Center for
Technology in Government

Does Mobility Make a Difference?

A Cumulative Study of the Impact of Mobile Technology in New York State Child Protective Services

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Child protective services' (CPS) caseworkers perform one of the most important human service jobs in government. In this study we had the opportunity to learn just how difficult that work can be and how critical it is for the safety of children in New York State. We are indebted to CPS caseworkers and supervisors for taking the time away from their incredibly busy schedules to take surveys, answer questions, and participate in group interviews. Their candid thoughts and experiences are the foundation for this report.

We are also grateful for all the support we received from the NYS Office of Children and Family Services (OCFS). In particular, two leaders stand out; Jack Nabozny, Operations and Field Support Manager who worked diligently to keep the entire project running on time and smoothly; and William Travis, Deputy Commissioner and Chief Information Officer who set forth a vision, helped lay the groundwork, and has always been a champion of change.

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Executive Summary

During the course of a workday, a child protective service (CPS) caseworker handles a variety of assignments and tasks that require traveling to different locations or accessing and entering sensitive information about child abuse and neglect allegations. Over the past six years, New York State (NYS) has invested in a mobile technology strategy to support that child protective services (CPS) work. Several mobile technologies, including dictation software and laptop computers, have been deployed throughout the state so that almost all CPS caseworkers in almost all NYS local departments of social services (local districts) have these tools available. This report presents results from a multi-year assessment on how the use of mobility technology affects CPS casework. The report also offers recommendations for improving the Office of Children and Family Services' (OCFS) mobile technology strategy.

Overall the main questions pursued in this assessment were: How is CPS casework influenced by the use of mobile technologies? What are the influencing factors that promote use? What policy, management, and technology strategies best support mobile work? This cumulative study builds upon an already strong foundation of knowledge generated in previous assessments, but focuses attention on local districts that have had laptops for at least two years and as long as five years. Findings suggest the following impacts:

Laptops have transformed the way CPS caseworkers receive information from the State Central Registry about cases while on-call. As in the previous assessments, one of the most consistent findings is the overwhelming agreement by caseworkers of the value of the laptops for after-hours (on-call) casework. Caseworkers across the state noted the change in the way they can receive a new case and background information from the State Central Registry (SCR); they emphasized the importance of having access to full case records rather than summaries dictated by SCR staff over the phone. This transformation was also evident in communication between caseworkers and supervisors while in the field. Complete and faster access to information provided more informed responses to on-call cases. This improvement is particularly important since it involves child safety and caseworker safety in situations that may necessitate quick responses.

Laptops provide all caseworkers access to important information sources while out of the office. Our interviews provided vivid descriptions of the value of connectivity and mobility in emergent (or non-routine) situations. Some caseworkers described new possible information sharing with law enforcement. A situation may bring caseworkers and law enforcement officers together in the field. In such situations, law enforcement officers often need information about the case that only a caseworker can provide, but they can only provide it if they have access to the data sources remotely and such disclosure is authorized. A more common but less critical scenario involves the need for information to inform a real-time decision facing a CPS caseworker in the field. These needs can run from simply looking up a phone number or best transportion route to the next destination or for important decisions about possible interventions or removing a child from a dangerous situation. In the case of a removal decision, for example, the CPS caseworker may need to check the online state Sex Offender Registry concerning the status of family members or other possible alternative care-givers for children at risk. A networked laptop can provide more complete and timely access to the relevant information in such time-critical situations.

Mobility enables an immersive community experience. The use of a fully functioning laptop with good connectivity can also allow CPS caseworkers to simply spend more time in the field to learn about the social and physical environment of the children and families in their cases. While not widespread among all caseworkers, findings reveal an emerging possibility for caseworkers to engage in more community immersive experiences. They noted that the more they are "seen" in the community, the more they can gain access to information sources needed to do their work. Some interviewees reported that when they can move computer work out of the office, they have more opportunities to learn about the neighborhoods and social interactions surrounding the children and families in their care.

Statistical results show modest but meaningful improvements in productivity. The impact of laptop use on CPS casework was more apparent on where and when the work was performed and on the volume of work able to be completed, rather than on any measure of timeliness. Timeliness alone is not an adequate indicator of productivity. Many CPS policy mandates, such as contemporaneous progress note entry, 60-day investigation completion requirements, and deadlines for safety assessment submission within seven days, can affect the pace of casework. These are complicated processes and issues of work flow that the laptop alone cannot solve. The statistical results regarding productivity are indicative of real effects, but are not large. Given the many other factors that can and do impact CPS casework, additional studies are needed to address issues of measuring productivity impacts.

Over the five year course of studying laptop use, we have observed many variations in local conditions of laptop deployment; variations that affect the value derived from this technology. We have seen instances of highly supportive environments at the district level that result in effective use of this technology. We have also seen numerous examples of less positive situations, where lack of resources, administrative challenges, or policy barriers lead to less positive results. Designing and managing a successful mobile strategy for casework is not easy. There are many factors that influence mobility within the local districts and wide variability among local districts with respect to network connectivity, technical support, and work culture. The major limitations to mobility we found included technical infrastructure problems, limited connectivity/service, and policies or practices that restrict and discourage use of equipment outside the office. Conversely, the most influential factors for promoting mobility in the local districts were having continuous connectivity, flexibility in managing caseworkers' mobility, and providing a supportive district and supervisory policy environment. In order to support the recent efforts and future anticipated changes towards a more mobile workforce, we present the following recommendations:

Short-Term – operational recommendations

- Share information across districts about what it means to have a more mobile workforce.
- Communicate the importance of investing in continuous connectivity.
- Encourage mobility through support and guidance.

Long-Term – visionary recommendations

- Plan for platform and network interoperability.
- Anticipate a Bring Your Own Device (BYOD) environment.
- Experiment with new models of casework or service delivery.
- Expect a changed relationship between the caseworker and information.

This is an opportune time to exploit the opportunities that mobile technology offers. It is no longer a future state that "might" occur. Smart devices and connected laptops are transforming the way governments are delivering services, and citizens and employees are beginning to expect it. And, as with many government program areas, caseworkers are learning how mobility affects their work, changes policies and practices, and impacts the decisions they make. It's a learning curve — a big one — and NYS is already way ahead of the pack.

Genesis of the New York State Mobile Technology Project

Beginning in 2006, OCFS, local districts, and the state legislature embarked on a coordinated effort to deploy and assess mobile technologies in child protective services (CPS). At the time, New York State was among a handful of states examining the use of mobile technologies to enhance child welfare and child protection service delivery.

The state legislature charged OCFS with deploying and assessing the use of mobile technologies as part of each yearly appropriation. To conduct these independent assessments, OCFS partnered with the Center for Technology in Government (CTG), an applied research center at the University at Albany-SUNY. Since that time, CTG has conducted annual assessment studies, briefly described below:

> During the summer and fall of 2006, the first deployment and assessment, the *NYS Portable Information Technology Pilot*, was carried out with three local districts – New York City Administration for Children's Services (NYC/ACS), Monroe County Department of Human Services, Child and Family Services Division, and Westchester County Department of Social Services, Family and Children's Services. Mobile technologies were deployed to approximately 60 CPS caseworkers to support casework and related documentation activities. A range of mobile technologies were tested, including: laptops, notebooks, tablet PCs, Personal Digital Assistants (PDAs), telephonic dictation services, digital pens, and dictation software. The purpose of the assessment was to evaluate how technology was used in the work setting and the impact of technology use on the work itself.[1]
>
> From July 2007 to October 2007, a second deployment and assessment, the *Extended Pilot in New York City's Administration for Children Services*, focused exclusively on network connected laptops and expanded the number of caseworkers testing the technology. Connected laptops were selected based on findings from the *NYS Portable Information Technology Pilot*, which highlighted connected laptops as enabling information entry and retrieval to the state central database while out in the field. Two field offices from NYC – Manhattan and Staten Island – were selected and approximately 200 CPS caseworkers, supervisors, and managers received laptops and wireless cards. The objective of the assessment was to examine in greater depth the use of connected laptops in CPS casework and to learn more about laptop use in large urban areas.[2]
>
> The New York State legislature continued funding in State Fiscal Year (SFY) 2007-08 to test mobile technologies in more local districts across the state. In May 2007, OCFS issued a call for proposals to all local districts interested in applying for funding to pursue mobile technology strategies in CPS casework. By October 2007, following the completion of the extended pilot in New York City, a third deployment and assessment, the *Demonstration Project in 23 NYS Local Social Service Districts*, issued over 450 laptops and tablet PCs to

[1] The phase 1 report is available at: http://www.ctg.albany.edu/publications/reports/assessing_mobile/assessing_mobile.pdf.
[2] The phase 2 report is available at: http://www.ctg.albany.edu/publications/reports/assessing_mobile_2008/assessing_mobile_2008.pdf.

21 selected local districts in rural, suburban, and urban areas across the state. The objective of the assessment was to examine the opportunities and barriers for statewide deployment of connected laptops as well as the impact of laptops on CPS casework in various settings across the state.[3]

In SFY 2008-09, the New York State legislature provided funding to examine mobile technologies across the state. This assessment entitled, *An Extended Assessment*, focused on three local districts that previously deployed laptops as part of earlier deployments.

In SFY 2009-10, the New York State legislature provided funding to examine the use of mobile technologies in child protective services. During that year, two types of devices were used: the Dell E6410 laptop and the Dell Latitude 2100 (Netbook) and deployed to CPS caseworkers, supervisors, and managers. The goal of this final assessment was to conduct a cumulative analysis to examine how well laptop use had become integrated into CPS casework and to examine to what extent changes in productivity and satisfaction were occurring with longer exposure and experience with these devices.

[3] The phase 3 report is available at:
http://www.ctg.albany.edu/publications/reports/assessing_mobile_demo/assessing_mobile_demo.pdf.

Study Results of Laptop Use in CPS Casework

Previous pilot and demonstration assessments have established a solid foundation of information to support a reasonably clear picture of the short term impacts of deploying and using laptops in CPS work. However, both OCFS and CTG recognized the need to learn more about the long-term impacts and conditions necessary for a statewide deployment.

This cumulative study builds upon the already strong foundation of knowledge generated in the previous assessments, but focuses more on the local districts that have had laptops for at least two years and as long as five years. In order to learn more about how laptops are integrated into CPS casework, the assessment examines findings on use, mobility, productivity, and satisfaction. In addition, a separate analysis was conducted for the "newly deployed" districts to examine the impacts on those districts having laptops for a shorter period of time.

The project design for this report included conducting analysis on data gathered from four sources (see Appendix B for detailed methodology and analysis framework):

- *An online survey*. In this survey questions were asked about how they used the devices, their attitudes about using them, and about the impacts on work processes and results.

- *CONNECTIONS data (Statewide Automated Child Welfare Information System)*. This data was used to examine evidence of increases in productivity in terms of documentation and related casework task completion.

- *Group interviews*. Interviews were conducted with four selected local districts to get firsthand information on how they used the laptop computers, the benefits and challenges they experienced, and how using these devices impacted their work.

- *District questionnaires*. The information gathered from the questionnaires helped develop a fuller picture of the environment within the local districts providing information about the deployment process, training, and changes in policies and procedures.

This report offers both straightforward results of data analysis and more general findings, observations, and recommendations about how laptop use integrates with and impacts CPS casework.

General Survey Results

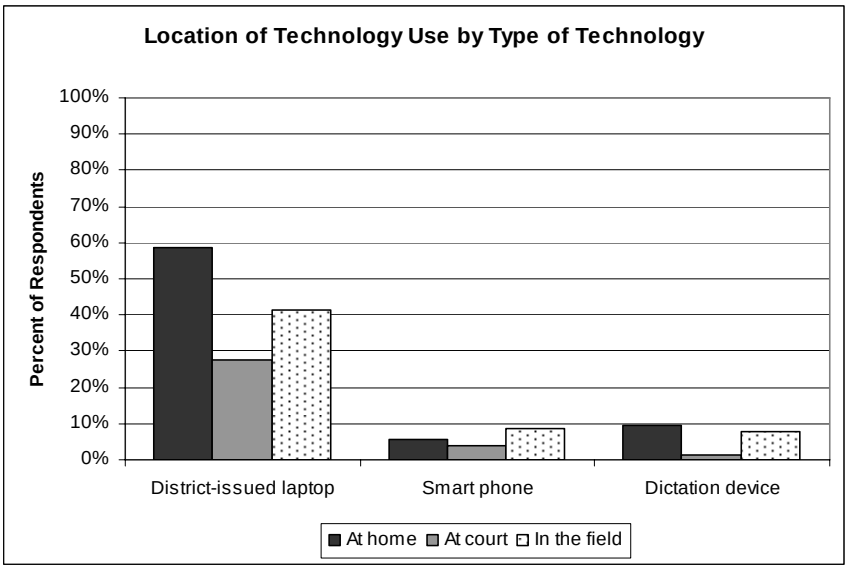
The project provided the opportunity to survey CPS caseworkers who had a wide range of experience in using laptop computers, from a few months to over five years. To take advantage of that opportunity, we contacted all 51 local districts that had received laptops with OCFS funding. The local districts provided lists of their staff who originally received laptops, totaling 1,990 persons over the five year period. Of those 1,990 staff who received laptops, 1,275 were still performing CPS casework and using laptop computers. Using the email addresses supplied by the

local districts, we sent an email link to the online survey to those 1,275 CPS caseworkers. A total of 906 CPS caseworkers responded to the survey, providing an overall response rate of 71%.

The survey asked for information regarding what types of technologies they used, how and where the laptops were used, the impacts of laptop use, how laptop use is supported by the local districts, use of other mobile technologies, and attitudes about using these devices for CPS casework. All smart phones indicated in the survey data were not district issued but rather the caseworker's personal device.

Since mobile devices allow for work in multiple locations, many of the survey questions asked where and how these technologies were employed. Since the CPS caseworkers surveyed often had access to more than one mobile device, we asked which devices, if any, they used in locations other than the office. The answers shown below identify the laptop as the most likely mobile device to be used outside the office, at just under 60% reporting use at home, 27% used in court, and just over 40% in the field. Reported use of other devices in the same locations was lower.

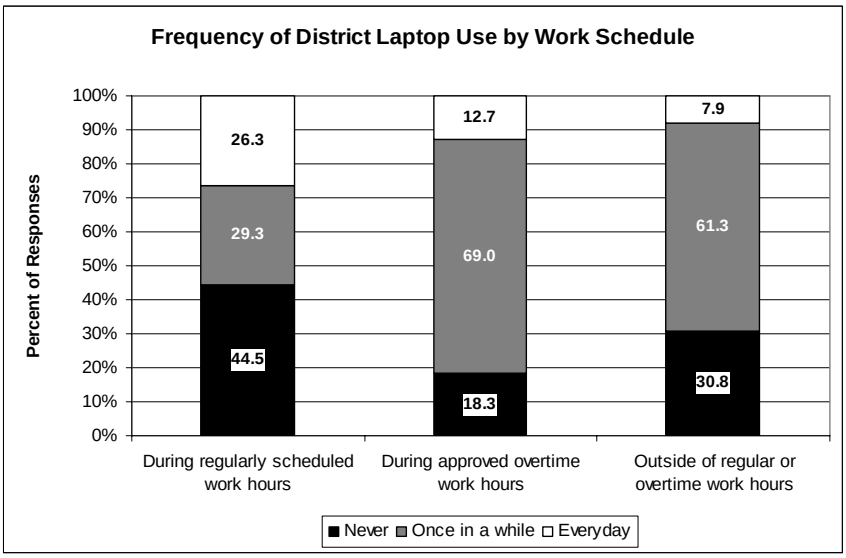
Figure 1 - Location of Technology Use by Type of Technology



Overall, home was reported as the most frequent location for use of mobile devices. Over 80% of the respondents reported using their laptops at home *during approved overtime hours* and just under 70% reported using the laptop at home during non-work hours, in non-overtime situations. Surprisingly, almost half of the respondents reported that they never use the laptops outside the office during regularly scheduled work hours.

There was considerable variation in the survey results on how laptop use was distributed over time, as seen in Figure 2 below. Almost half of the respondents reported never using the laptop during regular work hours. By contrast, over three-fourths of the respondents reported using the laptops during approved overtime and just under 70% used the laptops during uncompensated time.

Figure 2 – Frequency of Laptop by Work Schedule



The results shown in Figure 3 and Figure 4 (next page) indicate considerable variation in the kinds of work done on laptops outside the office. Completing required documentation is the dominant work, with approximately 15% of respondents reporting daily work of that sort in both the field and at home. Use of the laptops in interviews and field observations was rare. Other forms of documentation make up the remaining uses at relatively high frequencies. Working remotely in CONNECTIONS one or more days per week was reported by over 20% of respondents both at home and in the field.

The survey responses for use of laptops in interviews or observations are indicative of a divergence in opinion and policy with respect to this particular use. That almost half of the respondents reported at least some use of the laptops in interviews or field observations is somewhat in conflict with responses from the interviews with CPS caseworkers. When asked in these interviews about such use of the laptops, the CPS caseworkers responded in an overwhelmingly negative way. Very few reported such use and many commented that they never take the devices into a client's home, claiming that it would be dangerous and would interfere with establishing rapport. In a few local districts, the CPS caseworkers said there was a policy prohibiting such use. Caseworkers in a few districts did report encouragement for use of laptops in these situations. What we did learn was that some caseworkers used the laptops in interviews with community and school officials. In situations where they conducted interviews with professionals within the community, they used the laptops to document their notes. This nuance is not collected in the survey and could account for the variability.

Figure 3- Frequency of Documentation Uses of Laptop While at Home

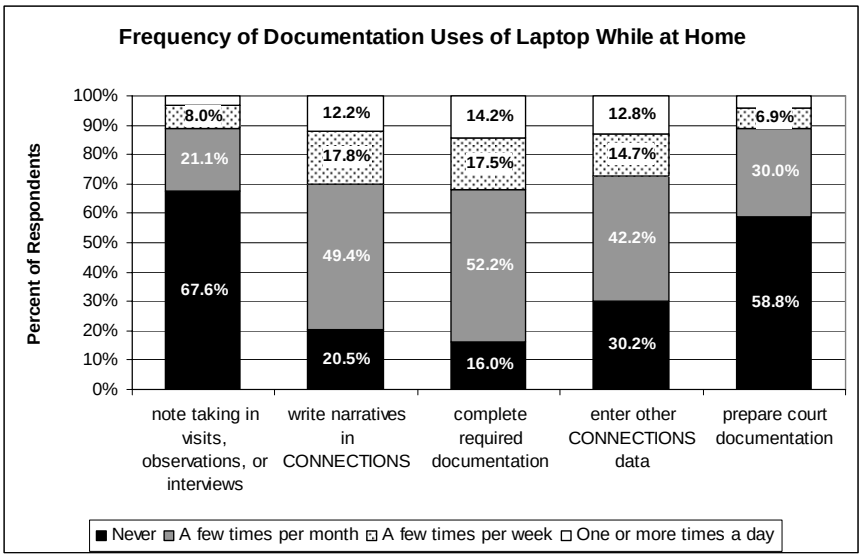
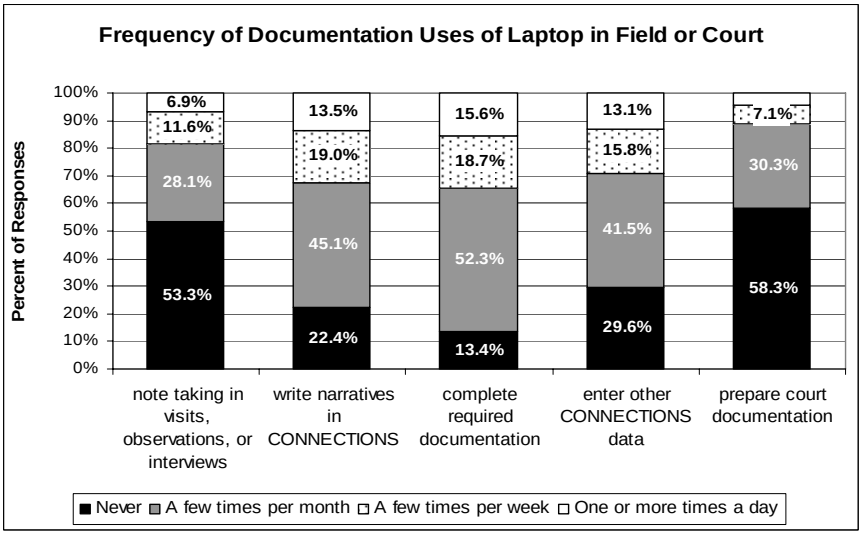


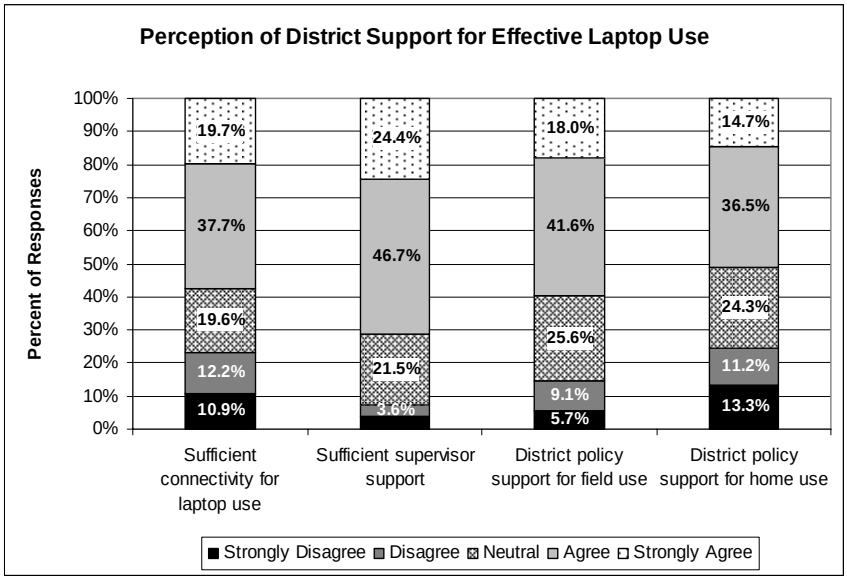
Figure 4- Frequency of Documentation Uses of Laptop in Field or Court



Variations among districts are also reflected in the implementation and support for laptop use by CPS caseworkers. The degree and types of this variation is shown in part by the answers to survey questions about district-level support shown in Figure 5 (below) and in more detail in the following section (on page 22). For the survey questions, substantial proportions of the respondents did not agree with statements that described their district as having a positive and supportive environment for laptop use. Only about 60% of the respondents agreed that their district provided sufficient connectivity for laptop use. This is consistent with the reports from many districts that chose not to provide air cards for all or in some cases, for any laptops. Over 40% of respondents disagreed with statements describing their district as having good policy support for laptop use in the field or at home. Statements of sufficient supervisory support received the most agreement from the respondents, over 70%. The question of sufficient connectivity comes up again in the statistical analysis section below. Whether or not a district provides ample connectivity does show a statistical

relationship with measures of productivity. These results are discussed in more detail in a later section.

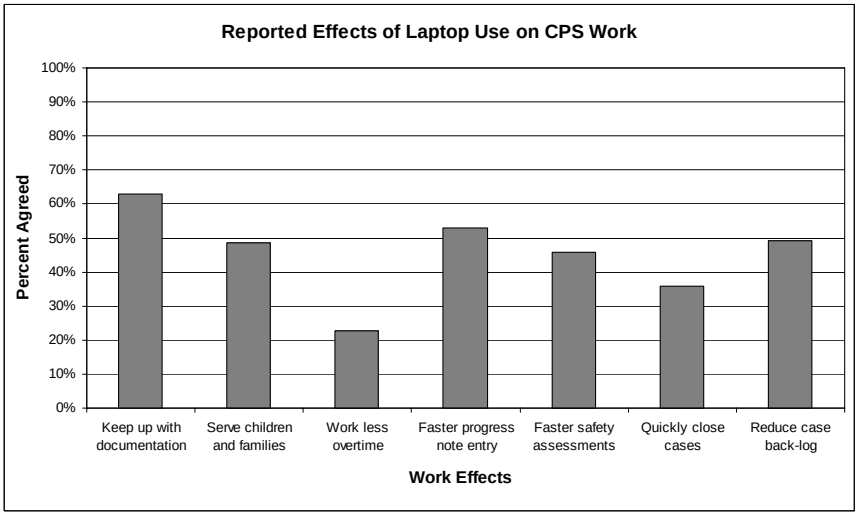
Figure 5 - Perception of District Support for Effective Laptop Use



In addition to the statistical data on productivity, we asked the survey respondents about how laptop use affected their work. Some questions involved impacts of task performance, shown in Figure 6 below, and others about how the increased mobility afforded by laptop use affected work practices and locations (Figure 7).

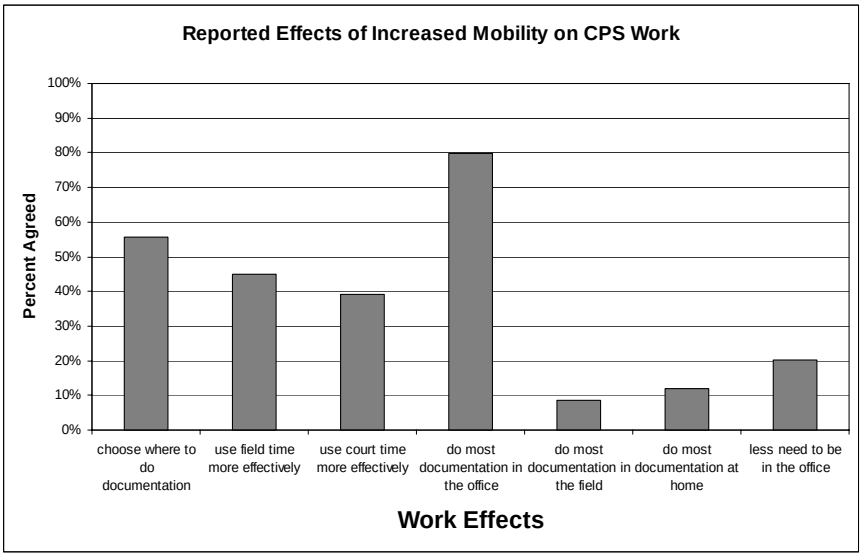
The most prevalent results, according to the answers shown in Figure 6, are improved ability to keep up with documentation generally, faster (quicker or more timely) progress note entry, and reducing case backlogs. Just less than half of the respondents agreed with the statement that laptop use improved service to children and families. There was less agreement about reductions in overtime or more timely closings.

Figure 6 – Reported Productivity Gains Due to Laptop Use by Type of Work



The questions about mobility related impacts of laptop use (Figure 7) provided a less consistent and to some degree, counterintuitive answers. Between 40% and 55% of the respondents agreed that laptops allowed more choice in work location and contributed to more effective use of time in the field. These are not, however, overwhelmingly positive results. Rather they indicate that the benefits of mobile device use are conditioned on many factors, particularly individual acceptance and supportive environments; simply having the device is not sufficient to produce all the desired results. This idea is strongly reinforced by the answers to the other questions about where documentation work takes place. In particular, four out of five respondents agreed with the statement that they do most of their documentation in the office, with correspondingly small percentages reporting documentation done mostly in the field or at home.

Figure 7 – Impacts of Increased Mobility Due to Laptop Use



Despite the limitations or problems with laptop use, the enthusiasm for the devices among the survey respondents was high. Three out of four respondents agreed with the statement: "I like using the laptop for casework," and only about one in ten agreed with the statement: "Using the laptop does not fit my personal work style." These responses are consistent with the results from our interviews, in which very few CPS caseworkers or supervisors had anything but positive things to say about having the devices. When asked if they would be willing to give the device up, there were no takers.

CONNECTIONS DATA ANALYSIS

The purpose of analyzing the CONNECTIONS data was to learn more about CPS workers over the same time span. The same data collection methods used in the previous assessments were used to collect work product data for a period before obtaining a laptop, and a comparable period afterward. That data was then combined with data from previous assessment for the statistical analyses, yielding data on approximately 400 CPS workers from 39 local districts. This section presents the findings from the analysis conducted with that CONNECTIONS data.

Having available data over an extended time period allowed us to explore whether using laptop computers for longer periods resulted in different productivity impacts or patterns of use. We used three kinds of analysis to explore that question. For impacts on patterns of use, we used the survey data obtained from the full sample of respondents (n = approximately 900), reported on above. Out of the roughly 900 respondents in the full survey we were able to match CONNECTIONS data on documentation and other indicators of work activity for a subsample (n = approximately 400). Matching the CONNECTIONS data with the survey data thus allowed us to explore how laptops were deployed and used. The matching of data from multiple phases of the work also allowed examination of how the length of time a laptop was used related to patterns of use and possible improvements in productivity.

Since the subsample of respondents might have different patterns of survey answers, we examined the data on how and where workers used the laptops and found that the data varied in relation to the number of years they used the devices. For the subsample there was little evidence of an impact resulting from how long the laptops were in use. Only three questions produced some evidence of a change over time: respondents reported more frequently that laptop use improved their documentation productivity, that they spent less time in the office, and expressed greater liking for using the devices. For the full sample (n = 900) there was even less evidence that longer use of laptops produced different attitudes or patterns of use among the CPS caseworkers. None of the questions about those matters showed significant variation with the number of years the respondents had used these devices. This suggests that, other things being equal, the period of adapting to laptop use is relatively short, so there would be little variation after the first few months of use.

This does not mean that responses turned more negative over time. The distribution of responses about increased job satisfaction from the newly deployed districts, for example, was virtually identical to that from the overall sample; for both, only one in five reported lower satisfaction with laptop use. There were similar consistencies over time in the reports of how laptops were used and reported impacts on productivity.

We also examined the productivity data for the subsample in relation to methods and length of time of laptop use. That analysis was done by examining relationships between productivity, deployment, and use variables using pair-wise correlation coefficients. The correlations between these variables indicate whether they are related, but without regard to links with any other variables. The variables in this analysis were chosen to be the best representatives of the administrative and policy context of deployment, the patterns of laptop use, and impacts on productivity. The correlation results are shown in Table 1 below.

The correlation matrix shows there is a positive relationship between respondents' perceptions of supportive district policies for working in the field and using the laptop in the field, perceptions of sufficient connectivity, and perceptions of not having to be in the office as much. In addition, supportive district policies have a positive relationship with caseworkers using the laptop in the field to take notes, communicate with supervisors and peers, read case histories, do additional research, access information from CONNECTIONS, and contact collaterals. Polices are needed to help shape the attitudes and behaviors of caseworkers. Changes in policies may be necessary to shape some attitudes and behaviors to encourage a more mobile workforce.

Table 1 - Selected Variable Correlation Matrix

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
[1] Use laptop at home when overtime work is approved	1.000		0.203**			0.318**		
[2] Supportive district policy for working in the field		1.000	0.514**	0.484**	0.289**			
[3] Supportive district policy for working at home			1.000	0.309**	0.106*			
[4] Sufficient connectivity to use laptop effectively				1.000	0.326**			
[5] Perception of not needing to be in the office					1.000			
[6] Average hours of overtime work (in hours) a week						1.000		
[7] Percentage of timely case closings (within 60 days)							1.000	0.558**
[8] Percentage of timely safety assessment (within 7 days)								1.000
Use laptop at home outside regular or overtime work hours	0.223**	0.149*	0.163*			0.244**		0.209**
Use laptop at home for required documentation	0.324**		0.180**	0.169**	0.156*	0.343**		
Use laptop in the field to take notes		0.212**		0.151*	0.254**			
Use laptop in the field for communication with supervisor		0.318**		0.261**	0.323**	0.171*		
Use laptop in the field for communication with peer		0.283**		0.219**	0.250**	0.252**		
Use laptop in the field to read case		0.248**		0.298**	0.262**	0.266**		
Use laptop in the field for research		0.286**		0.255**	0.276**	0.195*		
Use laptop in the field to contact collateral		0.252**		0.200**	0.279**	0.195*	0.170*	
Use laptop in the field to write narrative		0.258**		0.219**	0.318**			
Use laptop in the field to access information		0.224**		0.267**	0.318**	0.156*		
Use laptop in the field for required documentation		0.232**		0.186*	0.283**	0.153*		
Case count (proxy for workload)							-0.205**	-0.204**

* $p < 0.05$, ** $p < 0.01$

We are a little closer to understanding whether the introduction of laptops produces shifts in the location of work. However, we still need to understand how this changes productivity. There is a positive relationship between caseworkers completing safety assessments on-time and working at home outside of regular or approved overtime hours. In addition, there is a positive relationship between using the laptop at home with approved overtime hours and working more overtime hours,

as would be expected. This can be interpreted as evidence that laptop use and extra work hours can help caseworkers to keep more current and more effectively manage caseloads.

Models of Factors Affecting Productivity

Our previous research and interviews have made clear that the effective use of laptops is affected by a complex combination of factors. Our analysis therefore includes testing a model of how a combination of factors can account for impacts on productivity. To do so, we constructed a set of statistical models of productivity impacts as a function of 11 to 12 variables that represent characteristics of the workers, the district deployment and administrative context, technology availability, perceptions of impacts, and length of time of laptop use. Using linear regression methods, we examined the degree to which the model variables could account for differences in productivity. Those results are presented in Table 2 and Table 3 below.

The results in Table 2 include two productivity models based on the timeliness of progress note entry as the measure of productivity (dependent variable). We had access to two measures of length of time of laptop use, which were not fully consistent, so we ran analyses with each: reported length of time of laptop use from the survey, and elapsed time since the laptops were deployed in each district. We used three productivity measures separately as dependent variables, timeliness of progress notes, timeliness of safety assessments, and timeliness of case closings, each with one of two time variables to represent length of laptop use. The variables in the model are a combination of answers to survey questions, data on progress note entry from CONNECTIONS, and data on laptop deployment policies and practices from the local districts. The analysis tests the degree to which these variables, acting together, can account for variations in the timeliness of progress note entry by individual CPS caseworkers. This analysis differs from the productivity impacts reported on in previous reports, which were based solely on district-level data.

The results for progress note timeliness suggest that there is little in the way of a consistent relationship with any the variables in the model except for smart phone availability. The model accounts for only about 5% of the variation in progress note timeliness, which indicates that the high degree of variability among the districts, workers, and cases make this kind of modeling less useful. The one statistically significant factor is the availability of a smart phone (as noted previously, smart phones were not issued through these deployments). The regression coefficient is positive, indicating that having a smart phone available contributes to increased progress note timeliness. Since progress notes are not entered directly from a smart phone, this result can indicate that use of a smart phone creates efficiencies in some other aspect of the work, allowing more time for progress note entry. The lack of statistically significant relationships with the other variables does not mean they are unimportant, but only that the way these factors are measured and combined in the model does not account for variation in progress note timeliness.

The same modeling approach described for progress notes was employed, with modifications, to the analysis of productivity in terms of timeliness of safety assessments (due in seven days) and case closing (due on 60 days). These results are shown in Table 3 (next page); Models 3 and 5 use timeliness of case closing as the productivity measure (dependent variable). Timeliness of safety assessment completion (dependent variable) was used for Models 2 and 4.

Table 2 - Regression Results: Progress Notes Analysis

VARIABLE	Standard Regression Coefficients Model 1[a]	Model 2[b]
Length of laptop use	0.112	0.034
Continuous connectivity	0.037	0.136
Supportive work environment	0.088	0.075
Years of CPS casework experience	-0.087	-0.080
Home computer availability	-0.112	-0.084
Smart phone availability	**0.137***	**0.201***
Dictation device availability	-0.042	-0.098
Cell phone availability	0.066	0.032
Self-reported productivity impacts	-0.129	-0.122
Preference for laptop use	0.112	0.096
Overtime hours per week	0.038	0.070
Adjusted R-squared	**.051***	**.063***

NOTES:
* Statistically significant at .05 level
a. Dependent Variable: Average elapsed time-progress notes; laptop use since deployed
b. Dependent Variable: Average elapsed time-progress notes; laptop use self-reported years

Table 3 - Regression Results: Case Closing and Safety Assessment Analysis

VARIABLE	Standardized Regression Coefficients Model 3[c]	Model 4[d]	Model 5[e]	Model 6[f]
Case count	**-0.195***	**-0.194***	**-0.238***	**-0.232***
Length of laptop use	-0.136	**-0.142***	-0.026	**-0.189***
Continuous connectivity	**-0.206***	**-0.362***	**-0.123***	**-0.267***
Work environment	-0.047	**-0.142***	-0.053	-0.106
Yrs. of CPS casework experience	0.076	0.106	0.016	0.087
Home computer availability	-0.001	-0.102	0.022	-0.032
Smart phone availability	-0.060	**-0.174***	-0.065	**-0.137***
Dictation device availability	0.071	0.096	0.010	-0.003
Cell phone availability	-0.035	-0.035	-0.032	-0.023
Self-reported productivity impacts	0.059	0.054	0.139	0.123
Preference for laptop use	0.019	-0.055	-0.055	-0.089
Overtime hours per week	-0.057	0.011	-0.026	0.017
Adjusted R-squared	**.085***	**.251***	**.063***	**.227***

NOTES:
***** Statistically significant at .05 level
c. Dependent Variable: Percent timely case closing; laptop use self-reported years
d. Dependent Variable: Percent safety assessments w/in seven days; laptop use self-reported years
e. Dependent Variable: Percent timely case closing; laptop use since deployed
f. Dependent Variable: Percent safety assessments w/in seven days; laptop use since deployed

These modeling results are quite different from those for progress note timeliness. The models account for substantially more of the variation in the productivity measures and more of the factors have a statistically significant relationship. But contrary to expectations, all the factors, with the exception of one, that were expected to have a positive relationship with productivity reflect a negative relationship. The caseload of each individual is negatively related to productivity, as would be expected. Heavier workload means less time to work on individual cases, slowing output. However, the other factors—connectivity, length of laptop use, work environment, and smart phone availability for safety assessments—all show negative relationships. Such a result, consistently contrary to reasonable expectations and at odds with previous research, should not be taken at face value. The relatively low proportions of variability accounted for, as with the progress notes, indicate that these models are at best rough approximations of the actual effects of interest.

Taking into account results from previous research and the complex relationships among these variables, we do have one possible way to account for the counterintuitive results for the models of timely case closing and safety assessments. First, the timeliness of one is closely related to the other (correlation coefficient = 0.56, $p<.01$), and both are negatively affected by caseload. We also saw two counties with the largest average caseloads—Erie and Westchester—also have very high productivity and do not have continuous connectivity. Their large numbers can skew the results of a regression analysis. To test the possibility, we repeated the analysis with those two counties omitted. The result was that the negative relationship of timely case closing and safety assessments with connectivity dropped away. Only caseload remained as a factor affecting case closing. However, the relationships of work environment and laptop use with timely safety assessments remained negative.

The rich data set available for this assessment provided this opportunity to explore a more holistic model of what affects CPS field work. Though we recognized that such a modeling effort was unlikely to yield conclusive results, it did offer the prospect of advancing understanding beyond our current knowledge. These limited results demonstrate the difficulty of using such models that are, at best, very rough approximations of the many factors that can affect productivity in CPS casework. The full complexity of field work is not fully understood. The variables used in these models only partially represent the field and casework context, and this limited data cannot do justice to the subject. In spite of these limitations, the models do indicate the importance of caseload and administrative context, and offer some foundation for future study.

Impacts of Mobile Technology Use

The overall results show that laptop use impacts CPS casework more in terms of where the work was performed and on the volume of work completed, than on the nature of the work itself. The statistical results on productivity show modest but meaningful improvements. Thus, the laptop appears to primarily expand the opportunities for work in terms of time and place.

These expanded opportunities appear to occur less frequently during the work day in the field than they do by extending the work day to time at home. This is because of a combination of circumstances needed for extensive laptop use in the field, which can be difficult to come by. Such an opportunity would require at least three conditions: a block of unscheduled time, which is long enough to justify setting-up and establishing a network connection with the laptop, finding an appropriate place to work, and having adequate connectivity. According to CPS caseworkers, such blocks of time are typically not available. In general, the idea that CPS casework provides numerous opportunities and blocks of time for laptop use was not shared by most CPS caseworkers for the following reasons:

- Use of the laptop in a home visit or other client interview is not an option in some districts since that is prohibited by policy, considered inappropriate, or considered too dangerous in a potentially hostile and unstable environment.
- Connectivity from the field may not be available either due to lack of signal or of the necessary hardware.
- Not all CPS caseworkers we surveyed had access to air cards,[4] and even for those who did, signal availability was spotty in many rural areas.
- Working in a car may be too risky or complicated by bad weather or cramped space.
- Aside from lengthy commuter train rides, use of public transportation does not provide ample opportunity for laptop use.
- Free Wi-Fi hotspots may be unavailable, hard to find, or lack sufficient privacy.

Though the opportunities for field use of laptops were less numerous than anticipated, some instances were considered quite important. Some of the most important ones involve the need for time-sensitive access to information that is available via a network connection (such as in CONNECTIONS, CCRS, WMS, sex offender registries, etc.). Without a laptop or other network device, CPS caseworkers in the field who need this kind of information must go to the office, which can involve a substantial delay, or have it relayed to them from the office by phone. The latter process requires that someone be present in the office to help and that the amount of information needed is small enough to be readily transmitted by phone. This phone exchange of data is common practice during regular work hours but not on evenings and weekends.

In almost all of our interviews, the CPS caseworkers identified the increased value of the laptops when responding to an on-call assignment. The ability to access the entire case history is very valuable. A worker with a laptop can receive the assignment and background information by email and even query databases for additional data. Without a laptop, the caseworker must have the case history read to them over the phone. Such a process is time consuming and error prone, and can leave a case worker without critical information they may need once engaged with the case

[4] *Air card* is the generic term CPS workers and administrators apply to the adapters attached to their laptops that provide connectivity to cellular data networks.

situation. If the case involves law enforcement personnel, the case worker with a laptop may be able to provide useful background information otherwise not available.

The low-frequency but highly important on-call use of laptops illustrates the limits of strictly statistical assessments of impacts on productivity. These statistical assessments are important, but they do not capture the value of on-call and other instances when laptops can provide critically important information in rare but high stakes situations. This aspect of the value of mobile technology should be part of any assessment or decision making about IT investments.

The advantages of the laptop for information access of this type can be seen by examining four scenarios that the CPS caseworkers described as examples of the value of laptop use.

- *On call*. On call is a frequent scenario. For case investigations that begin on evenings or weekends, CPS caseworkers are assigned to be "on-call" while at home, usually on a rotating basis.[5] When a new investigation is required to start outside regular hours, the SCR assigns the case to an on-call worker. The CPS caseworker then needs sufficient details about the case to begin an investigation immediately, including any record of previous problems at the address or with the person(s) involved. With a laptop, the on-call worker can access the case information and relevant files in full and pursue additional information from other relevant databases. When CPS caseworkers do not have laptops, SCR staff read information over the phone. The workers must write out as much as they can and may need to call back for additional information. With a laptop, CPS caseworkers can begin investigations quickly with more information available to guide them.

- *New case while in the field.* A new case can also be assigned during regular hours to CPS caseworkers while in the field. With a networked laptop, they can receive the full set of information about the case and query other data sources as needed. The laptop provides the same advantages in this situation as for on-call case assignments.

- *Collaboration with other organizations*. A third scenario involves collaboration with law enforcement. A case may bring CPS caseworkers and law enforcement officers together in the field. In such situations, law enforcement officers often need information about the case that the CPS caseworker can provide, if they have access to data sources remotely from that location and such disclosure is authorized. Such cases can involve children in unsafe situations or other possibilities for violence that require quick action. A networked laptop can provide more complete and timely access to the relevant information in such a critical situation.

- *On-site decision making*. A more common but less critical scenario involves the need for information to inform a real-time decision facing a CPS caseworker in the field. These needs can run from simply looking up a phone number or best route to the next destination or for important decisions about possible interventions or removing a child from a dangerous situation. In the case of a removal decision, for example, the CPS caseworker may need to check the Sex Offender Registry concerning the status of family members or other possible alternative care-givers for children at risk.

[5] One large district uses a CPS unit that handles only evening and weekend calls so that the remaining staff are working only during regular business hours.

The value of laptop use may also extend beyond better access to information. CPS caseworkers described the importance of how laptop use helps make more time available for contact with families and other parties in investigations when they can use the laptops to keep up with documentation and other administrative tasks after hours. The time saved is used for more direct contact with families. The result, in their opinion, is better service. This view is reflected in both the survey results (Figure 6 on page 12) and comments of CPS caseworkers in interviews. One caseworker described it best when she said:

> "The district laptops were the single greatest work tool provided to CPS caseworkers. Prior to receiving the district laptops, I completed case work at home on either my PC or other district agency devices (Key Pad, etc.), only to arrive to the office spending 2-3 additional hours downloading, checking, and preparing case work to enter into CONNECTIONS. That time is now saved and spent in a much more productive manner. Thank you for the laptops."

The use of a fully functioning laptop with good connectivity can also allow CPS caseworkers to simply spend more time in the field to learn about the social and physical environment of the children and families in their cases. Some interviewees reported that when they can move computer work out of the office, they have more opportunities to learn about the neighborhoods and social interactions surrounding the children and families in their care. CPS caseworkers can observe street life and gather details about housing conditions, possible gang activity, and other possible resources and threats in the context of their cases. That knowledge can be valuable in judging the risks to children and choosing treatment or intervention strategies.

The "Good" and the "Not-So-Good" Scenarios for Mobility

Over the five year course of studying laptop use, we have observed many variations in local conditions of laptop deployment; variations that affect the value derived from this technology. These observations provide some useful conclusions about how to get the most value from an investment in mobile technology for CPS casework. We have seen instances of highly supportive environments at the district level that result in effective use of this technology. We have also seen numerous examples of less positive situations, where lack of resources, administrative challenges, or policy barriers lead to less positive results. No district could be called ideal, nor were any uniformly negative. So instead of singling out particular districts, we developed composite descriptions of how laptops were introduced and used in two hypothetical local social service districts. The "Good" description shows a more favorable environment where the use of mobile technology in CPS yields numerous benefits and provides high value. The "Not-So-Good" description presents an environment that limits and sometimes restricts use, and thus fails to take full advantage of mobile technology.

Every part of the composite descriptions comes from an actual district and is based on direct quotes and accounts of circumstances in multiple districts. The material below is drawn from policies, practices, and strategies reported by the local districts that participated in the data collection.

However neither of the descriptions below represents any specific local district in NYS. The descriptions represent instead anchor ends of a continuum of "favorableness" of local conditions for laptop deployment and use. All districts in our study could be placed somewhere on this continuum between the two anchor end composites.

The goal of presenting these descriptions is to show how local administration actions and policies can impact the value derived from laptop deployment. These descriptions illustrate available ways to support effective use of this technology along with actions and policies to avoid. We present these composites in the hope that districts will see what is possible and start to adapt their own environment in order to get the most value from the mobile technology investment.

Scenario 1: The Good

District A represents a highly supportive environment for laptop use from a technical and policy perspective. Part of that support consists of regular monthly meetings that include a discussion with CPS caseworkers about the use of their laptops. At the last meeting, one individual administrator summed up their experience stating, "Having the laptops has been great, really….. I mean caseworkers are now in the field more–it's like they are more a part of the community. Now instead of spending time driving back to the office, they find a place to work in their catchment area. Their notes get done quicker, they respond to calls quicker, and frankly they are learning a heck of a lot more about the community. There's really no down side."

The material in Table 4 (below) shows how District A created the conditions that allowed the CPS caseworkers to realize the high value of using their laptop computers.

Table 4 – Development of Supportive Technical and Policy Conditions for Laptop Use

Condition	Evidence
Deployment and Training	• All caseworkers, supervisors, and managers were introduced to the laptops through a kick-off event and discussions of the goals of integrating laptops in CPS casework. • Everyone receiving a laptop participated in small group training and then signed up for their individual training sessions where they were shown how to use the computer and how to connect to CONNECTIONS. • Small sessions were held in 2-3 county locations to show how to troubleshoot and connect from the field (library, court, coffee shop) • Caseworkers were asked to sign an acceptable use policy for the laptop. • Manuals and step-by-step guides were provided for all laptop users.
Connectivity	• Wireless air cards were purchased for each laptop so that all users could connect from any location in the field or at home at any time. • Cell phone coverage within the district is between 80-100% reliable.
Security	• Caseworkers were briefed on security measures and then asked to sign a form stating they understood and agreed to the acceptable use. • A guide was given to remind and assist caseworkers on protocol when they work in public places.
Technical Support	• Instruction manuals were created and distributed to each caseworker. • Clear instructions were given on how to reach technical support. For the first several months of deployment, support was given during and outside of regular work hours.
Technical Infrastructure & Resources	• Technical support was available on evenings and weekends. • Before state and local systems underwent updates, caseworkers were given notice and told what to expect in terms of delays and changes. • Technical support staff work to reduce problems of complex, time consuming sign-on and authentication procedures. • Provision of other technology (digital cameras, cell phones, GPS devices, etc.) to support field work was also provided.
Management practice & policy: *Use during standard daytime work hours*	• Caseworkers were encouraged by written policy or informal practice to take the laptops into the field and use at any location they deem suitable to work; this includes all public and private locations. • Caseworkers were allowed substantial flexibility in scheduling field work and encouraged to return to the office only when necessary. This is done through a written policy or informal management practices. • Policies and guidelines for laptop use in public places are developed and communicated with all staff.
Management practice & policy: *Use during after-work hours*	• Supportive policies and practices for use of laptop at home, both during and after hours, are developed and communicated to staff. • Compensation is provided for overtime when using the laptop to do work outside of regular work hours.

Scenario 2: The Not-So-Good

District B represents a mix of policies, practices, and decisions that may interfere with obtaining the full value of laptop use. The results were clear during a regularly scheduled monthly meeting of CPS staff when a discussion ensued about the use of laptops. One individual stated "there doesn't seem to be much of an impact from the laptops. We seem to be using them just like desktops." Another individual added, "I don't have any connectivity, I can only use it at the library, which is not near my catchment area, and I don't get overtime or comp time to catch up on work at night at home." The material in Table 5 (below) shows the non-supportive conditions in District B.

Table 5 - Development of Non-Supportive Technical and Policy Conditions for Laptop Use

Category	Evidence
Training	• Laptops were installed after hours with no caseworkers present. Desktops were removed and a state-issued manual for the laptop was left on the desk. • Caseworkers were asked to sign an agreement that they would be financially responsible for damage or loss of the laptop. • No group or individual training was offered to any of the caseworkers.
Connectivity	• No wireless air cards were purchased for any of the laptops due to budget constraints. Administrators believe that free Wi-Fi hot spots would be adequate or that cellular data coverage was too limited to be useful.
Security	• All caseworkers were asked to sign a form agreeing to abide by an acceptable use policy for the laptops. • Administrators created regulations requiring all laptops to be placed and locked into the docking stations in the office at night.
Technical Support	• There is a low priority for support for network problems. • There is low availability of support outside regular work hours.
Technical Infrastructure	• There is little to no communication and support for software and system updates and network protocol changes. • There are incompatibilities and technical issues in links between county and state systems that persist with little to no attention. • Complex, time consuming sign-on and authentication procedures are considered part of the process and not given attention. • There is no district provision of additional technology to support field work: digital cameras, cell phones, GPS devices.
Management practice/policy: *Use during standard daytime work hours*	• Caseworkers are discouraged from using the laptop in the field during the day. • There is limited flexibility for scheduling field work; meaning that there are fixed field work days and this cannot change. • Caseworkers are instructed through formal policy and informal practices that they cannot work in public locations.
Management practice/policy: *Use after-work*	• There is both formal and informal prohibition of work at home. • Highly restrictive policies that state there are no exceptions for overtime compensation for work done at home outside of regular work hours.

Top Three Indicators of a Good Scenario

Connectivity

The ability to interact with needed information resources from any location away from the office is fundamental to the laptop value proposition. Districts can support connectivity in three main ways: (1) by investing in ubiquitous data connections wherever possible—usually through air cards, (2) by encouraging workers to use the laptops in all appropriate locations, and (3) by providing the necessary technical support to establish and maintain all the necessary network links and software functions. Even though it seems to be the most basic aspect of mobile technology use, connectivity was problematic in many districts, in part due to budget constraints limiting the availability of air cards and in part due to poor or unavailable cellular data service. The state can help in this regard by encouraging and, where possible, supporting or developing ubiquitous wireless data services.

Flexibility

CPS casework is complex, full of uncertainty, and demanding of real-time professional judgments and decisions. A network connected laptop provides a tool to support flexible responses to emergency situations and unanticipated events in the field. Caseworkers who can easily adjust their schedules and travel plan can make the most effective use of their time in the field. Policies and practices that support adaptive use of field and after-hours time, such as lack of rigid schedules and flexible supervisory interactions, and support mobile work generally, gain the most value from the mobile technology.

Incentives

The results show that a large proportion of CPS caseworkers are willing to work longer hours to keep up to date with their documentation and case closing tasks. Caseworkers report that even without monetary compensation they feel a greater satisfaction and peace of mind when they spend time completing work on the laptop during after-hours. Incentives to encourage use of laptops do not always need to be monetary; many caseworkers expressed that pre-approved compensatory time and even just recognition of the effort is enough for them to continue.

Top Three Indicators of a Not-So-Good Scenario

Technical Infrastructure Problems

Effective use of laptops in the field depends in large part on the ease and reliability of interactions with information resources such as CONNECTIONS and other databases. Those interactions depend on a complex combination of network connections between the laptop, and at various times, a cellular data network, local wireless access point, county computer system, and various NY State computing systems, each with different protocols. Due to the sensitivity of the data, these connections also require high security that further complicates functioning. Failures or errors in any part of such complex linkages can greatly reduce the laptop's usefulness. Cumbersome log-on procedures are time consuming, error prone, and also discourage use. Even getting a laptop configuration to work smoothly does not permanently solve these issues, since there are frequent software updates and changes in network configurations that require renewed attention.

Limited Connectivity

Aside from use as a stand-alone word processor, a laptop without connectivity does not confer the benefits to be derived from the technology. There were two main factors limiting connectivity in our study. One was the unwillingness of districts to provide air cards for the laptops, primarily due to the high cost of service. Some districts provided a small number of air cards that could be shared among laptop users. In other districts, CPS caseworkers had to use free Wi-Fi hot spots in the field or their own internet service at home. Relying on shared air cards or free hot spots is clearly not optimal.

Another factor was the limited availability of reliable cellular data service in large areas of New York State, particularly in the Adirondack and Catskill areas and along the Pennsylvania border. The first factor was simply one of providing adequate resources; improving the second depends on wireless service providers and is thus outside the reach of state or local authority. The prospect of a state-sponsored wireless network for government is often discussed but is not available now for CPS casework.

Restricting or Discouraging Use

Several policies and practices either directly or indirectly restrict the effective use of laptops in the field. Laptops help deliver value by allowing more flexible and efficient use of time. Flexibility is diminished by policies and supervisory practices that restrict places for laptop use, and require that laptops be stored in the office outside regular work hours.

Some policies and practices work as disincentives for workers to make the most of their laptops. Districts that do not provide air cards limit most field use of laptops to only free Wi-Fi hot spots, when available. Other disincentives include policies that encourage workers to only perform visits in the field and complete the rest of the work in the office, hold workers personally responsible for loss or damage to equipment, provide no or ineffective training and tech support, and do not help maintain reliable connections.

Recommendations

Over the past five years, New York State has invested heavily in mobile technology devices, specifically for CPS casework. These investments have been spread throughout the state, so that caseworkers in almost all local districts are now able to use laptops to access and receive information directly from CONNECTIONS. This investment is a strong indication that NYS is committed to providing the necessary resources to those who serve our state's children and families.

The results of this study point to some recommendations that can help ensure that the full returns from this investment can be obtained. The short term recommendations below speak to matters of operations, management, and policy that can be implemented relatively quickly and do not necessarily involve large commitments of additional resources or complex policy issues to be resolved. The longer term recommendations that follow are offered to indicate the directions for new policies, investments, or major changes in practice that may require considerably more time or resource commitments.

Short-term Recommendations

1. **Share information across districts about what it means to have a more mobile workforce**.
   Introducing a network connected laptop into a profession that relies on extensive fieldwork, required documentation, and continuous professional judgment is not an easy task. A connected laptop has the potential to make a caseworker more mobile. But when this opportunity arrives, it is usually considered merely an infrastructure upgrade. It's not usually met with an organization-wide understanding that it is a fundamental shift in the way work is done. The making of a more "mobile" caseworker has far reaching implications into every aspect of the work environment. Changing when and where people do work affected most everything, scheduling and managing time out of the office, technical support while away from the office, the appropriateness of working in public places, and permission and compensation to conduct work off site and outside of work hours. There are numerous people, processes, and policies affected by this change and it should not be considered just a technology project.

   The two main areas that must be addressed are working from home and working in the field. Both scenarios have policy and practice implications. Having cross district and district-wide discussions about the potential implications and scenarios will help administrators determine where they need to focus their attention for adjusting policies. OCFS should consider identifying appropriate forums to facilitate this discussion.

   - *From Home.* Government has historically prohibited working from home and many state, city, and county governments continue to adhere to this philosophy. In New York State, there are many districts that allow caseworkers to work from home *outside of* regular work hours (with a laptop) and allow them to receive overtime or compensatory time. At the same time, almost all districts disallow working from home during regularly scheduled work hours. The only exceptions to this seems to be when bad weather conditions, especially in winter, make driving too hazardous. In this case, caseworkers can get preapproval to work from home during regular daytime work hours.

- *In the Field.* Working in the field is another policy area that should be discussed. It may seem quite straight forward, but it is not. Some districts encouraged use in the field by stating that caseworkers can work in any location, including in their car as well as public places such as parks, libraries, cafés, and coffee shops. Other districts forbid working in any location other than a public library or a county building. If increased mobility is an expected outcome, then the local district should openly discuss and identify all the different types of locations they deem appropriate.

2. **Communicate the importance of investing in continuous connectivity.**
   A laptop computer that is not set up for continuous connectivity is in essence just a small desktop computer. A desktop does not increase caseworker mobility. Caseworker mobility is dependent on the ability to connect to multiple systems and sites from any geographic location. If there is no way to connect, then there is not much mobility. There is the ability to do word processing and save it to the hard drive, but that creates another set of issues and added steps along the way. Investing in air cards for each laptop is a fundamental component of caseworker mobility, even if there are abundant hotspots within a district. Hotspots do not offer the same flexibility as dedicated air cards. It is understandable that some districts do not buy the air cards because of poor cellular coverage but others were omitted because of cost. There is a significant cost to air card use, but if the goal is to provide caseworkers with the resources that allow them to become more immersed in their catchment area and closer to the children and families they serve, then a strong case can be made to incur those expenses.

3. **Encourage mobility through support and guidance.**
   Even if a laptop is connected, increased mobility is dependent on the formal and informal "encouragement" from a district and this can come in the form of policies and practices. Examples of such are:

   - *Flexible scheduling and laptop use in the field*. Flexibility is a fundamental benefit of mobility and provides the capability to increase opportunities to do work during the normal work day. Creating flexible polices for scheduling visits, allowing caseworkers to use laptops outside the office, and not requiring them to travel back to the office to document notes can help promote mobility.

   - *Proactive technical support.* Sometimes the hard part of working on a laptop outside the office is working through the multiple technical difficulties that workers often encounter. Having a proactive technical staff that offers information about how to log-in from the field, how updates will affect use, and provides after-hours support for troubleshooting will help caseworkers and supervisors become more comfortable with the technology.

Long-term Visionary Recommendations

Building a mobile strategy and encouraging a mobile workforce requires anticipating the changes that may come along with respect to changes in technology, management, and policy.

1. **Plan for platform and network interoperability.**
   The agencies deploying laptops are, at least temporarily, faced with resolving the tension between desktop and office-oriented technologies and work practices versus more mobile work and mobile technology strategies. To work to resolve that tension, a "mobile first" approach to Web development and applications allows greater capability for mobile access to and exploitation of agency resources. This strategy can also lead to potential simplification of interfaces. A mobile orientation could encourage greater understanding of work tasks and information process development that is independent of specific devices. This approach can also set the foundation for a better, more efficient user experience. It could facilitate a two-way, ongoing feedback and response cycle.

2. **Anticipate a Bring Your Own Device (BYOD) environment**
   The growth in the use of highly capable mobile devices and applications in society has resulted in the growing demand by workers to use their own mobile devices for work: The Bring Your Own Device (BYOD) phenomenon is increasingly being faced by public and private organizations. It is unlikely that these demands will fade any time soon, but in fact are more likely to grow. While some see this environment as a problem resulting from the security threats posed by personal devices and the complexity and cost of supporting and controlling the use of devices, it can also be viewed as an opportunity. These devices usually incorporate more robust communication capabilities, including multi-media and social media applications, than simple phones or laptops. The devices can improve connections among workers and supervisors and knowledge sharing among field workers. The devices are smaller and less obtrusive than laptops and can be more easily transported and employed in a variety of locations where laptops are less convenient or accessible. An experimental approach to incorporating workers' devices, especially the high capability tablet and smart phone variety, may return important dividends.

3. **Experiment with new models of casework or service delivery.**
   The video capability of many tablet and smart phone devices provide possibilities for service interactions not currently available. These could include impromptu virtual meetings, checking upon children and families with reduced travel, multi-media report and documentation content, and advanced training opportunities for workers and supervisors. Prototyping and testing these capabilities with a small set of caseworkers for a limited number of functions will help uncover the policy, management, and technical implications of a large scale transition.

4. **Plan for and take advantage of a changed relationship between caseworkers and data.**
   Mobility and cloud computing capabilities are natural partners, expanding the opportunities of access to and exchange of data that is not restricted to fixed locations. The laptop deployment examined in this study is an example of an early stage cloud computing system, with data access and exchange in links with a central set of repositories that are similar to a private cloud. It would be possible to use the applications and strategies that are emerging from cloud computing to craft a more integrated and seamless interface for CPS casework. As it is now, the field worker spends time switching access among multiple remote

databases—CONNECTIONS, WMS, etc.—in complex and inefficient ways. A more integrated system would make the relevant resources available, provide some analytical and mining capabilities, and shape the exchange of data to better fit the demands of the field work situation. A cloud-based architecture and new application interfaces have the potential to make the CPS caseworker a more effective analyst and knowledge worker than with the current systems.

Approaches to Improving Mobile Technology Effectiveness

The OCFS and other NYS agencies have multiple approaches available for crafting ways to improve mobile technology effectiveness, for CPS casework and in some respects in general for other service and program areas. In general, these approaches fall into four categories: *infrastructure*, *policy*, *systems*, and *support*. This section describes possible actions the state can take to improve mobile technology effectiveness in each of the four approaches.

1. **Infrastructure.** The availability of sufficient wireless broadband service throughout the state is a key infrastructure action for effective mobile technology use. Ensuring access to this service for mobile workers is a shared responsibility of state and local government. To learn where intervention is needed, the OCFS and Office for Technology (OFT) should use the data available from the Office of Cyber Security's (OCS) broadband mapping program[6] to identify problem areas. In problem areas where local government is unable to fill access gaps due to high cost, a special program for local governments in high cost broadband areas could be kept to reasonable levels if targeted to the high-need areas. The state can also provide financial incentives for private providers to expand access for state mobile workers. In other areas it may be necessary for state and local government to establish public wireless services to fill remaining gaps. A plan for this strategy should be developed in collaboration with the Broadband Council and the OFT (see the discussion of support below).

2. **Policy.** The effectiveness of mobile technology for caseworkers depends in part on an appropriate policy environment. The OCFS has already taken steps to address policy concerns, issuing administrative directives on equipment use and portable device security, in addition to issuing guidance on personal, private, and sensitive information (PPSI). While OCFS cannot dictate policy to local districts for all aspects of mobile work, it must continue to develop recommended guidelines for a broad span of policy concerns, such as acceptable use, changes in casework or culture, human resources, security, privacy, and training. These guidelines should describe:

    - Policies that expand flexibility of scheduling and location of work to better exploit mobility.
    - Supervisory practices that encourage the most effective use of mobile devices and integration with overall work flow.
    - Compensation policies that provide incentives for field workers to use work time and work location more flexibly.
    - Security standards and implementation guidance and performance standards for use of tablets and other devices that can provide additional mobile functionality.
    - Training materials and skill standards for technical support and help desk staff.

[6] OCS provides a wide variety of mapping and analysis services for the benefit of New York State. http://www.broadbandmap.ny.gov/

- Guidelines for equipping a mobile workforce with the tools needed for the full capability they require, such as digital photography, voice communication, internet access, video conferencing, data exchange, and interoperability with legacy systems.

These policies and guidelines should be developed in collaboration with OFT, the CIO Council, and representatives of local government since they have implications for workers in many other state and local agencies.

3. **Systems.** Effective use of mobile technology depends on multiple systems: the device itself, the system that provides wireless access to the internet, the host systems accessed by mobile workers, and the support system to maintain the workflow. This last component is discussed in the next section. To sustain the positive results of the state's leadership in deploying mobile technology, more attention is needed to the interconnected systems, including:

    - Improvements in the responsiveness and flexibility of the central systems, especially CONNECTIONS, should receive serious attention.
    - Anticipate the impacts on mobile work of the new systems emerging, such as tablet computers or social media use, increasingly capable smart phones, cloud computing, more powerful processors, and new tools for business intelligence and analysis of large data sets.
    - From its leadership position in mobile technology deployment, OCFS should join with OFT, the Broadband Council, and the CIO Council to sponsor a mobility task force. The task force would be charged with outlining a NYS mobility strategy that deals with enhanced interoperability across agencies and with local government, infrastructure gaps, policy changes, support for technical needs and training, device and security standards, and employment, supervision, and workforce issues.
    - Work with OFT Customer Care Center to provide direct help desk support statewide, for all mobile workers.

4. **Support.** Providing statewide coordinated support for mobile work is needed for IT support, and workforce development. For IT, mobile technology use adds a new level of complexity and workload for local IT staff. A statewide support strategy should involve:

    - Training and professional development resources—courses, materials, peer group, and community of practice opportunities directed at various groups including local district IT professionals, state IT professionals, child welfare administrators, managers, supervisors, and caseworkers.
    - Experiment with and support new social media related resources for sharing information and knowledge – paying particular attention to developing communities of practice that share best practices and solutions, news, and other forms of advice and useful knowledge about being mobile. Mobility is happening in other agencies, these support efforts should be coordinated with the OFT Customer Care Center and the CIO Council for synergy with other agency efforts.

A statewide approach helps to leverage resources, this is especially important for smaller counties where staff resources are limited and individuals cannot specialize in a particular area of techical support or mobile professional development.

Conclusion

Many districts are reaping the rewards of setting up an environment that promotes the use of laptops and a more mobile work environment. Caseworkers are integrating the mobile technology into their work processes and as a result can spend more time in the field. The immersive experience is a direct factor in making more informed choices for NYS children and families. But not every local district is there yet. CPS caseworkers, supervisors, managers, and administrators find themselves with a good opportunity to make change and reach this new level of mobility. The investments in infrastructure have already been made, now it's time to continue building up the environment, because a more mobile workforce is here to stay.

APPENDIX A: Assessment of Newly Deployed Districts

This section describes the results of the assessment of districts that received laptops for the first time in the 2009-10 deployment. These districts were assessed separately from the other districts because we know from previous studies that the newly deployed districts are still at the beginning of their learning curve and will show few productivity changes. It is still important to assess these districts in other areas, therefore survey results are presented in this section for the following newly deployed districts: Allegany, Chemung, Franklin, Montgomery, Otsego, Saratoga, Schoharie, and St. Regis.

Overall Findings

Laptop use:

- Nearly all respondents (93%) reported using district-issued laptops to complete their work.
- Using "once in a while" was the most popular frequency, compared to "never using" and "using everyday," regardless of use at home, in the field, or at court.
- Respondents used laptops more frequently during regularly scheduled work hours than during approved overtime work hours.

Preference for laptop use:

- The majority of respondents (70%) reported that they liked using the laptop for casework.
- Only a small percentage of respondents (13%) reported that the laptop did not fit their personal work style.

Productivity:

- In terms of both documentation and service to children and families, more than half of respondents reported that they were better able to accomplish these tasks as a result of having a district-issued laptop.
- In terms of ability to "quickly enter safety assessments" and "quickly close my cases," more than one third of respondents reported that they were better able to handle these tasks as result of having a district-issued laptop.
- One third of respondents reported that they were better able to "work less overtime" as a result of having a district-issued laptop.

Mobility:

- Over half of respondents reported that they could choose where they do documentation as result of having a district-issued laptop.
- Only a small portion of respondents (18%) reported that they did not need to be in the office, and the majority of respondents (79%) still preferred doing most of their documentation in the office.

Job satisfaction:

- About half the respondents reported that they were more satisfied with their jobs as result of having a district-issued laptop, while a similar proportion of respondents (41%) held a

neutral position towards improved job satisfaction as result of having a district-issued laptop.

Technologies Used for Work

Participants were asked to identify the technologies they used for work. Five technologies were examined, as shown in table the below. Nearly all respondents (93%) reported that they used district-issued laptops to complete their work. Over half the respondents reported that they used cell phones (either district-issue or personal). There are also relatively small portions of respondents who reported that they used dictation devices (18%), home computers (10%), and personal smart phones (9%) for their work.

Technology	Percent
District-issued laptop	93%
Home computer	10%
Smart phone	8%
Dictation device	18%
Cell phone	60%

Using District-issued Laptops at Home

When asked how often they used their district-issued laptops at home to do CPS casework, most respondents reported that they used these laptops "once in a while," regardless of whether it was during regularly scheduled work hours (36%), during approved overtime work hours (61%), or outside of regular or overtime work hours (55%). As shown in the table below, around 30% of respondents reported they never used district-issued laptops at home. Of respondents who reported using district-issued laptops everyday, use during regularly scheduled work hours (30%) is moderately higher than during approved overtime (14%) and outside of regular or overtime hours (13%).

	During regularly scheduled work hours	During approved overtime work hours	Outside of regular or overtime work hours
Never	34%	26%	32%
Once in a while	36%	61%	55%
Everyday	30%	14%	13%

Using District-issued Laptops in the Field or at Court

Participants were asked how often they used their district-issued laptops in the field or at court to do CPS casework. Most respondents reported that they used these laptops "once in a while," regardless of whether it was during regularly scheduled work (68%) or during approved overtime (58%). Only 5% of respondents reported they never used district-issued laptops during regularly scheduled work hours, compared with 33% who reported never using district-issued laptops during approved overtime.

	During regularly scheduled work hours	During approved overtime work hours
Never	5%	33%
Once in a while	68%	58%
Everyday	27%	8%

Preference for Laptop Use

The majority of respondents (70%) reported that they liked using the laptop for casework. Quite consistent with this result, only a small percentage of respondents (13%) reported that the laptop did not fit their personal work style. Around 25% percent of respondents remained neutral on laptop use.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I like using the laptop for casework	2%	3%	26%	35%	35%
Using the laptop does not fit my personal work style	29%	33%	24%	9%	4%

Improved Productivity

Participants were asked about changes in personal productivity as a result of having a district-issued laptop. The survey examined seven productivity-related items, which are presented in the table below. Over half of respondents reported that they were better able to "keep up with documentation" (66%), "quickly enter progress notes" (56%), and "serve my children and families" (50%) as result of having a district-issued laptop. Over one third of respondents reported that they were better able to "quickly close my cases" (34%) and "quickly enter safety assessments" (44%) after having a district-issued laptop. Only 28% of respondents reported that they were able to "work less overtime."

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Keep up with documentation	5%	9%	20%	48%	19%
Serve my children and families	4%	12%	34%	36%	14%
Work less overtime	7%	19%	47%	21%	7%
Quickly enter progress notes	4%	10%	30%	42%	14%
Quickly enter safety assessments	5%	11%	41%	34%	10%
Quickly close my cases	5%	16%	45%	24%	10%
Catch up on back-logged cases	5%	12%	35%	33%	15%

Increased Mobility

When asked about changes in mobility, although over half of respondents (57%) reported that they could choose where they do documentation as result of having a district-issued laptop, over two-thirds of respondents (79%) still preferred doing most of their documentation in the office, in contrast with the percentage of respondents who preferred doing most of their documentation in the field (7%) or respondents who preferred doing most of their documentation at home (10%). In addition, only 18% of respondents reported that they did not need to be in the office as much after having a district-issued laptop. In terms of improved time efficiency, half of respondents (51%) reported that they could use time in the field more effectively, compared with 36% of respondents who reported that they could use time at court more efficiently.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I can choose where I do documentation	7%	15%	21%	42%	15%
I can use time in the field more effectively	7%	18%	24%	41%	10%
I can use time at court more effectively	6%	13%	45%	26%	10%
I do most of my documentation in the office	2%	5%	14%	40%	39%
I do most of my documentation in the field	21%	43%	29%	7%	1%
I do most of my documentation at home	27%	38%	25%	9%	1%
I do not need to be in the office as much	16%	41%	25%	15%	3%

Improved Job Satisfaction

When asked about changes in job satisfaction, approximately half of respondents (47%) reported that they were more satisfied with their jobs as result of having a district-issued laptop, while a similar proportion of respondents (41%) held a neutral position towards improved job satisfaction as result of having a district-issued laptop.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Job satisfaction	8%	4%	41%	40%	7%

Appendix B: Data Collection Methods

The project used four data collection methods: 1) surveys, 2) extracting administrative data from CONNECTIONS, the statewide child welfare information system, 3) district questionnaires and 4) group interviews.

Surveys

Two types of surveys were used. One was administered directly to CPS caseworkers and supervisors. The other was administered to the mobile project contact identified by each of the participating districts.

Caseworker and supervisor online survey
CTG administered an online survey to caseworkers and supervisors using commercial software. The survey was opened on December 28, 2010 and closed on January 25, 2011. The instrument collected data about respondents' perceptions and attitudes using the laptop and other mobile devices including dictation devices and smart phones and concentrated on the following areas of CPS casework: *how the technology was used in work practice* (including case investigations and interventions, case documentation and reporting, court-related activities, administrative and other office duties); *work mobility and location* (examining use at the office, court house, and while in the field); *productivity changes, job satisfaction, and technology acceptance.*

Districts provided participation lists by supplying the names, email addresses, and job titles of caseworkers and supervisors currently assigned a laptop. CTG received participation lists from 51 of the 55 districts. A total of 1,275 caseworkers and supervisors were identified as using district-issued laptops and formed the population list. All 1,275 caseworkers and supervisors received a personalized email inviting them to take the online survey. A total of 906 completed the survey (a 71% response rate). The response rate by participating districts is denoted below:

District	Response rate	District	Response rate	District	Response rate
ACS	38%	Genesee	100%	Saratoga *	84%
Albany	44%	Jefferson	76%	Schoharie *	83%
Allegany *	100%	Lewis	80%	Schuyler	80%
Broome	50%	Madison	94%	Seneca	73%
Cattaraugus	61%	Monroe	57%	St. Lawrence	59%
Cayuga	27%	Montgomery *	83%	St. Regis *	100%
Chemung	81%	Nassau	31%	Suffolk	87%
Chenango	64%	Niagara	76%	Sullivan	53%
Clinton	69%	Onondaga	67%	Tioga	86%
Columbia	60%	Ontario	57%	Tompkins	80%
Cortland	62%	Orange	50%	Ulster	79%
Delaware	86%	Orleans	50%	Warren	100%
Dutchess	67%	Oswego	80%	Washington	88%
Erie	49%	Otsego *	90%	Wayne	100%
Essex	67%	Putnam	88%	Westchester	77%
Franklin *	46%	Rensselaer	82%	Wyoming	50%
Fulton	83%	Rockland	45%	Yates	73%

* Districts that received laptops for the first time in 2010.

Administrative data (CONNECTIONS data)

The overall objective for using administrative data from the statewide central child welfare system (CONNECTIONS) was to create measures of productivity that would reflect the timeliness of important work practices such as entering progress notes, closing cases, and submitting safety assessments. The data extracted from CONNECTIONS included information on case records and caseworkers' progress notes. The information contained within each of these records included:

- *Unique identifier information* (Stage ID, Person ID, District ID)
- *Time-related information about the investigation stage* (Intake Start Date, Investigation Stage Start Date, Investigation Stage End Date)
- *Time-related information about progress notes* (Progress Note ID, Progress Note Event Date, Progress Note Entry Date, Progress Note Type, Progress Note Purpose)
- *Time-related information about safety assessments* (Safety Assessment Submission Date, Safety Assessment Approval Date).

CONNECTIONS data was extracted only for participants who: 1) completed the online survey in 2010-2011 and 2) participated in, and were assessed during a previous pilot period (a total of 399 participants matched is criteria). From this list of 399, CONNECTIONS data was extracted during three time periods:

- Before the technology was introduced (T1),
- For a period right after the technology was introduced (T2), and
- Several years of use after the initial introduction (T3).

The exact time period for each participant's T1, T2, and T3 varied by the date their district received and deployed laptops in the field.

District questionnaires

Each district contact was asked to complete a questionnaire about their district. Almost all the districts completed and submitted the questionnaires. The focus of the questionnaire was to learn about each district's goals for using mobile technology and the ways they solved connectivity issues, deployed the laptops, selected participants, and addressed policy concerns, and to obtain basic demographic information about the county.

Districts completing the questionnaire are listed below:

- Allegany
- Broome
- Chemung
- Chenango
- Clinton
- Columbia
- Cortland
- Delaware
- Dutchess
- Erie
- Essex
- Fulton
- Genesee
- Jefferson
- Lewis
- Madison
- Monroe
- Montgomery
- Nassau
- Niagara
- Ontario

Districts not returning a completed questionnaire are listed below:

- Albany
- Cattaraugus
- Cayuga
- Franklin
- Livingston
- NYC ACS
- Oneida
- Onondaga
- Orange
- Saratoga
- Schenectady
- St. Regis
- Sullivan
- Tioga

The questions below illustrate the types of questions asked:

- What was your district's objective for participating in this pilot?
- What connectivity solutions did you choose and with what provider?
- What do you hope to achieve by deploying mobile technology?
- Were all devices deployed? If not, how many were not deployed and why?
- Did all participants receive their own device or are devices shared among several participants? If shared, please describe how the devices were shared among the participants.
- How were caseworkers and supervisors selected to participate in the pilot?
- Please describe the deployment training process.
- How did each participant receive their device?
- Please describe the security procedures that were addressed during training.
- What are the geographical areas, population, and urban/rural makeup of your district?
- What is the total number of CPS caseworkers in your district (not just those participating in the mobile technology project)?

Group interviews

Four districts participated in semi-structured group interviews about the use and impact of mobile devices. District selection was based on the following two factors: length of deployment (recently deployed or previously deployed) and population density (urban or rural areas). A list was compiled and CTG and OCFS collectively selected the four districts for group interviews:

- Franklin County – recent deployment and rural
- Saratoga County – recent deployment and urban
- Oswego County – previous deployment and rural
- Suffolk County – previous deployment and urban

The site visits and group interviews were conducted between December 2010 and March 2011. Site visits lasted approximately 1-1.5 days. Each district scheduled groups of 9-15 caseworkers at a time for the group interviews. In addition, supervisors were convened in their own group interview. Each group interview lasted approximately 60-70 minutes.

Participation in all group interviews was voluntary. Participants' responses were recorded by hand-written notes and a digital recorder (to supplement hand-written notes). Site visits were conducted by staff from CTG including Meghan Cook, Anthony Cresswell, Natalie Helbig, Taewoo Nam, and Jana Hrdinova.

Overall, the site visit teams spoke to 137 caseworkers and 32 supervisors. Participants were asked about their general experience with the mobile technology device, how and where they used it, and to what extent the device impacted their work.

Sample questions from the group interviews include:

- Are you assigned your own laptop or do you share a laptop with other people?
- Does your laptop also serve as your desktop computer?
- Where did you use your laptop the most and for what activities?
- Has using the laptop for work changed your job for the better? Worse?
- What made you want to/not want to use the laptop?
- What type of work do you use the laptop to do?
- Where do you primarily use your laptop?
- Do you primarily use it within scheduled work hours or outside scheduled work hours?
- Does having a laptop affect your job-related level of stress?
- Does having a laptop affect your job satisfaction?
- What are the barriers to using the laptop?
- What are the benefits to using a laptop?
- Has the laptop enabled you to use your time more efficiently?
- Has the laptop helped or hindered you in completing case documentation in a timely manner?
- What sorts of problems have you experienced with using the laptop?
- Would you recommend the mobile device to your colleagues?
- What other mobile technology do you use for work? What is it and how do you use it?

APPENDIX C: Supplemental Regression Model Analysis

Two datasets were used for the statistical analysis. Dataset #1 consisted of participant survey responses (*n*=906) and we performed descriptive analyses (mean and frequency) and basic inferential analyses (bivariate correlation and Chi-square test based on cross-tabulation between two variables). Dataset #2 combined participant survey data and caseworker productivity data from CONNECTIONS by selecting only caseworkers who used the laptop in previous deployment phases and who answered the survey (*n*=398). We created basic linear regression models to examine the relationship between productivity and various factors of laptop use. We performed data quality checks and recoded the datasets as needed.

Regression analysis was used to explore the relationship between productivity and organizational-, individual-, and district-level variables. Three dependent variables (average elapsed time of progress note entry, percentage of timely case closings, and percentage of timely safety assessment submissions) were predicted by a set of independent variables: length laptop was in use, the number of total cases each caseworker processed, two district-level environmental variables (continuous connectivity and work conditions), years of experience doing CPS casework, availability of other technologies such as a home computer, smart phone, dictation device, or cell phone, self-reported productivity impacts from using laptop, personal preference for using laptop, and self-reported average number of overtime hours a week. While two district-level environmental variables are derived from qualitative analysis of district questionnaires, the other independent variables come from the survey data.

We used two measures for length of laptop use: [1] district supplied information concerning the number of days elapsed between the date a district deployed laptops to caseworkers and the end of our evaluation time period (2/12/2011) and [2] self-reported information gathered from survey data asking each respondent when they received a district-issued laptop.

A total of six model specifications were analyzed: the combination of one of two laptop use time measures and three dependent variables, while the set of other predictor variables has not changed. The model specifications of the multivariate regression are as follows:

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Dependent variable (or predicted variable)	Average elapsed time of progress note entry		Percentage of timely case closings		Percentage of timely safety assessment submissions	
Independent variables (or predictors)						
Length of laptop use [1]	O		O		O	
Length of laptop use [2]		O		O		O
Total case counts	O	O	O	O	O	O
District-level environmental variables	O	O	O	O	O	O
Years of experience	O	O	O	O	O	O

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Dependent variable (or predicted variable)	Average elapsed time of progress note entry		Percentage of timely case closings		Percentage of timely safety assessment submissions	
Availability of other technologies	O	O	O	O	O	O
Self-reported productivity impacts	O	O	O	O	O	O
Personal preference for using laptop	O	O	O	O	O	O
Self-reported overtime hours	O	O	O	O	O	O

APPENDIX D: Analysis Framework

Two datasets were used for the statistical analysis. Dataset #1 consisted of participant survey responses (n = 906) and we performed descriptive analyses (mean and frequency) and basic inferential analyses (bivariate correlation and Chi-square test-based on cross-tabulation between two variables). Dataset #2 combined participant survey data and caseworker productivity data from CONNECTIONS by selecting only caseworkers who used the laptop in previous deployment phases and who answered the survey (n = 398). We created basic linear regression models to examine the relationship between productivity and various factors of laptop use. We performed data quality checks and recoded the datasets as needed.

Regression analysis was used to explore the relationship between productivity and organizational-, individual-, and district-level variables. Three dependent variables (average elapsed time of progress note entry, percentage of timely case closings, and percentage of timely safety assessment submissions) were predicted by a set of independent variables: length laptop was in use, the number of total cases each caseworker processed, two district-level environmental variables (continuous connectivity and work conditions), years of experience doing CPS casework, availability of other technologies such as a home computer, smart phone, dictation device, or cell phone, self-reported productivity impacts from using laptop, personal preference for using laptop, and self-reported average number of overtime hours a week. While two district-level environmental variables are derived from qualitative analysis of district questionnaires, the other independent variables come from the survey data. We used two measures for length of laptop use: [1] district supplied information concerning the number of days elapsed between the date a district deployed laptops to caseworkers and the end of our evaluation time period (2/12/2011) and [2] self-reported information gathered from survey data asking each respondent when they received a district-issued laptop.

A total of six model specifications were analyzed: the combination of one of two laptop use time measures and three dependent variables while the set of other predictor variables has not changed. The model specifications of the multivariate regression are as follows:

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Dependent variable (or predicted variable)	Average elapsed time of progress note entry		Percentage of timely case closings		Percentage of timely safety assessment submissions	
Independent variables (or predictors)						
Length of laptop use [1]	O		O		O	
Length of laptop use [2]		O		O		O
Total case counts	O	O	O	O	O	O
District-level environmental variables	O	O	O	O	O	O
Years of experience	O	O	O	O	O	O
Availability of other technologies	O	O	O	O	O	O

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Dependent variable (or predicted variable)	Average elapsed time of progress note entry		Percentage of timely case closings		Percentage of timely safety assessment submissions	
Independent variables (or predictors)						
Self-reported productivity impacts	O	O	O	O	O	O
Personal preference for using laptop	O	O	O	O	O	O
Self-reported overtime hours	O	O	O	O	O	O

APPENDIX E: About the Center for Technology in Government (CTG)

The Center for Technology in Government (CTG) is an applied research center committed to improving government and public services through policy, management, and technology innovation. Through its program of partnership, research, and innovation, the Center provides government organizations and individuals with an array of tools and resources designed to support the development of a digital government. The goal of every CTG partnership project is to build knowledge that improves the way government works. CTG projects have helped state, local, and federal agencies increase productivity and coordination, reduce costs, enhance quality, and deliver better services to citizens and businesses. The results generated by each project add to a growing knowledge base designed to support the work of both government professionals and academic researchers.

Since its creation in 1993, CTG has:

- conducted almost 50 partnership projects, which produced outcomes that have helped state, local, and federal government agencies improve services and operations;
- collaborated with nearly 100 government agencies, 42 private companies, and 14 academic institutions and research organizations;
- issued over 100 guides, reports, and online resources designed to support the work of government professionals, and over 300 scholarly articles that have contributed to the field of research on IT innovation in government organizations;
- developed and evaluated 12 prototype systems that answered critical policy, management, organizational, and technology questions;
- obtained 37 research grants and fee-for-service contracts for over $10 million;
- been honored with 16 state and national awards such as the Ford Foundation's *Innovations in American Government* award;
- given over 250 trainings, workshops, and conference presentations; and
- provided data and support to more than 20 doctoral dissertations and masters projects.

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