

Technical Comments:

The USPTO has no technical comments for this report.