





Visual Privacy Productivity Study

Commissioned by 3M

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Ponemon Institute, October 2012

Part 1. Introduction

This independent research is commissioned by 3M, makers of the 3M privacy filter. Ponemon Institute conducted an experimental study on how the use of a privacy filter affects the productivity and privacy of actual employees in a business environment. Often overlooked by today's mobile workforce is the importance of safeguarding confidential data from prying eyes. The findings of the Visual Privacy & Productivity Experimental Study reveal that there is awareness of the importance of visual privacy and this perception does affect productivity when working outside the office.

Visual privacy is an important issue for organizations due to the increase in employees working away from the office. According to another study sponsored by 3M in 2010, Visual Data Breach Risk Assessment Study, 67 percent of working professionals have worked with some type of sensitive data when outside the office. The types of data typically include regulated information such as Social Security numbers, credit card numbers and corporate financial information along with nonregulated but sensitive corporate strategy information.

The adjacent case is about a well-meaning employee's desire to be productive but puts her company's confidential financial information at risk. Unfortunately, she did not take steps to preserve visual privacy so her good intentions resulted in the exposure of sensitive corporate data to a competitor.

The facts of this case are consistent with the 3M study², which reveals that there is significant risk to businesses that comes from employees making poor choices in how they access and display sensitive information. Further, while people say they value visual privacy they may not act to preserve it when it comes to corporate data.

The experiment was conducted in five separate companies and 274 employees of these companies participated. Approximately half of the participants used a computer with a 3M privacy filter and the other half did not have this protection. Both groups were instructed to download survey software onto the computer with the researcher sitting in close proximity.

Jane was the controller of a fast growing natural foods company headquartered in Seattle. On a "red eye" flight to the East coast to meet with the company's bankers, she was delighted to be upgraded to first class. She decided to use the long flight to finish last guarter's management accounting report that summarized financial results. Jane planned to share this information with the CFO and other senior managers of the company who would be at the meeting in New York.

Jane used a common accounting convention in her spreadsheet program. The color red indicated a negative result and black indicated a positive result. The clicking noise of her laptop keys kept Jim, the passenger next to her, from resting. Instead, he gazed at her laptop screen for a few minutes.

Jim was a trained accountant and understood the meaning of red and black used in an accounting analysis. He clearly saw a significant amount of "red ink" in Jane's report. He also noticed that the trend in data suggested the company was in poor fiscal condition.

Toward the end of the flight, Jane and Jim spoke briefly and exchanged business cards. Jane was a little stunned to notice that Jim was the CFO of one of her company's most formidable competitors, a wellestablished distributor of organic frozen foods and herbal teas. She worried about what he might have seen on her computer screen and wondered whether she should report what happened to her boss.

Jane never reported this incident to her boss, the CFO. However, Jim noticed that based on the red/black color scheme on Jane's computer, he realized that the company was in financial distress.

Productivity of both groups was measured according to the observed total time working and the keystroke count during an approximate 10 minute waiting time.

In addition to measuring participants' productivity when working in close proximity to others with and without a privacy shield, we asked questions about the importance of visual privacy in the workplace.

¹Visual Data Breach Risk Assessment Study, conducted by Herbert H. Thompson, Ph.D, chief security strategist, People Security, commissioned by 3M, 2010 ² Ibid.



Five of our most important findings are as follows:

- Employees are more productive and transparent when a 3M privacy filter is installed on their laptop or desktop computer.
- Gender makes a difference. Female employees appear to work longer and harder than their male counterparts. The positive effect of the 3M privacy filter on employee productivity appears to be stronger for female versus male employees.
- Age makes a difference. Employees between 26 and 35 years appear to work harder and longer than employees over 55 years. The positive effect of the 3M filter appears to be strongest for individuals at or below 35 years.
- The impact of 3M privacy filters on employees' productivity and transparency (or honesty of response) is related to their privacy orientation. The positive effect of the 3M privacy filter appears to be stronger for those who perceive privacy as very important or important to them.
- Position seniority appears to impact the positive effect of the 3M privacy filter on employee productivity. Our results show that individuals at or above the supervisory level within their organizations are more productive than rank and file employees. In contrast, individuals below the supervisory level exhibit, on average, a higher level of transparency.

Key findings

Following is a summary of key findings from experimental research involving 274 individuals (a.k.a. subjects) in a natural business setting. At the time of this study, all subjects were employees of one of five participating companies located in the United States.

Productivity

Subjects' productivity systematically varied according to the treatment experienced by them. Specifically, during a 10-minute experimental period, individuals whose computer had a 3M filter installed worked an average of 4.6 minutes versus only 2.3 minutes for those whose computer did not contain any filter.

On average, over a 10-minute period, Individuals using a 3M filter completed 756 keystrokes versus 461 keystrokes for those whose computer did not contain any filter.

When given a choice to work or walk away (not work), 97 individuals (35 percent of the sample) decided to walk away during an experimental waiting period. Twenty-five Individuals with a 3M filter installed on their computer walked way. In contrast, 72 individuals who did not have an installed filter walked away.

Transparency

Subjects' transparency, as measured by the nature and frequency of responses to 20 standardized questions, appeared to be systematically related to the treatment experienced by them. In the context of this study, transparency is measured two ways: (1) the number of negative responses provided and (2) the number of questions passed (i.e., no response). A total of 121 individuals (44 percent of the sample) did not provide any negative responses – in other words, zero out of 20 questions.

On average, individuals using a 3M filter provided 4.3 negative responses (22 percent of all questions) versus 3.3 negative responses (17 percent of all questions) provided by those whose computer did not contain a filter.

Similarly, individuals using a 3M filter passed on 4.8 questions (24 percent of all questions) as compared to 7.6 passed questions (38 percent of all questions) provided by those whose computer did not have a filter installed.

Subject's gender

Results of both experiments indicate a gender effect, wherein female subjects worked longer than male subjects. During a 10-minute experimental period, female subjects whose computer had a 3M filter worked



4.9 minutes versus 4.3 minutes for male subjects. Similarly, without an installed filter, female subjects worked 2.5 minutes as compared to 2.1 minutes for males.

Findings reveal an unexpected interaction between the gender of the researcher and subject. The average time worked was 4.0 minutes when both the researcher and the subject are female and 3.6 minutes when the researcher and the subject are male. In contrast, the combination of female researcher and male subject worked, on average, 2.8 minutes during the 10-minute experimental period.

Gender also makes a difference with respect to the walk away versus continue working response during the experimental waiting period. Accordingly, 55 female subjects (38 percent) walked away rather than worked on their computer during a 10-minute waiting period. For male subjects, 67 (52 percent) walked away during the waiting period.

Subject's age

Subjects' age appears to impact work-related productivity. Individuals between 26 to 35 years experiencing a 3M filter worked, on average, 5.0 minutes during the 10-minute experimental period. In contrast, individuals over 55 years who did not experience a filter worked an average of 2.0 minutes.

Age also appears to impact a subject's transparency as measured by the frequency of no response or passed questions. Individuals between 26 and 35 years who experienced a 3M filter passed on 4.3 questions (22 percent of all questions), on average. Individuals over 55 years who experienced a 3M filter passed on 5.8 questions (29 percent of all questions). In sharp contrast, those over 55 years who did not experience a 3M filter passed on 10.9 questions (55 percent of all questions).

Subjects' orientation to privacy appears to impact work-related productivity. Individuals who say privacy is important to them and who experienced a 3M filter, on average, worked 4.9 minutes during a 10-minute experimental period. Those whose computer did not contain a filter and who say privacy is not important to them worked 1.9 minutes, on average.

Privacy orientation

Privacy orientation appears to impact transparency. Subjects experiencing a 3M filter who say privacy is very important to them passed on 5.8 questions (29 percent of all questions), on average. Individuals who say privacy is very important and who did not experience a filter passed on 9.3 questions (47 percent of all questions). In contrast, individuals who say privacy is irrelevant to them and who experienced a 3M filter passed on 3.5 questions (18 percent of all questions). Individuals who see privacy as irrelevant to them and who did not experience a filter passed on 3.5 questions (18 percent of all questions). Individuals who see privacy as irrelevant to them and who did not experience a filter passed on 4.0 questions (20 percent of all questions).

Seniority

Subjects' position seniority appears to impact productivity. On average, individuals at or above the supervisory level and who experienced a 3M filter worked an average of 5.2 minutes. Individuals below the supervisory level and whose computer did not contain a filter worked an average of 1.8 minutes.

Subjects' position seniority also appears to impact individual transparency. Those below the supervisory level who experienced a 3M filter passed on 4.5 questions (23 percent of all questions), on average. Those individuals at or above the supervisory level whose computer did not have a filter passed on 8.2 questions (41 percent of all questions).

Economic impact

Appendix 1 illustrates the potential economic impact of the productivity gains realized by companies when employees who travel for business purposes use a 3M privacy filter. We calculate a total economic benefit of \$543 for business travelers who routinely conduct work on their laptop or tablet on flights. Assuming that a typical company that has 7,655 employees (of which 26 percent (2011) have a laptop or tablet computer) we calculate a total economic gain of almost \$1.1 million per annum.



Part 2. Experimental methods

This study examines how visual privacy issues affect the productivity and privacy of actual employees in an office environment. We recruited five business organizations to participate in this study.³ To effectively stage the experiment, we worked closely with each participating organization in identifying a target sample of employees. Each company sent personalized invitations to targeted individuals (a.k.a. subjects) and coordinated individualized 60-minute meetings. The communications to individuals simply stated that the study focused on employee perceptions and attitudes about their organization.

In total, 274 individuals successfully completed all requirements. All experiments were conducted in a natural office setting. Specific office venues, seating and laptop/desktop requirements (including the download of a keystroke and survey software) was controlled by the researcher. Table 1 provides a summary of the industries, regional locations and sample size for this study.

Table 1 Industry classification of participating companies	U.S. regional locations	Sample/Trials
Financial services	Midwest	67
Consumer products	Midwest	51
Education	Southwest	50
Healthcare	Northeast	51
Energy	Pacific-West	55
Total number of subjects		274

All subjects completed two experiments in the same (sequential) order. Subjects were randomly assigned treatment groups A (with 3M privacy filter) or B (placebo). Table 2 summarizes our basic research design. Please note that the researcher was required to complete all procedures for each subject within 60 minutes. Total time, on average, was 41 minutes.

Table 2		
Treatments	Experiment 1	Experiment 2
Active ⁴	Treatment A1 Researcher installs a 3M privacy filter and sits or stands in close proximity to the subject's computer	Treatment A2 A 3M privacy filter prevents researcher from seeing the subject's responses to 20 sensitive questions
Placebo	Treatment B1 Researcher sits or stands in close proximity to the subject's computer with a full visual of the computer screen	Treatment B2 Researcher sits or stands in close proximity to the subject's computer with a full visual of the subject's entry to questions
Measures	Number of keystrokes and time spent working over a 10-minute period	Response pattern to 20 sensitive survey questions

The four guiding hypotheses of this experimental research are stated as follows:

- H₁ Individuals in Treatment B1 will record fewer keystrokes in business applications (such as email) than those experiencing Treatment A1.
- H₂ Individuals in Treatment B1 will spend less time doing work-related activities (such as email) than those experiencing Treatment A1.
- H₃ Individuals in Treatment B2 will be more likely to pass on questions than those in Treatment A2.
- H₄ Individuals in Treatment B2 will be less likely to reveal "negative stigma" responses than those in Treatment A2.

³Ponemon Institute has assembled a council of large organizations (called the RIM Council). This group focuses on privacy and data protection issues and members routinely participate in benchmarking activities. ⁴The researcher installed a properly fitted 3M privacy filter before launching the experiments.





Following are the step-by-step procedures executed by the researcher in Experiment 1.

1. The researcher greets the subject at his or her seating area, cubical or nearby conference room.

2. The researcher instructs the subject showing him or her how to download survey and keystroke logging software onto their laptop or desktop computer.

3. The researcher determines that the keystroke software was loaded properly. If not, the researcher instructs the subject to perform a redo.

4. The researcher specifies a short delay (awaiting for a "phantom" colleague before getting started).

Following are the two treatments experienced by subjects. Please note that subjects were randomly assigned to only one treatment group.

- Treatment A1 (n_{1A} = 140) Researcher installs the 3M privacy filter and suggests the subject continues working with mention of an estimated waiting time or delay = 30 minutes.
- Treatment B1 (n_{1B} = 134) Researcher suggests the subject continues working and silently sits in close proximity to the subject with mention of an estimated waiting time or delay = 30 minutes.

5. After 10 minutes, the researcher announces that he or she is going to implement the survey (rather than continue waiting for the phantom colleague).

The researcher examines two sets of data to determine the productivity impact: (1) observed total time working during the waiting period (a.k.a. time on the clock) and (2) keystroke count during the waiting period.

In Experiment 2, the researcher instructs the subject that there are 20 <u>sensitive</u> questions to be answered (see Appendix 2).

6. The researcher instructs the subject on how to activate the survey script.

7. Before starting the survey, the researcher announces that no personally identifiable information will be collected and all responses are completely anonymous.

8. The researcher and subject launch the survey script.

9. The researcher reads each one of the 20 sensitive questions aloud, requiring the subject to confidentially choose a Yes, No or Pass (skip) response by entry to the survey.

- Treatment A2 (n_{2A} = 140) Researcher sits in close proximity but is unable to view the subject's desktop or laptop computer screen because of the 3M privacy filter.
- Treatment B2 (n_{2B} = 134) Researcher sits in close proximity or viewing range of each subject's desktop or laptop computer.

The researcher examines two sets of data to determine the transparency impact: (1) the percentage of 20 sensitive questions passed (skipped) and (2) the percentage of negative stigma questions answered.⁵

Debriefing questionnaire. After concluding both experiments, the researcher instructs the subject to complete a short questionnaire contained on the survey software (see Appendix 3). Here again, the questionnaire did not collect any personally identifiable information.

⁵Negative stigma questions are those that reflect poorly on the subject if revealed to superiors. For example a No response to Q17 (Do you consider your boss a good leader) is a negative stigma response.



Part 3. Subjects

Our study involves individuals who voluntarily agreed to participate in the research project. Approximately, 53 percent of subjects were female and 47 percent male. Fifty-six percent of subjects believe privacy is either very important or important to them. The average experience of subjects completing the study was 7.99 years of relevant business experience and 3.5 years in their present position.

Pie Chart 1 reports the approximate position level of subjects in this study. As can be seen, 47 percent of participating individuals are at or above the supervisory level. The largest segment of subjects conform to the staff or associate level.



Pie Chart 1. Position level of subjects

Pie chart 2 reports the age range of participants in this study. As shown, the largest segment (at 34 percent) pertains to individuals between 26 and 35 years. The smallest segment pertains to individuals at or above 55 years of age (at 9 percent).



Pie Chart 2. Age range of subjects



Pie Chart 3 summarizes the functional areas of subjects in five separate companies. As can be seen, IT (23 percent), customer service (21 percent) and finance (14 percent) represent the three most likely functional areas occupied by subjects.



Pie Chart 3: Functional area of subjects

Pie Chart 4 shows the percentage response to the question, "How important is privacy to you?" Fifty-six percent of subjects say privacy is very important (30 percent) or important (26) to them. Only 24 percent say privacy is either not important (15 percent) or irrelevant (9 percent).



Pie Chart 4: Importance of privacy to subjects



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Figure 1 shows the relationship between privacy orientation and gender. As reported, over 61 percent of female subjects say privacy is either very important or important to them. In contrast, 50 percent of male respondents say privacy is very important or important to them.



Figure 1. Response to the question, "How important is privacy to you?" by gender Very important and important response combined

Privacy is very important and important responses combined

Figure 2 reports the relationship between privacy orientation and age. As shown, over 65 percent of subjects over 55 years say privacy is either very important or important to them. In contrast, only 49 percent of respondents between 18 and 25 years say privacy is very important or important to them.



Figure 2. Response to the question, "How important is privacy to you?" by subjects' age Very important and important response combined

Privacy is very important and important combined



Part 4. Detailed findings

Table 3 provides comparative results for five participating companies (Treatments A & B combined). In general, the results for five companies are similar with the exception of recorded keystrokes. Here, subjects in the consumer products company recorded, on average, 841 keystrokes during the experimental trial. In contrast, subjects is the healthcare company recorded only 416 keystrokes on average.

Table 3 Company/key stats	Financial services	Consumer products	Education	Healthcare	Energy	Total /Avg
Trials/sample size	67	51	50	51	55	274
Time on clock	3.7	4.0	3.1	3.4	3.3	3.5
Time off clock	6.8	6.5	7.5	7.1	7.2	7.0
Total time	10.5	10.4	10.5	10.5	10.5	10.5
Key strokes	644.8	840.9	473.6	415.6	666.1	611.7
Q Positive	9.0	10.7	9.5	10.5	10.6	10.0
Q Negative	3.7	3.4	3.5	3.9	4.4	3.8
Q Passed	7.2	5.9	7.0	5.6	5.0	6.2

Productivity

Figure 3 shows that subjects' productivity systematically varied according to the treatment experienced by them. Specifically, during a 10-minute experimental period, individuals whose computer had a 3M filter installed worked an average of 4.6 minutes versus only 2.3 minutes for those whose computer did not contain any filter.

Figure 3. Productivity Experiment – Time on the clock

Consolidated for five companies





3M

As shown in Figure 4, over a 10-minute period, Individuals using a 3M filter completed 756 keystrokes versus 461 keystrokes for those whose computer did not contain any filter.



Consolidated for five companies



As shown in Figure 5, when given a choice to work or walk away (not work), 97 individuals (35 percent of the sample) decided to walk away during an experimental waiting period. Twenty-five Individuals with a 3M filter installed on their computer walked way. In contrast, 72 individuals who did not have an installed filter walked away.









Transparency

Consolidated for five companies

Subjects' transparency, as measured by the nature and frequency of responses to 20 "sensitive" questions, are systematically related to the treatment experienced by them. In the context of this study, transparency is measured two ways: (1) the number of negative responses provided and (2) the number of questions passed (i.e., no response). A total of 121 individuals (44 percent of the sample) did not provide any negative responses. Figure 6 records the response distribution for Treatment A and B combined.



Figure 6. Frequency of positive and negative responses to 20 questions

Figure 7 shows subjects experiencing a 3M privacy filter provided 4.3 negative responses (or 22 percent of all questions). In contrast, subjects that did not experience a privacy filter provided on average 3.3 negative responses (or 17 percent of all questions). Similarly, individuals using a 3M filter passed on 4.8 questions (or 24 percent of all questions) as compared to 7.6 passed questions (or 38 percent of all questions) provided by those whose computer screen was in full view to the researcher.









Subject's gender

Experimental results as shown in Figure 8 indicate a gender effect, wherein female subjects worked longer than males. During the 10-minute experimental trial, female subjects whose computer had a 3M filter worked 4.9 minutes versus 4.3 minutes for male subjects. Similarly, without an installed filter, female subjects worked 2.5 minutes as compared to 2.1 minutes for males.







Findings reveal an unexpected interaction between the gender of the researcher and subject. As reported in Figure 9, the average time worked was 4.0 minutes when both the researcher and the subject are female and 3.6 minutes when the researcher and the subject are male. In contrast, the combination of female researcher and male subject worked, on average, 2.8 minutes during the 10-minute experimental period.







As noted in Figure 10, gender also makes a difference with respect to the walk away versus continue working response during the experimental trial. Accordingly, 55 female subjects (38 percent) walked away rather than continued working. For male subjects, 67 (52 percent) walked away during the waiting 10-minute period.



Figure 10. Productivity experiment - Walk away vs. work response by gender

Subject's age

According to Figure 11, subjects' age appears to impact work-related productivity. Individuals between 26 to 35 years experiencing a 3M filter worked, on average, 5.0 minutes during the 10-minute experimental period. In contrast, individuals over 55 years who did not experience a filter worked an average of 2.0 minutes.





Treatment B (placebo) Treatment A (3M filter)





The subject's age range affects transparency as measured by the frequency of the no response or passed questions. As shown in Figure 12, subjects between 26 and 35 years who experienced a 3M filter passed on 4.3 questions (22 percent of all questions), on average. Subjects over 55 years who experienced a 3M filter passed on 5.8 questions (29 percent of all questions). In sharp contrast, those over 55 years who did not experience a 3M filter passed on 10.9 questions (55 percent of all questions).



Figure 12. Transparency experiment – passed (skipped) questions by age range Consolidated for five companies

Treatment B (placebo) Treatment A (3M filter)





Privacy orientation

According to Figure 13, subjects' orientation to privacy appears to impact work-related productivity. Individuals who say privacy is important to them and who experienced a 3M filter, on average, worked 4.9 minutes during a 10-minute experimental period. Those whose computer did not contain a filter and who say privacy is important to them worked 1.9 minutes, on average.





Treatment B (placebo) Treatment A (3M filter)

Figure 14 shows subjects' privacy orientation impacts transparency. Subjects experiencing a 3M filter who say privacy is very important to them passed on 5.8 questions (29 percent of all questions), on average. Individuals who say privacy is very important and who did not experience a filter passed on 9.3 questions (47 percent of all questions). In contrast, individuals who say privacy is irrelevant to them and who experienced a 3M filter passed on 3.5 questions (18 percent of all questions). Individuals who see privacy is irrelevant to them and who did not experience a filter passed on 4.0 questions (20 percent of all questions).









Seniority

Figure 15 shows subjects' position seniority appears to impact productivity. On average, individuals at or above the supervisory level and who experienced a 3M filter worked an average of 5.2 minutes. Individuals below the supervisory level and whose computer did not contain a filter worked an average of 1.8 minutes.





Figure 16 shows position seniority affects transparency. Those below the supervisory level who experienced a 3M filter passed on 4.5 questions (23 percent of all questions), on average. Those individuals at or above the supervisory level whose computer did not have a filter passed on 8.2 questions (41 percent of all questions).









Travel profile

Figure 17 divides subjects into two subgroups based on their self-reported business travel profile; that is, those who frequently travel and those who do not frequently travel with a laptop. Subjects who frequently travel and who experienced a 3M filter worked an average of 4.7 minutes. Individuals who frequently travel and whose computer did not contain a filter worked an average of 2.1 minutes.





Very frequently and frequently
Not frequently and never

Figure 18 examines the affect of frequent business travel on subjects' transparency. It shows that subjects who do not travel frequently are slightly more susceptible to experimental treatments. Individuals who self-report that they do not travel frequently and who experienced a 3M filter passed on 4.6 questions (23 percent of all questions), on average. Those individuals who do not travel frequently and whose computer did not have a filter passed on 7.7 questions (39 percent of all questions).







Part 5. Limitations

There are inherent limitations to experimental research that needs to be carefully considered before drawing inferences from the presented findings. The following items are specific limitations that are germane to most field-based experimental studies.

Findings are based on a voluntary sample of individuals located in one of five participating companies. These individuals were recruited for participation by their organizations rather than through direct contact by the researcher. Invitations were sent to a representative sample of individuals in a variety of functional areas, resulting in 274 individuals who participated in this experimental research. We acknowledge it is possible that individuals who did not participate are substantially different in terms of underlying beliefs and behavior from those who participated.

The accuracy of experimental results is dependent upon the researcher's ability to create situations that represent the underlying phenomenon of interest. The degree to which our experiment did not capture a visual privacy impact (and the resulting affect of productivity and transparency) could not be measured.

The quality of experimental research is based on the integrity of confidential responses received from subjects. While certain checks and balances were incorporated into our survey evaluation process including sanity checks, there is always the possibility that some respondents did not provide truthful responses.

Thank you for your participation. All responses are completely confidential. Please contact <u>research@ponemon.org</u> or call us at 800.887.3118 if you have any questions.

Ponemon Institute Advancing Responsible Information Management

Ponemon Institute is dedicated to independent research and education that advances responsible information and privacy management practices within business and government. Our mission is to conduct high quality, empirical studies on critical issues affecting the management and security of sensitive information about people and organizations.

As a member of the **Council of American Survey Research Organizations (CASRO)**, we uphold strict data confidentiality, privacy and ethical research standards. We do not collect any personally identifiable information from individuals (or organization identifiable information in our business research). Furthermore, we have strict quality standards to ensure that subjects are not asked extraneous, irrelevant or improper questions.



Appendix 1. Illustration on the economic impact of employee travel

The following table illustrates the potential economic impact of the productivity gains realized by companies when employees who travel for business purposes use a 3M privacy filter. Please note that this analysis assumes that the finding of a twofold (2X) productivity increase found in the first experiment can be applied to travelers who carry and use a laptop or tablet computer on airplane flights.

We calculate a total economic benefit of \$543 for business travelers who routinely conduct work on their laptop or tablet on flights. Assuming that a typical company that has 7,655 employees, of which 26 percent have a laptop or tablet computer) we calculate a total economic gain of almost \$1.1 million per annum.

Assumptions	Calculus	Values
Average U.S. employee headcount from		
Ponemon samples*	A = Meta analysis from 50 studies	7,655
Average number of employees who travel		
with laptop or comparable device*	B = A X 26% (estimate from earlier study)	2,011
Average length of commercial airplane		
flight in hours	C = Hours estimated from airline data	1.27
Roundtrip (X 2)	D = C X 2	2.54
Percent time available to use computer in		
flight*	E = Estimate based on survey evidence	65%
Available time in minutes	F = D X E X 60 minutes	99.1
Productivity impact (no filter) in minutes	G = F / 2	49.5
Extrapolated number of business trips per		
year*	H = Extrapolation (see below)	21.0
Business travelers who say they typically		
work on flights*	I = Estimate based on survey evidence	56%
Estimated time working on a typical flight	J = I X [F-G]	27.74
Estimated minutes working on flights over		
12 months	K = J X H	582
Value of labor (typical business user in		
US) in dollars per hour*	L = Estimate based on survey evidence	\$56.0
Value of labor (typical business user in		
US) in dollars per minute	M = L / 60 minutes	\$0.93
Value of lost minutes per employee	N = K X M	\$543
Average value of lost minutes per		
company	O = N X B	\$1,091,961

*Derived from earlier Ponemon Institute studies.

The following table shows the extrapolation of the average number of airline trips experienced by employees who travel for business purposes.

Business trips per year	Pct%	Median number of trips	Extrapolated value
> 50	8%	50	4.0
41 to 50	8%	45	3.6
31 to 40	14%	35	4.9
21 to 30	15%	25	3.8
11 to 20	20%	15	3.0
5 to 10	15%	7.5	1.1
1 to 5	20%	3	0.6
Total	100%		21.0



Appendix 2. 20 Sensitive Questions

Following are 20 test questions that will be used to measure the visual privacy impact. Respondents can choose the following responses

Yes No Pass

- Q1. Do you believe you are qualified to fulfill the responsibilities of your job?
- Q2. In general, do you believe others in your company are qualified to fulfill the responsibilities of their job?
- Q3. Do you believe your salary is adequate for the work you do?
- Q4. Do you believe others in your company are paid less than they should be?
- Q5. Do you believe there are sufficient opportunities for promotion in your company?
- Q6. Do you ever feel you are in a dead-end position without hopes of advancement?
- Q7. Do you like your boss?
- Q8. Are you presently looking for another job?
- Q9. Do you believe the company is concerned about creating a positive work environment for you?
- Q10. Do you believe it is acceptable to use sick days for purposes other than health issues?
- Q11. Did you ever take sick days when you were not sick?
- Q12. Do you use the company computer to access your personal email and social media accounts?
- Q13. Do you ever download company information on a USB or other mobile devices without permission?
- Q14. Are you worried that you might be fired?
- Q15. Does your company allow you to work from home if you want to?
- Q16. Do you find the work you do meaningful and important?
- Q16. Do you feel your performance job reviews accurately reflect your performance
- Q17. Do you consider your company an ethical organization?
- Q18. Do you consider your boss a good (inspirational) leader?
- Q19. Do you believe the CEO's compensation is justified based on his or her performance?
- Q20. Do you ever feel unproductive or feel you are wasting time during the workday?



Q1. How important is privacy to you?	Pct%
Very important	30%
Important	26%
Somewhat important	20%
Not important	15%
Irrelevant	9%
Total	100%
Q2. With respect to the 20 sensitive survey questions asked by the researcher, how	
important was the researcher's commitment to ensuring your anonymity?	Pct%
Very important	33%
Important	24%
Somewhat important	23%
Not important	11%
Irrelevant	9%
Total	100%

Appendix 3. Response to Debriefing Questionnaire

Q3. Did you feel that the researcher was standing or sitting too close to you (or violated your sense of privacy and personal space)?	Pct%
Yes	56%
No	44%
Total	100%

Q4. Do you ever feel that your sense of privacy is violated when people around you discuss sensitive personal issues near you (such as overhearing a conversation)?	Pct%
Yes	63%
No	37%
Total	100%

Q5. Have you ever caught someone in your workplace looking at your laptop or desktop screen without your permission or consent?	Pct%
Yes	69%
No	31%
Total	100%

Q6. Do you ever travel with your laptop, tablet or net book for business purposes?	Pct%
Very frequently	26%
Frequently	30%
Not frequently	33%
Never	11%
Total	100%

Q7. Have you ever caught someone sitting near you on a flight, train, bus or other form of commercial travel glancing at your computer or tablet screen?	Pct%
Yes	55%
No	45%
Total	100%

Q8. Have you ever caught someone sitting near you in a public location such as a café, airport gate, hotel lobby and other locations glancing at your computer or tablet screen?	Pct%
Yes	51%
No	49%
Total	100%



Q9. Did you ever stop working on your laptop or tablet computer because you	
suspected someone was glancing at your computer screen?	Pct%
Yes	41%
No	59%
Total	100%

Q10. What steps do you normally take to ensure strangers in public places don't see business information that may be displayed on your computer? Please select all that	
apply.	Pct%
Do nothing and continue working	52%
Find seating away from crowds	44%
Turn off my computer once I suspect people are glancing at the screen	39%
Never access confidential information from my computer in a public location	31%
Never use my computer in a public location	26%
Use a privacy filter and continue working	21%
Other	2%
Total	215%

Q11. My organization places importance on protecting sensitive or confidential information that may be displayed on a computer or tablet screen in public places.	Pct%
Strongly agree	23%
Agree	30%
Unsure	32%
Disagree	8%
Strongly disagree	7%
Total	100%

Q12. My organization has adequate policies and procedures for protecting sensitive or confidential information that may be displayed on a computer or tablet screen in a	
public location.	Pct%
Strongly agree	25%
Agree	28%
Unsure	30%
Disagree	13%
Strongly disagree	4%
Total	100%

Q13. Most people in my organization are very careful about protecting sensitive or confidential information that is displayed while using a laptop or tablet computer in	
public places.	Pct%
Strongly agree	19%
Agree	23%
Unsure	30%
Disagree	17%
Strongly disagree	11%
Total	100%



ЗМ

Subject demographics and organizational characteristics

What best describes your position level?	Pct%
Vice president or executive	2%
Director	10%
Manager	18%
Supervisor	17%
Staff or associate	36%
Technician	10%
Consultant	3%
Other	4%
Total	100%

What best describes the function or role you perform in your company?	Pct%
Administration	5%
Communications	3%
Compliance & internal audit	2%
Customer service	21%
Finance & accounting	14%
General management	8%
Information technology (IT)	23%
Legal	2%
Logistics	1%
Marketing	4%
Research	3%
Sales	13%
Other	1%
Total	100%

What best describes your age range	Pct%
18 to 25	14%
26 to 35	34%
36 to 45	29%
46 to 55	14%
56 to 65	8%
Over 65	1%
Total	100%

Please check the devices that you normally use for work-related activities	Pct%
Smart phone	65%
Tablet computer	29%
Desktop computer	45%
Laptop computer	65%
Net book computer	14%
Other	2%
Total	220%

Gender	Pct%
Female	53%
Male	47%
Total	100%