

Portable Information Technology Pilot Program

Report to the Governor and Legislature

December 2006



Submitted by: NYS Office of Children and Family Services
Pursuant to: Chapter 58 of the Laws of 2006

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Pilot Program**

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Submitted by: The NYS Office of Children and Family Services
Larry Brown, Executive Deputy Commissioner

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Portable Information Technology Pilot Program Report to the Governor and the Legislature

EXECUTIVE SUMMARY

This report is submitted pursuant to the mandate in Chapter 58 of the Laws of 2006. Through that provision, the State Legislature directed the Commissioner of the Office of Children and Family Services (OCFS) to pilot portable information technology for Child Protective Services (CPS) caseworkers in three designated Local Social Service Departments, to report the results of the pilot, and recommend a future course of action.

The three local districts—the New York City Administration for Children’s Services (ACS), the Westchester County Department of Social Services and the Monroe County Department of Human Services—piloted distinct technologies. ACS tested laptop PCs, tablet PCs and a Personal Digital Assistant (Blackberry). Westchester County tested a telephonic dictation/transcription service (Santrax). Monroe County tested voice recognition software (Dragon Naturally Speaking) and digital pens. Additional technologies were acquired under this program, however, it was not possible to include their use in the evaluation. OCFS continues to work with the three participating local districts to optimize the use of portable technology.

The Center for Technology in Government (CTG), University at Albany/SUNY, conducted an independent evaluation of the piloted technologies. The evidence obtained from the evaluation suggests that portable technology, notably laptop PCs used in combination with wireless access, assists CPS caseworkers to more effectively perform investigation tasks and contribute to increased productivity. Additional testing is needed to validate these results. A summary of CTG’s findings is contained in Section III of this report. The complete evaluation report, *Assessing Mobile Technologies in Child Protective Services*, is enclosed as Appendix B.

On the basis of initial positive evaluation findings, guidance received from the Program’s Steering Committee, as well as numerous expressions of interest from child welfare executives throughout New York, OCFS recommends the continuation and expansion of the portable information technology pilot program. Testing portable technology in additional organizational and geographic environments will provide OCFS with a greater opportunity to determine the best investments to pursue in future years.

Under the current program with remaining funds, ACS and OCFS will collaborate on the deployment of 200 additional laptop PCs to the ACS Division of Child Protection staff. CTG will evaluate this expansion of the pilot. OCFS will also continue to assist Westchester and Monroe counties to refine best practices in the use of the technologies deployed in those Districts. OCFS will also work with the state Office of General Services to incorporate ultra-light laptops into the aggregate buy procurement program. In addition, OCFS will review and update its policies and procedures that relate to Personal, Private and Sensitive Information to using the interim model policy provided

by the state Office of Cyber Security and Critical Infrastructure Coordination (CSCIC) for guidance until first quarter 2007 when the updated statewide cyber security policy will be issued. Finally, OCFS will work with the state Office of Court Administration (OCA) and Office for Technology (OFT) to discuss expansion of wireless connectivity in court facilities.

Subject to funding availability, OCFS plans for SFY 2007-08 consist of the following program elements:

- Solicit proposals from additional local districts and provide technical assistance to assist them develop, procure, test and implement portable technology programs;
- Evaluate these initiatives;
- Develop model protocols for training and user support;
- Develop a data synchronization solution to address data transfer where wireless connectivity is not practical; and
- Conduct continued analysis of cyber security.

BACKGROUND

Legislative Requirement

Chapter 58 of the Laws of 2006 contains the requirement that OCFS “conduct a pilot program in New York City, Westchester County and Monroe County to test best practices in portable information technology for child protective services caseworkers . . . [to] allow such caseworkers to complete effectively tasks necessary for their investigations of allegations of child abuse and maltreatment from field locations.” The State Legislature further required that the OCFS Commissioner submit a report no later than January 15, 2007 that “details the impact of such pilot program on caseworker efficiency and productivity, and on caseload impact for caseworkers with such technology” and include the OCFS Commissioner’s recommendations in regard to whether the pilot program should continue as it exists, expand or be discontinued as well as address the issue of cyber security. The State Legislature appropriated an amount not to exceed \$1 million in the 2006-07 State Budget to conduct the pilot program. This report fulfills the requirement contained in Chapter 58 of the Laws of 2006.

Program Organization and Governance

The OCFS Division of Information Technology (OCFS-IT) was assigned to implement the Portable Information Technology program. OCFS-IT implemented the program in accordance with established system development life cycle (SDLC) and project management procedures, including:

- Designation of a Program Manager;
- Development of a Project Charter in the form of a business case;
- Development of a detailed Project Plan;
- Establishment of a Program Steering Committee; and
- Definition of business needs by users.

The Program Steering Committee includes representatives from the OCFS administration, program, policy, and information technology divisions; the three participating local districts; and the independent program evaluator. The Committee held its first meeting on April 17, 2006, and has met approximately bimonthly since. Committee members have played an invaluable role in guiding program strategy.

User Group Priorities

OCFS-IT invited CPS administrators and line staff from the three participating local districts to a one-day joint application development (JAD) session in Albany on April 27, 2006. The users defined the CPS investigation processes and critical business needs that portable technologies should support. The session was also attended by OCFS policy and program staff and the OCFS Information Security Officer. A summary of the JAD session is contained in Appendix A.

Users advised OCFS that portable technology should address the following business needs:

The most critical work activities to support are:

- Communication between CPS worker and supervisor
- Entry of progress notes and safety assessments
- Searches of the database for person/case history

The technology should:

- Be simple to learn
- Involve minimal steps to transfer data into the central database
- Be unobtrusive, light and durable, and have a long battery life

Workers need:

- Workspace in remote sites (e.g., court)
- Work policies that reflect a mobile work force
- Initial training and ongoing technical support

Users also stressed that spikes in workload, programmatic requirements, work processes, and workplace policies were important factors in determining worker productivity and the quality of the work performed.

Independent Program Evaluator

CTG conducted an independent evaluation of the piloted technologies. OCFS sought an independent evaluator that could immediately mobilize appropriate resources, possessed expertise in both portable technologies and formal evaluation methodology, and had experience working on public sector projects. CTG fulfilled these requirements. CTG began evaluation activities in mid-June 2006. A summary of CTG's findings is contained in Section III. The complete evaluation report, *Assessing Mobile Technologies in Child Protective Services*, is enclosed as Appendix B.

Previous Portable Technology Efforts

The current portable technology pilot builds on previous OCFS efforts to provide CPS workers with technological tools to perform their work. CONNECTIONS provides CPS caseworkers with decision support tools and a robust framework in which to document their casework activities and manage their workload. The system's single electronic case record puts family history at a caseworker's fingertips and promotes the coordination of efforts among different caseworkers that serve a family.

CPS workers have documented the results of their investigations in CONNECTIONS since 1997. The system was enhanced to provide automated decision support tools such as the Safety Assessment and the Risk Assessment Profile in late 2003 and further expanded to support documentation of ongoing case management services including foster care and preventive services in 2005. Planned future development includes a repository for health and education information, automated support for the completion of required Permanency Hearing Reports, and the addition of financial management

components. OCFS is also planning a significant system redesign that will employ Web-based technology to simplify and streamline the user interface with the system.

OCFS recognized the need for CPS staff to perform essential investigation tasks from locations outside of their offices since initial system implementation. OCFS distributed 2,040 laptops as part of the deployment of CONNECTIONS computer equipment in 1996. These devices were refreshed in 2005. OCFS distributed portable word processors to all CPS staff in 2003 to support the remote entry of progress notes and other narratives. Additionally, in 2005, OCFS distributed 2,500 voice recognition software licenses primarily to local districts. This software supported remote data entry when used in conjunction with digital recorders.

Since 2005, OCFS has supported direct access to CONNECTIONS from devices that were not physically connected to the network through the use of a secure, high-speed Internet connection. This capability was particularly important to after-hours (on-call) CPS caseworkers who needed access to the system from home to perform required investigation tasks. Prior to 2005, these staff relied on much slower “dial-up” procedures. At present, nearly 6,000 daytime workers access CONNECTIONS using secure, high-speed connections from schools, community centers and many other locations in the field.

To further encourage the use of OCFS-supported technologies, OCFS, is collaborating with the Office of Court Administration and Office for Technology to install wireless access to the state network in court facilities. OCFS has also begun to explore synchronization solutions to streamline the current multi-step data transfer process that has affected the use of portable word processors and voice recognition software.

PROGRAM OPERATIONS

Implementation Approach and Program Scope

During the early stages of its planning, OCFS-IT developed an implementation strategy that provided for the centralized procurement and deployment of a specific set of technologies, selected based on an understanding of business needs. This approach changed when OCFS-IT learned that ACS and Westchester County had already begun their own portable technology initiatives. ACS planned to conduct a proof of concept for the use of ultra-light laptop and tablet PCs. Westchester County began the steps to procure a private vendor to pilot a telephonic dictation/transcription system for CPS staff. The two local districts and OCFS-IT concluded that to overlay a separate, OCFS-sponsored pilot program onto these pre-existing initiatives would potentially create confusion, overtax technical and administrative staff, and inefficiently use available resources. Since these two portable technology initiatives clearly fit within the parameters of the legislation, OCFS decided to leverage the work already underway and secured agreement to support, coordinate and evaluate them using the pilot program resources. OCFS then worked with Monroe County administrators to define the technologies that would be piloted by CPS caseworkers in that local district.

In summary, the technologies selected to be piloted in the three designated local districts consisted of the following:

New York City Administration for Children's Services

- Ultra-light laptop PCs
- Ultra-light tablet PCs
- Personal Digital Assistant
- The above referenced testing of broadband wireless connectivity

Westchester County Department of Social Services

- Telephonic dictation/transcription service in conjunction with cellular telephones
- Ultra-light laptop PCs

Monroe County Department of Human Services

- Ultra-light laptop PCs
- Ultra-light tablet PCs
- The above referenced testing of satellite connectivity and wireless LAN access in the Hall of Justice
- Enhanced voice recognition software, including digital recorders
- Digital Pens

The pilot of wireless access to CONNECTIONS represents a significant advance. To that point, information security policy prohibited wireless access to the state computer network on the basis of concerns for data privacy, network integrity, and device performance. ACS and OCFS, in coordination with OFT, developed a technical solution for implementation on a pilot basis that addressed these concerns.

The pilot local districts also requested that OCFS simplify the process for transferring data into CONNECTIONS from the telephonic dictation/transcription service (Westchester County) as well as from voice recognition software and digital pen (Monroe County). This could not, however, be accomplished within the pilot program timeframe, as OCFS design and programmer resources were fully engaged in developing critical, user requested system enhancements to the CONNECTIONS application. In addition, OCFS-IT and OFT were in the process of implementing a plan to address system performance issues and did not wish to introduce any variable that could potentially affect the application or network stability. OCFS will seek to address this need in 2007, subject to resources availability.

Procurement and Deployment

OCFS-IT recognized from the inception of this program that the procurement and deployment of portable technologies within the tight timeframes demanded by the project schedule presented a challenge. The numerous steps involved in researching and selecting the technologies in conformance with procurement requirements posed significant risk to rapid acquisition and deployment. Because ACS and Westchester

County had begun this process before the inception of the pilot program, the laptop/tablet PCs and PDA technologies (ACS) and the telephonic dictation/transcription system (Westchester County) were deployed early enough to receive robust testing in the field. This, however, was not the case for the deployment of the laptop PCs in Westchester and the laptop/tablet PCs in Monroe County. In consequence, the opportunity to fully test these technologies in these locations was limited.

Nonetheless, the technologies that were tested in the three designated local districts represented distinct alternatives, providing a basis to make useful and informative comparisons. OCFS continues to work with Westchester and Monroe counties to optimize the use of the technologies deployed in these Districts.

SUMMARY OF EVALUATION FINDINGS

The results of the evaluation of the tests conducted in ACS, Westchester County and Monroe County *suggest* that portable technology, notably laptop PCs used in combination with wireless access, assists CPS caseworkers to more effectively document and communicate various components of the investigation tasks and contribute to increased productivity. As CTG details in the evaluation report, factors apart from the tested technologies may account for the positive results received. There is, however, sufficient statistical and anecdotal evidence to warrant additional testing and evaluation on a larger scale.

CTG found evidence that the pilot workers increased the production of work outputs such as progress notes and submitted work on a timelier basis including progress notes and CPS investigation reports during the pilot period. Factors such as increased use of overtime in ACS throughout the field test period may partially or fully explain these results, however, the results of the surveys and interviews conducted with the staff that used these technologies, as reported by CTG, indicates that their use at the least contributed to the achievement of these improvements.

The test results also support the view that laptop PCs, used in conjunction with wireless connectivity, present the greatest potential for improving CPS work than all of the other technologies reviewed. This technology enables one-step entry of data directly into CONNECTIONS and, in addition, supports all of the functions that a worker is able to perform from their desktop PCs, including the ability to extract data from the database as well as access email, perform work on other systems and use the tools on the Internet. CTG found that workers most often use these devices if they are light, compact (concealable) and have a long battery life. The availability of dependable wireless access is critical to achieving the maximum benefits to be gained by this technology.

CTG also found that the other piloted technologies assisted CPS caseworkers perform their work, though not to the extent of the laptops. The telephonic dictation service enabled caseworkers to produce progress note narratives from the field while the information was fresh in their minds. Digital pens were used during family interviews or other meetings. Several caseworkers found these technologies easy to use and helpful

in staying on top of their work. The efficiencies gained by some workers, however, were partially offset by the process of transferring the data captured from the device into the database. It remains unclear, however, if an automated solution can be developed to simplify this process. Moreover, several workers found the time needed to train the devices to their voice pattern (voice recognition), (re)learn dictation skills, or adjust their handwriting style (digital pens) too difficult to invest in light of the other demands on their time. Importantly, CTG stressed that these technologies only support the data input capability in contrast to laptops that can be used to both input data and retrieve it from the system.

Based on its review of portable technology development at the national level, CTG found that New York is one of a handful of states that are piloting or using portable technology for CPS workers. Laptop or tablet PCs were the primary or exclusive portable tools used in these states. The experience in these states was not universally positive. According to CTG's research, the successful efforts shared one or more of the following characteristics:

- Workers played a key role in evaluating the devices and establishing the work practices for their use;
- The devices minimized double data entry; data was entered directly into the system through a persistent wireless connection or through a synchronization process;
- The state invested in the infrastructure needed to support the portable devices;
- The deployment had broad-based organizational support, including the provision of user training and ongoing technical support; and
- The technology was extensively piloted over an extended period.

In summary, the key CTG findings that have guided OCFS planning for the continued development of portable technology solutions are:

- Laptops, using wireless access and perhaps combined with other dictation technologies have the greatest potential to positively affect CPS worker productivity. Alternatives to address situations where a persistent wireless connection is not practical should entail a minimum number of steps to transfer data to the database;
- No one technology will enhance the work of all CPS workers. Other tools and strategies may be needed;
- The successful use of a mobile technology is dependent on worker satisfaction, business processes and workplace policies that adjust for a mobile workforce, the provision of training and user support, and time to enable staff to master the technology; and
- The need to update information security procedures and technical safeguards.

CYBER SECURITY

As noted in the background section of this report, all transmission of data to the network, either through wired or wireless mechanisms, is secured. Wireless transmissions are conducted through secure socket layer–virtual private network (SSL-VPN) technology. The technical and procedural steps involved with SSL-VPN connectivity adheres to applicable industry standards for security, privacy, and network integrity. During the pilot in New York City, OCFS and ACS administrators added an additional layer of security to protect the state network. This procedure had the added benefit of providing users access to ACS-administered applications, however, it requires users to log on multiple times, which they felt was cumbersome. ACS and OCFS are reviewing the need for this procedure.

During the first quarter of 2007, the NYS Office of Cyber Security and Critical Infrastructure Coordination (CSCIC) will be issuing statewide requirements that pertain to encryption, storage, transportation, and transmission of Personal, Private and Sensitive Information. In the interim, CSCIC has provided OCFS with a model policy. OCFS will revise its policies and procedures that pertain to encryption and the storage of data on portable devices and on such storage media as flash drives and computer discs. OCFS also anticipates the deployment of encryption software on the 1,404 laptops that OCFS has deployed in the field. From a network integrity perspective, OCFS is working with OFT to implement procedures pertaining to the frequency with which OCFS laptops will be directly joined to the network to receive patches and virus protection updates.

RECOMMENDATIONS AND FOLLOW UP ACTIVITIES

On the basis of the positive evaluation findings, the guidance received from the Program’s Steering Committee as well as numerous expressions of interest from child welfare executives throughout New York, OCFS recommends the continuation and expansion of the portable information technology pilot program. Testing portable technology in more varied organizational and geographic environments will provide OCFS with greater opportunity to determine the best investments to pursue in future years. OCFS will continue to monitor the development of new technologies that may present opportunities to support caseworker activities in the future.

Under the current program with remaining funds, ACS and OCFS will collaborate on the deployment of 200 laptop PCs to Division of Child Protection staff in New York City. CTG will evaluate this expansion of the pilot. OCFS will also continue to assist Westchester and Monroe counties to refine best practices in the use of the technologies deployed in those Districts. OCFS will also work with the state Office of General Services to incorporate ultra-light laptops into the aggregate buy procurement program. In addition, OCFS will review and update its policies and procedures that relate to Personal, Private and Sensitive Information to using the interim model policy provided by the CSCIC for guidance until first quarter 2007 when the updated statewide cyber

security policy will be issued. Finally, OCFS will continue to work with OCA and OFT to discuss expansion of wireless connectivity in court facilities.

Subject to funding availability, OCFS plans for SFY 2007-08 consist of the following program elements:

- Solicit proposals from additional Local districts and provide technical assistance to assist them develop, procure, test and implement portable technology programs;
- Evaluate these initiatives;
- Develop model protocols for training and user support;
- Develop a data synchronization solution to address data transfer where wireless connectivity is not practical; and
- Conduct continued analysis of cyber security.

APPENDIX A

Joint Application Development Workshop:
Summary of Observations – May 18, 2006

APPENDIX A

NYS OFFICE OF CHILDREN AND FAMILY SERVICES

DIVISION OF INFORMATION TECHNOLOGY

CONNECTIONS

Portable Information Technology Project Workshop - April 27, 2006

Attending: Robin Kanter, Virginia Meehan, Elvis Mendez (Westchester DSS); Tom Corbett, Doug Willis, (Monroe DSS); Donald Antonetty, Steve Feger, Ken Ehrlich, Reinaldo Gibbs, Isiaka Oyesile, Lisa Clark (NYC ACS); Donna Canestra (SUNY CTG); Joe Rella (OFT); Betty Pierre (OCFS-DDPS); Catherine Grose (OCFS-SPPD); Tom Donovan, Brian Kelley, Jo Shrader, Pamela Knowles, Frank Minunni, Ted Salem (OCFS-IT).

Final (5-18-06)

Summary of Observations Made by Participants

1. Supervisor to Caseworker Communication
 - Supervisors contact Caseworkers when the worker is in the field to assign a new investigation, provide information from the report, provide any available background information and relay instructions on how the investigation is to proceed
 - The supervisory instructions should be recorded; it is preferable that the supervisor write them into record and transmit the instructions to field-based worker
2. Caseworker to Supervisor Communication (while worker still in the field)
 - Debrief supervisor on results of contacts, interviews, observations
 - Receive additional instructions or assistance
 - Obtain approvals for planned case actions
3. Caseworker Communication with Information Sources and Case Participants
 - The preference is for the worker in the field to make these initial contacts rather than office-based staff (supervisors) making them
 - Workers should have as much background information as possible
4. Timely Data Capture
 - Information obtained from contacts should be recorded as contemporaneously to the event as is possible while information is fresh and to heighten the recordings value as evidence
 - Safety Assessments need to be completed within a few days of start of investigation

- Workers document injuries, living conditions in photographs:
 - These are stored off line
 - There may be value in being able to immediately review these images with supervisors in other locations
 - There is a need to clarify and understand any issues and ramifications regarding taking photographs, including those of people (injuries), the insides of residences, etc. and the transmission of these images, such as when using a camera-phone to take and send the images
5. Keep it Simple
- There is high staff turnover; there is not the luxury of time for staff to master complex technology
 - New staff have an incredible amount of program and technical information to master in a short time and we should not add to this burden or negatively affect retention
6. High Caseloads
- There is a steady flow of new investigations (with intensive activity at the start of each investigation) in addition to the ongoing work on the investigations that are still active
 - Workers struggle to balance the demands of the casework (contacts, interviews, observations) with the “paperwork” requirements such as progress notes, Safety/Risk Assessments, Local forms and the FASP. There is significant pressure on staff to complete assigned tasks within tight timeframes
 - The above is exacerbated by a significant amount of “dead time” spent waiting in court, hospitals, etc. – most significant: appears to be the biggest burden
 - Workers sometimes are only able to be in the office one to two days per week
7. Significant Technical Support Required for Portable Technology Support (see #5 – Keep it Simple, above)
- Workers easily become exasperated when they can not receive rapid response to questions or resolutions to technical problems – they have too many other pressures on their time
 - Workers are not technicians and the level of technical prowess varies widely between newer staff who have grown up using new technology and seasoned staff who are not always as adept
 - Consider field support hotline/helpdesk. Dispatch support could help

8. Multiple Solutions Required Based on Dependencies
 - Geographic and physical conditions that effect connectivity and communication (e.g., dead zones in subways or rural areas)
 - The technical infrastructure and expertise of different governmental jurisdictions
 - Preferences of administrators and staff in different jurisdictions
 - Business practices, including whether public transportation is a primary mode of transport
 - Safety concerns
 - Technical skill level of staff
9. Likely Candidates for Technological Support
 - Progress Notes
 - Safety Assessments
 - Persons, Demographics
 - Long term – interaction with the application, receive new reports online
10. Other Needs for Portable Technical Support
 - Directions
 - Location
 - Resources
 - Local System or Local forms
11. Remote Information Needs
 - Current report (composition, allegations, etc)
 - Case history (access to prior reports)
 - Criminal history and/or registries before the initial face-to-face contact with the subject
12. Any devices deployed to workers in the field should be:
 - Reliable, durable,
 - Light weight
 - Unobtrusive (so as not to make the worker a target)
 - Have sufficient power (battery life) to support extended hours in the field
13. Workspace in Remote Sites
 - Courts
 - Hospitals
 - Child Advocacy Centers

- These spaces need to be secure and private
14. Potential Labor Relations Issues
- Staff may be concerned about increased accountability, including the use of portable devices to track their movements and personal use of equipment
 - Concern about increased responsibilities, including expectations that work be done during non-business hours or at home
 - The potential for staff to expect greater compensation commensurate with perceived increase in responsibilities
15. Lessons learned from Previous Technology Solutions
- Quick Pad – met a need but workers experienced difficulty with battery life and uploading
 - Dragon Naturally Speaking – results differ between very successful in Clinton County to not at all successful in NYC, Monroe and Westchester
 - Westchester County workers use tape recorders and have them transcribed and is piloting a telephony transcription system

Respectfully submitted,

Ted Salem

CONNECTIONS Implementation Management

APPENDIX B

Assessing Mobile Technologies in Child Protective Services, Center for Technology in Government, University at Albany/SUNY – November 2006



Center for
Technology in Government

Assessing Mobile Technologies in Child Protective Services



Assessing Mobile Technologies in Child Protective Services

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November 2006

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Executive Summary

This assessment report was prepared by the Center for Technology in Government (CTG) (see Appendix A) under a contract with the NYS Office of Children and Family Services (OCFS). The purpose of the work was to assess the performance of mobile technology deployed in a pilot test program with child protective service (CPS) workers. The mobile technologies were deployed to a sample of CPS workers for use in their field work and reporting responsibilities. The pilot was conducted in three Local Departments of Social Services (Local Districts): the New York City Administration for Children's Services (NYC/ACS), Westchester County Department of Social Services, Family and Children's Services, and Monroe County Department of Human Services, Child and Family Services Division. OCFS engaged the Center for Technology in Government to conduct this assessment and provide a report to the Commissioner of OCFS to assist in decision making and planning for possible further deployment of these technologies.

This assessment covers technologies deployed in initiatives developed by these three Local Districts. Although they come under the oversight of the OCFS, these Local Districts were responsible for administering their programs according to local conditions and policies. As a result, each Local District developed their own mobile technology strategy and determined the length of their respective testing periods. The NYC/ACS pilot ran May-August, 2006, the Monroe County pilot began in September and is scheduled to run through December of this year, and the Westchester County pilot ran July-September, 2006. The assessment therefore examined each initiative in part as a separate activity and also collected additional data about overall work flow. Despite the difference across the three initiatives, the results provide useful insights into technology use and evidence of positive impacts on performance.

The assessment included a review of research on current practices throughout the United States (see Appendix B), which showed that New York is one of only a few states leading in the testing and deployment of mobile technologies for CPS workers. New York State's approach is unusual in testing several different mobile technologies. Because this is a new area of technology deployment and use, there is much uncertainty about effective mobile technology strategies. Thus a pilot strategy like the one reported here can be a useful way to test several technology alternatives and gather lessons to better inform decision makers about further deployments. These lessons are needed because technology innovations of this kind face can face significant organizational and technical challenges.

The assessment results come in part from surveys of CPS professionals who used the mobile technologies. They also participated in a series of assessment workshops and interviews across the three Local Districts. The results reveal much about the way participants used the technologies and how the devices performed. In addition, data from the central database was analyzed and provided some evidence of technology impacts on work flow. Within the constraints of the pilot conditions, the results do provide evidence of the value of mobile technologies for CPS field work as well as important lessons and guidance for further technology deployment and testing.

Overall results are linked to the particular technologies used in the three Local Districts:

- **Laptop computers with wireless network capabilities** (NYC/ACS District) - The overall results for laptops are positive in terms of user ratings and increased work output. Positive laptop ratings were based on: (1) value for reporting and documenting required only small adjustments in normal work practices, (2) mobile connectivity to the central database expanded opportunities to complete reporting requirements, and (3) access to the central database and other online resources made

workers more productive. Reporting volume to the central database increased substantially during the pilot period compared to the previous month, as did the rate of closing older cases. Deployment and use issues included the desire for more reliable connectivity and easier logon arrangements, which would increase the value of laptop use as well, and review of caseload and work policies related to the new capability to work outside the office and over extended hours.

- **Voice recognition software and digital pens** (Monroe County) - The initial experience with both voice recognition and digital pens include positive results and challenges. Over the short time for learning to work with these tools, some workers were able to increase their reporting efficiency. Others found dictation difficult due to lack of experience and that the transfer of text from the digital pen and the recognition software to the database involves too many steps to improve efficiency. This leaves much uncertainty about the potential value of these technologies to efficiently substitute speaking and writing for typing reports directly into the central database.
- **Telephone dictation and translation services accessible from cell phones** (Westchester County) – The dictation technology did show overall positive impacts in terms of volume of reporting increases and worker acceptance. The volume of progress notes entered per month during the pilot increased by over 90% compared to the prior month. User ratings of the dictation service for effectiveness and general use were high as well, although low dictation skills did remain an issue with some workers. One of the positive results was high worker ratings for the value of cell phones, both for the dictation service and for other communication needs in field work. Some of the challenges included: Connectivity and reliability issues early in the pilot, which were largely resolved by its end, and the system does not allow dictating directly into the central database, requiring users to cut and paste text from the transcription service.

The evidence of mobile technology’s effectiveness boils down to three key observations:

- The effectiveness of any mobile technology strategy appears to depend on a combination of worker preferences, work practice demands, the capabilities of the various devices and systems deployed, and organizational support. More than one technology may have value for CPS workers. Some provision for individual worker preferences should be a part of future strategies. And much more attention is needed to training, technical support, and adaptation of work policies to support the mobile CPS worker.
- The testers most often rated the technologies as effective, in spite of challenges in the early deployment and use, and with few exceptions recommended continued deployment. The testers also reported sophisticated and nuanced assessments of the strengths and weaknesses of the various devices. One clear lesson is that the users’ experiences and judgments must be an important part of any future tests and decisions about wider deployment.
- The two mobile strategies that had the longest tests—the telephone dictation system and connected laptops—showed evidence of improved timeliness and overall greater work productivity. These conclusions deal with the recording of progress notes, but not the outcomes of the related cases. Further data collection and analysis regarding case outcomes is needed before firm conclusions can be made about technology effectiveness.

The promise of mobile technology to improve child protective services seems clear. But rapid progress toward achieving that promise will require strategies that include significant attention to training and change management, and ongoing evaluation. The success of any new technology depends on human

and organizational conditions at least as much as the devices and systems themselves. The ability to work with the laptops outside the office at any time raised concerns about impacts on caseload and work policies that require further attention.

Based on the full range of assessment results and the current practices research, the report includes recommendations for further technology deployment and evaluation. The following statements present the highlights of the recommended next steps, more detail is available in the report.

More focused technology assessment: The most significant potential for improving CPS work was using laptops in the field. Continue to evaluate laptop use and connectivity enhancements.

Test additional combinations of dictation and laptops: Additional improvement in CPS work may be available by using a dictation device coupled with the laptop's functionality

Take a broader look at caseload management: The introduction of mobile devices provides a partial mechanism to address productivity and quality issues. Attending to improved caseload management from a technological perspective only may limit the potential for success.

Focus on change management and overall support: An understanding of the implications of change in any process for users, support staff, and executives is essential for any large-scale deployment.

Provide training, training, and more training: Investments are needed in training for all mobile devices deployed in every district.

Develop additional measures for improvement: These assessments should include expanded indicators of improvements in CPS work outcomes.

Address policy issues related to a more mobile workforce: Policies that govern work schedules and compensation need to be re-examined so that they reinforce rather than work against the goals associated with the use of new mobile tools.

Align wireless security provisions with the guidance of oversight agencies: All security policies should be developed in accordance with the NYS Office for Technology and NYS Office of Cyber Security and Critical Infrastructure forthcoming wireless security policies.

Introduction and Methods

The Pilot Program

This assessment report was prepared by the Center for Technology in Government (CTG) (see Appendix A) under a contract with the NYS Office of Children and Family Services (OCFS). The purpose of the work was to assess the performance of mobile technology deployed in a pilot test program with child protective service (CPS) workers. The mobile technologies were deployed to a sample of CPS workers for use in their field work and reporting responsibilities. The pilot was conducted in three Local Departments of Social Services (Local Districts): the 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. OCFS engaged CTG to conduct this assessment and provide a report to the Commissioner of OCFS to assist in decision making and planning for possible further deployment of these technologies.

This entire pilot initiative was a collaborative effort among OCFS, the Local Districts, and CTG, an applied research center at the University at Albany. OCFS coordinated the procurement and management of the Local District's initiatives, but each district designed how technology was tested in its own pilot. CTG led the independent assessment of the mobile technologies within the Local Districts.

All three Local Districts tested different technologies and managed their own timeline:

- Starting in mid-May 2006 and ending in August, NYC/ACS tested six technologies including models of notebooks, tablets, and a Blackberry.
- Westchester County tested a dictation system accessible by phone (hosted by a third party service provider). Its test began in early July 2006 and ended in late September 2006.
- Monroe County, starting its pilot in mid-September 2006 and ending in late-November 2006, tested digital pens and dictation software for personal computers.

CTG's overall evaluation focused on two core questions:

- How was technology used in the work setting? and
- How did the technology use impact the work itself?

CTG used three main kinds of data to construct answers to these questions: surveys of the users of the technologies, interviews and workshops to gather qualitative descriptions of experiences and challenges, and data on entries to the central CONNECTIONS database. The analysis and conclusions set forth in this report are based on those data resources.

Methods

The timing of CTG's arrival in this initiative led to some challenges in data collection: one Local District initiative had already begun, one was nearing its end, and one did not get started until quite near the end of the assessment period. To accommodate these differences CTG analyzed data previously collected by the districts and extended deadlines to accept as much information as possible. Overall the assessment extended over a four month period starting in July 2006 and ending in late October 2006

We collected data directly from the participants through a baseline survey, followed by periodic and post-pilot surveys (Appendix B and C), information gathering sessions with CPS caseworker and district implementation teams, and a full-day Final Assessment Workshop with district and OCFS staff. In addition, we did research on current practices in seven other states and analyzed data from the central database (Appendix D).

Overall, 18 separate surveys were administered, covering 70 participants. In addition, CTG interviewed 61 people, nine OCFS staff from both program and IT division and 52 district employees. Of the 52 district employees, 29 CPS caseworkers, 10 supervisors, and 13 from the program/IT Implementation Team participated in five information gathering sessions and one Final Assessment Workshop. Finally, data about 9,200 progress note entries and caseload records from the CONNECTIONS database, entered by field testers in the Local District initiatives, was extracted and analyzed.

Overall Assessment Results

This assessment covers three very different Local District initiatives, all with divergent mobile technology strategies and length of pilot testing. This report, therefore includes results that are specific to the individual initiatives plus general results of interest. Our review of the survey and workshop results across the three districts reveals much about the way participants used and evaluated the technology's effectiveness and performance. In addition, we were able to analyze data from the central database that provided evidence of improvements in work flow. These results vary according to the different time periods and pilot test situations. However they do provide some guidance for further technology deployment and testing.

Issues in Interpreting Assessment Results

The performance of any technology, especially the ones used in these pilot projects, is a result of a complex mix of human, organizational, and technical influences. The pilot tests were conducted in real field situations that reflect this complexity, not in laboratory experiments with elaborate and rigorous controls. Therefore, the assessment results, though valid and useful, do not answer many possible questions about the causes and implications of the impacts of the technologies. In addition, the number of test participants was small in some parts of the pilot, so as a result, some of the important work situations and associated challenges may not be represented in the results.

Timing was a particular issue in two of the Local District initiatives. In Monroe County, the participants had access to the various devices for such a short time that it is very difficult to distinguish between results due to improved efficiencies versus the disruptive effects of learning a new work method. Other factors include possible resistance to change by some workers or natural variations in workload. The timing problems were exacerbated by delays in deploying devices in Monroe County and the decision to rotate the various devices among the NYC/ACS participants on two week cycles. In addition, there was limited time for training and deployment support in all three Local District initiatives. The timing in the NYC/ACS test was further complicated because it occurred during a period the workers referred to as a "crisis." During the test period the workers were allowed to use paid overtime and were instructed to devote extra effort to reducing the backlog of open cases. As a consequence, it is not possible to separate the possible effects of the new technologies from the effects of these management actions.

Other issues are related to use of the data from the central CONNECTIONS repository. We extracted data about entries by all test participants for the month prior to and during their pilot test period to

trace possible technology impacts on the timeliness and reporting work flow for progress notes. Our findings on timeliness and work flow impacts (presented below) include analysis of these data, however, the nature of the data supports only very rough conclusions about technology impacts for these tests. The repository records the timing and types of progress notes entered, but not their length or quality. During the pilot test period, the participants were working on a mix of cases, some open for long periods prior to the pilot test, some started and closed during the pilot, and others remaining open at the end of the test period. Therefore, the notes entered during the pilot test period applied to both new and older cases, ranging from as little as a day to over two months old. The number of notes per case varied widely, as did the types of notes entered. Moreover, the data does not include the ultimate disposition of the cases or any rating of the quality of outcomes obtained. Thus the analysis supports only very general conclusions about timeliness and workflow impacts.¹ A more complete evaluation would require a considerably longer test period, some explicit control factors, and more detailed assessment of note quality and case outcomes.

Performance and Work Impacts

The effectiveness of the technologies examined in this assessment depend in large part on their overall capabilities and how well they fit with the users' normal work practices. As the summary in Table 1 shows (below), these technologies differ markedly in how they accomplish two main tasks: (1) converting the users' words into digital text, and (2) entering that text into the central database. Laptop activities are essentially the same as working at an office PC, except for connection and logon procedures. The other technologies involve additional steps to accomplish the analog-to-digital conversion and complete the database entry process. These additional steps add to the complexity of the work and introduce additional points of possible user error or technical malfunction. These use characteristics of the technologies are discussed in more detail below.

Table 1: Comparison of Technology Use Activities

Device	Data Entry Process		
	Analog-to-Digital Text Conversion	Intermediary Steps or Modifications	Placement into CONNECTIONS
Connected Laptop	type and edit at keyboard	none	simultaneous with typing
Digital Pen	write on special-purpose paper and download through software	compile and edit text	cut and paste
Voice Recognition Technology with Digital Recorder	speak with handheld recorder and download through software	edit text	cut and paste
Telephone Dictation Service	speak with cell phone to third party transcription service	retrieve and edit text	cut and paste

The technologies also differ in their capabilities, both as tested and as developed fully. Those differences are shown in Figure 1 (below).

¹ To compare the pre-pilot and pilot test periods it was necessary to assume that the two periods were the same with respect to the kinds of cases involved, the distribution of actions required for the cases, and the overall rates of cases opening and closing.

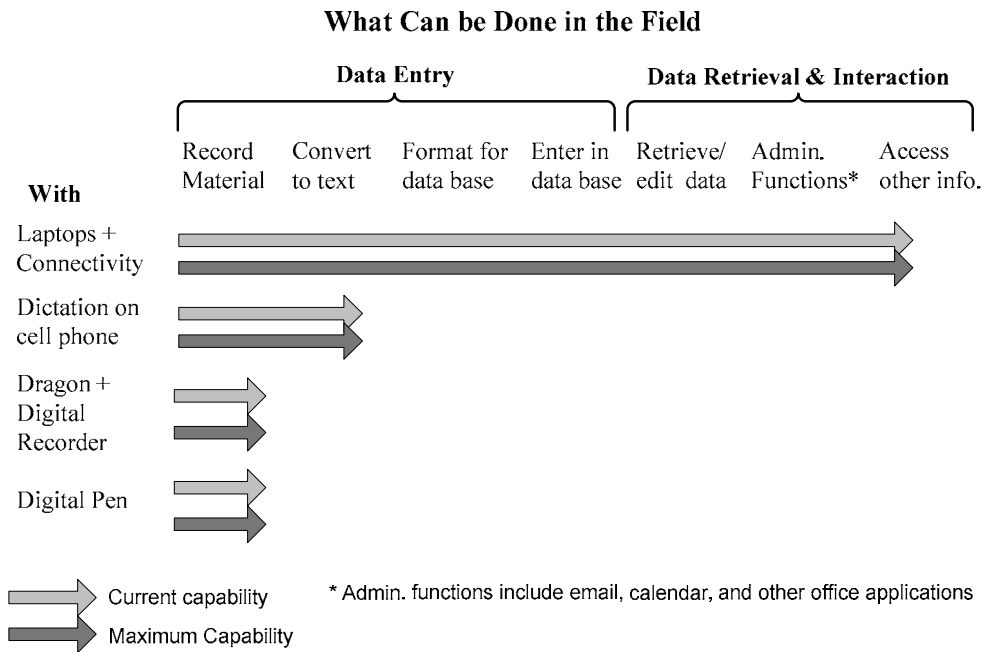


Figure 1 – Comparison of Technology Capabilities

The comparison is based on the use of the dictation and digital pen technologies in the field without a laptop computer. The data entry, retrieval, and interactivity capabilities are the ones described by the participants in the assessment. The figure shows the much higher overall capability of the connected laptop computer. Without a laptop or desk top PC, the other devices are effective only for the recording step of analog-to-digital conversion in the field. More specifically, in using Dragon Naturally Speaking (DNS) with a digital recorder, the only step that can be completed in the field is recording. Any conversion must take place in an office when connected to a PC. This is also true with a digital pen. The only variation that would extend the capability to perform functions in the field would be to use DNS or the digital pen in conjunction with a laptop with a wireless connection, but these capabilities were not tested in these initiatives.

Laptops

The overall results for laptop use, based on the NYC/ACS experience, are positive in terms of user ratings of device performance and support for increased work output. The case workers used the laptops primarily for documenting and reporting, plus for access to information resources both in the central database and on the Web. It was clear from the survey results and workshop comments that the positive ratings of the laptops were based primarily on three factors:

- using the laptop for reporting and documenting required only small adjustments in work practices, since laptop use is very similar to working with a desktop machine
- connectivity to the central database from outside the office provided new or increased opportunities for completing their reporting and documenting requirements
- access to the central database and other online information resources and email made workers more productive.

It was also clear, however, that case workers distinguished among the various locations for use and preferences among the laptop models. They generally did not use the laptops for recording or working in client contact situations, due to concerns that using the device would interfere with rapport or pose a security risk. The workers clearly preferred smaller, lighter laptop models as well, and recognized differences in connectivity among the models. However, the overall ratings for efficiency and

recommendations for future use were quite high and very similar across the four models tested. Only the tablet PC and Blackberry device received no or low ratings - the tablet PC due to the fact that it was not equipped to convert handwriting to digital text (recognizing or handling handwriting is also beyond the current capabilities of CONNECTIONS), and the Blackberry's restriction to email only.

The evidence presented below on timeliness and work product performance of the NYC/ACS technology suggests that there were productivity gains. However, there are too many other factors involved to attribute these gains solely to laptop use. The evidence on timeliness of progress notes entry (Figure 3), volume of notes entered per month (Figure 4), and clearing of case backlogs (Figure 5 and Figure 6) does point to a positive impact of laptop use. However, the case workers reported that because they used the laptops at home, the work time per day was increased and generated overtime pay. They had also been instructed to make an extra effort to clear backlogs during the "crisis" period. So we can say that the laptops supported more productive time during a work day (or week), but not necessarily that the laptops increased efficiency.

Dictation and Digital Pen Technologies

The dictation-based and digital pen technologies tested in Monroe and Westchester counties share sufficient characteristics and use issues to be considered together. Both rely on multi-step processes during which the devices transform the users' analog input (speaking or writing) into text in a digital format. The user then accesses the digital text files for review and cuts and pastes the text into the central database at a desktop PC. These could be called semi-mobile technologies, since they include small transportable devices for mobile analog input, but rely on desktop devices to complete the work process.²

The Monroe County results, involving both the voice recognition system and digital pens, reveal the close relationship among work practices, work situations, and technology use. The roughly one third of participants that used the digital pens found them to be useful for the following:

- note-taking in the field;
- other reporting tasks and occasional input for word processing;
- taking meeting notes that could be easily stored in electronic files, eliminating scattered paper notes;
- possibly completing locally designed forms, to be developed on the specialized paper.

Workers who preferred writing, used the pen in work situations where writing was an established and natural act. They did not, however, generally report pen use as particularly efficient or adaptable for a wide range of tasks

The main efficiency problems with pens appeared to result from the cumbersome process for transferring the text files created by the pen system into the central database, often requiring many intermediate steps. Some pen users also reported inaccuracies with writing recognition and some dissatisfaction with using them for long narrative notes. Pen users also expressed some concern for the cost and availability of the special paper needed for pen use. The users reported good results when the work situation, worker's preference for writing, and the pens unobtrusive nature aligned, however overall ratings of digital pens were not highly positive.

² The digital pens, Dragon Naturally Speaking voice recognition system, and the Santrax dictation service could all, in principle, deliver their digitized text to a laptop in the field, for entry into the central database from any location with connectivity. Dictation could also, in principle, be used to input directly to the central database, however none of these alternatives was tested during this pilot test period.

The telephone dictation system received a mix of high and moderately positive ratings and did contribute to increased work output in the following ways:

- users rated the system moderately efficient and usable;
- most users recommended keeping and expanding deployment of the service;
- several users found the cell phones valuable for other work-related tasks.

The workers also reported problems of poor cell phone connectivity and the complexity of data entry (cut & paste, etc.), which may have tempered the overall ratings. Some workers found dictation difficult and thus slower than typing, which could be mitigated by additional training. Problems with cell phone connectivity were also common, and some workers reported delays in the system processing of their dictation. These difficulties may account for the apparent drop in timeliness for the Westchester pilot seen in Figure 3. However, other measures of timeliness for the three initiatives presented in the following section show different patterns.

Dictation methods presented the same multi-step issues for moving the notes into the central database. Both the transcription service and Dragon voice recognition systems required users to cut and paste the text generated by the system into their reporting database, in one case from the transcription service Website and in the other from the PC running the Dragon application. In principle, the Dragon system could be used to dictate directly into the reporting database. But that would only be possible at a desktop PC with connections to the database, since no laptops with the Dragon system were deployed in the Monroe County test. In this context, the Dragon system by itself is not a mobile technology. The digital recorders intended for mobile recording were not deployed in time to include in this assessment.

The Westchester County pilot test, with slightly over 13 weeks of dictation system use, provided an opportunity to examine how learning to use a new technology might have affected workflow. The other pilot tests did not include data for a sufficient length of time with each new device to show much in the way of learning effects. If there was a learning process affecting progress note production in Westchester, plotting the number of notes entered each week would show a gradual increase, with relatively lower production in the early period, then the volume of notes accelerating as skill and familiarity increase. In Figure 2 (below) we see little evidence of such learning, with an uneven pattern indicating little systematic variation in progress note entry from week to week, though there is some acceleration in the last week. This may be the result of a slow learning process, showing up only in the last week or two. However, it seems more likely from the user's comments that adaptation was very rapid for those that found the system easy, and much slower or nonexistent for those that essentially rejected its use altogether. The combination of these two effects would result in the same pattern.

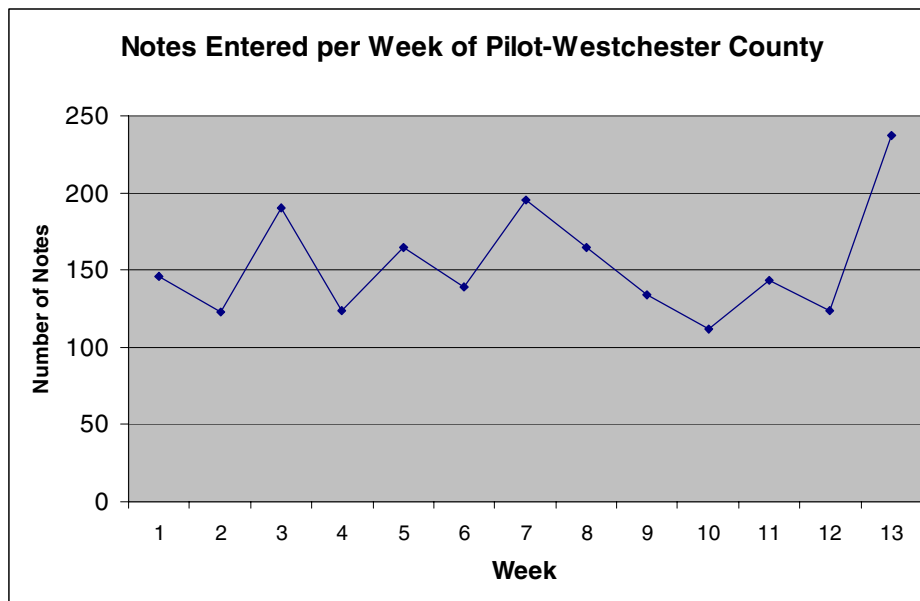


Figure 2 – Number of Notes by Week of Pilot - Westchester County

There is some indication that the types of progress notes entered during the Westchester pilot were different from the pre-pilot period (see Figure 7 below). Our analysis treated all progress notes alike, so the trend in the above Figure may miss important productivity or learning effects.

In addition to use for dictation, some workers employed the cell phones for other work activities. They reported using the phones for setting up client meetings, following up voice mail while in the field, contacting the office for needed information, and even as a date book and appointment calendar. For these workers, an apparently good fit of a mobile technology’s capabilities with a worker’s needs and preferences can be a very effective combination. By contrast, other workers used the same phone for virtually no dictation or other tasks.

The test of the Dragon dictation system in Monroe County provided some data about the system’s effectiveness and use, but none about its mobile potential, since the digital recorders were not deployed in time to include them in this evaluation. We concentrated our evaluation instead on the evidence for efficiency gains, though the time period was too short for firm conclusions. The participants’ ratings of their work on progress notes during the pilot were uniformly lower than for the pre-pilot period. They also rated the Dragon system in the low ranges for improving efficiency and versatility. The timeliness and progress note volume data show virtually no difference between the pre-pilot and pilot period (Figure 5 and Figure 6 below). A longer period of use will be necessary before the effectiveness of the Dragon system can be adequately assessed.

A longer time period will also allow for adjustments to the use problems described by the workers. These included the complexity of the Dragon application itself, the need for additional training, lack of experience and skill with dictation, and the problems of using a dictation system in the office environment. Training and additional experience may mitigate the complexity and dictation skill problems. However, dictation with the Dragon system constrains multi-tasking (typing while on the phone, etc.), which was described as a common work practice. The open office environment also means dictation can be disrupted if the system picks up extraneous noise. The sound of many users dictating simultaneously may also be distracting and disruptive to other work. These problems appear

to be reflected in the participants' low overall satisfaction with the system. They did see value, however, which was reflected in majority of testers who recommended continued use.

Evidence for Overall Work Flow Impacts

The data extracted from the central database provided some insight about three questions related to possible technology impacts: (1) Does timeliness of reporting change? (2) Are workers more or less productive with respect to progress notes and reporting? and (3) Does technology use affect the kind of reporting activities undertaken by the CPS workers? We were able to find some partial answers to these questions.

Timeliness of Progress Note Reporting

The indicator of timeliness we used was the number of days between an event and the entry of progress notes concerning that event. Progress note records in the central database include the date a note is entered, the type of note, the related event date, and other case information. We focused on the number of days between each note and its related event. We then plotted the percent of all notes entered for each district by days from the related event. The higher the proportion of notes in the earlier days, the more timely the overall reporting process. The results for all districts, both prior to and during their pilot tests are shown in Figure 3 (below).

The differences in timeliness across the three districts fit well with our understanding of the pilot test situations. The pre-pilot versus pilot indicators for Monroe County are essentially the same—apparently no substantial technology impacts on timeliness. This would be expected, given the very short time and incomplete deployment of the technologies for this pilot test. There is an approximately 10 percent improvement in timeliness for the NYC/ACS, which is consistent with the reported effectiveness of the laptops used and the “crisis” period management instructions to the workers. There is a decrease in the timeliness indicator for Westchester County, which is consistent with the mixed reports on effectiveness and acceptance of the telephonic dictation technology, as well as with technical problems reported with the system and cell phones. After the first two days following an event, the timeliness indicators for the three districts are much closer together and are virtually indistinguishable over the longer term.

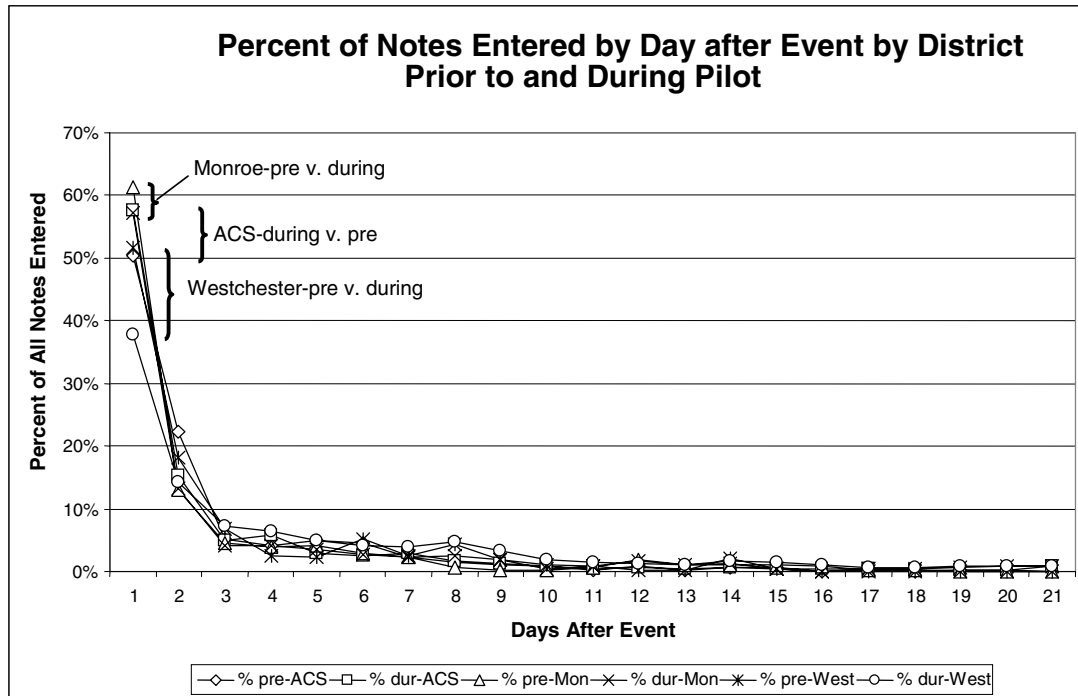


Figure 3 - Percent of Notes Entered by Day After Event

A different indicator of timeliness was also examined: the average elapsed time, in days, between event and progress note entry. This measure shows a different pattern altogether. The average number of days between an event and progress note increased for all three districts: from two to four days for Monroe, from two to over six days for NYC/ACS, and from two to over nine days for Westchester. For NYC/ACS, this rather large difference may be the result of what appears to be time devoted to completing documentation for older cases during the pilot period (described below). This does not, however, apply to the other districts. The Westchester County participants entered higher volume of notes during the pilot periods, compared to the pre-pilot period (described below). That larger volume may also include cases with much longer delays between event and note entry, which would raise the average event-to-note delay. There are also outliers—entries that occurred many days after the event—that have a disproportionate effect on the average.

Volume of Progress Notes

Possible work flow effects of the technologies appear in the different rates of progress note entry. There was a marked increase in the number of progress notes per month during the pilot test periods for NYC/ACS and Westchester, shown in Figure 4 (below). For both of these districts, the increase is substantial and not likely attributable to seasonal fluctuations in case load. The ACS increase may be caused in part by the “crisis” situation as well as by the technology use. It is also possible that the so-called Hawthorne Effect may account for some of these large increases in progress note entries.³ The difference for Monroe County is too small to be meaningful, as would be expected for the short pilot time period.

³ This effect is caused by the tendency of workers who know they are being observed or involved in an experiment to perform at a higher level, regardless of other circumstances.

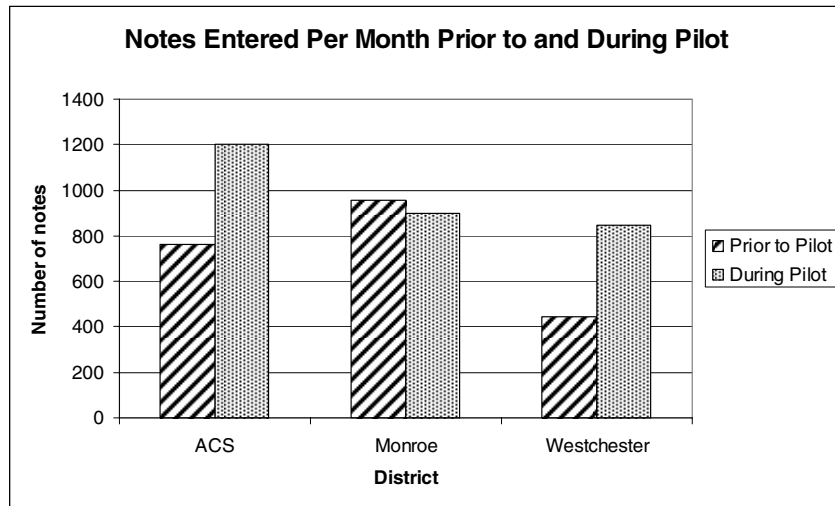


Figure 4 - Progress Notes Entered Per Month Prior to and During Pilot

Age of Cases and Backlogs

The increases in efficiency reported for the technologies may provide the workers with the capacity to reduce case backlogs. If so, the age of cases closed during the pilot period should be higher, on average, than during the prior period. So we compared the proportion of cases closed before and after the 60 day closing requirement for the pre-pilot v. pilot test period. Those comparisons are shown in Figure 5 and Figure 6 below.

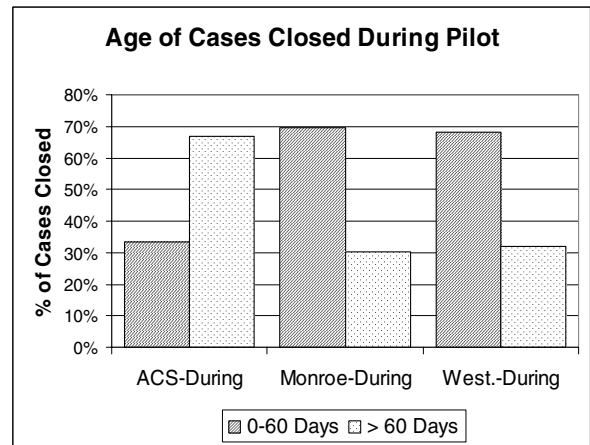
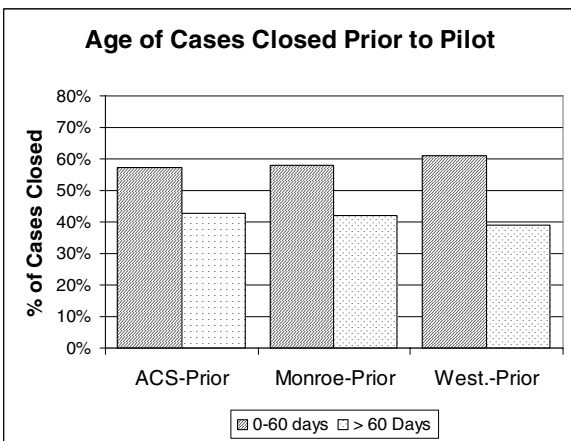


Figure 5 - Age of Cases Closed Prior to Pilot

Figure 6 - Age of Cases Closed During Pilot

Only the ACS data show evidence of backlog clearing, with the proportion of older cases closed during the pilot at more than 65%, compared to just over 40% in the prior period. Just the opposite shift appears in the Monroe and Westchester data (Figure 6). The increase in the newer case closing in Monroe and Westchester can be seen as evidence of productivity increases as well, since the actual rate of case closing increased for these two counties during the pilot.

The percentages shown above are useful for comparison across districts, but they do not tell the whole story. The NYC/ACS case load during the pilot test period included a much larger number of cases open over 60 days (261), compared to 83 in Monroe and 66 in Westchester. Therefore, we would

expect to see a substantial increase in older cases closed in the NYC/ACS district, given the combined impact of a substantial backlog to work on, new technology, and increased incentives and resources.

Types of Progress Notes

New technology is seldom neutral with respect to work practices. We would therefore expect the introduction of these new technologies to result in changes in what kind of work is done, as well as the speed or quantity. The descriptions of work impacts in the three districts provide a qualitative picture of some impacts. The data from CONNECTIONS shows some differences in types of impacts as well for Westchester and to a lesser degree for NYC/ACS. The patterns for the three districts are shown in Figure 7 (below). The figure shows the proportion of four kinds of notes: (1) attempted contacts, (2) contacts, (3) collateral contacts, and (4) summary notes both prior to and during the pilot test periods. These are only a few of the many types of notes, but the numbers of other note types were too small for meaningful comparisons.

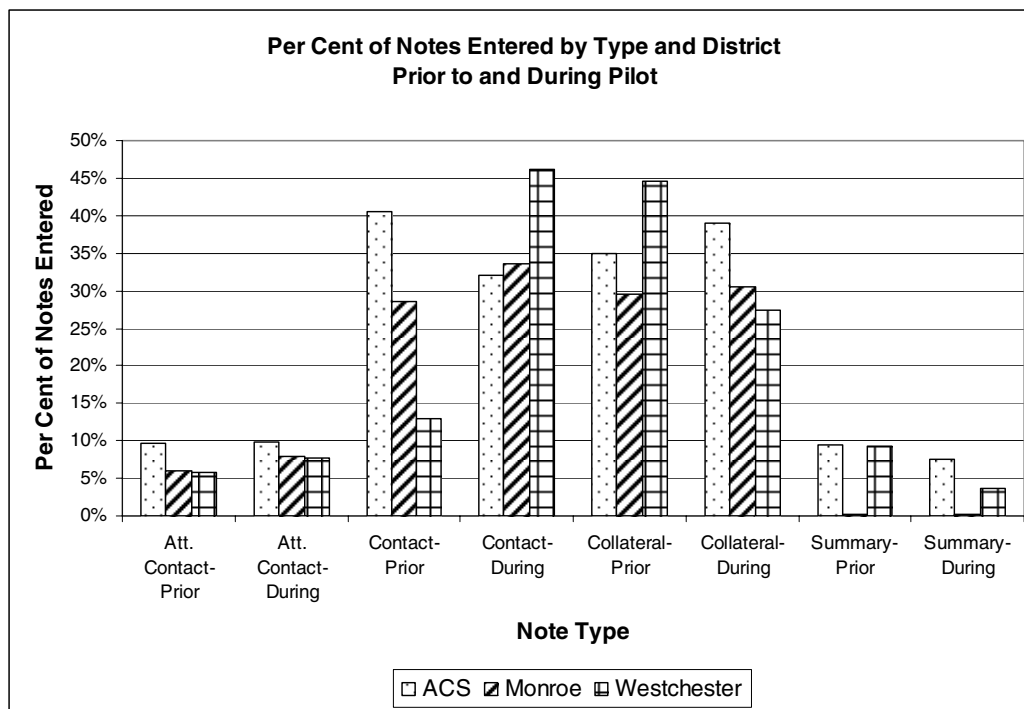


Figure 7 - Percent of Notes Entered by Type-Prior to and During Pilot

The main technology impacts appear to have occurred in Westchester County. The increased number of notes seen for Westchester in Figure 4 above appears to come predominately from increased numbers of field contacts as well as increased documentation. There was a proportionate reduction in collateral notes. This could be the result of increased time for field work due to the mobile devices, reducing the need for travel to and from the office for note entry. In contrast to Westchester County, the ACS pilot period differed less compared to the prior month. There were proportional reductions in contact notes relative to collateral notes, which is likely related to the large increase in work on older cases in NYC/ACS. As expected, the Monroe County comparisons show very little pre-versus post pilot period differences. Larger differences may emerge over a longer test period.

Understanding Technology in the CPS Casework Setting

Though the technologies examined here differed widely, there are some common themes that help explain the ways technology can fit in and enhance CPS casework. We found these themes useful in interpreting the detailed data from each of the three districts. The themes are described here to assist in

the district descriptions that follow and in future choices about technology deployment in these settings.

The Two Components of Mobility

For the purposes of working remotely in CPS, two work components are needed: a device with easy portability and connectivity with ubiquitous access. For instance, the voice recognition software is not a mobile device on its own, however, it becomes mobile if used in connection with a laptop or digital recorder. Also, a telephonic dictation service is essentially a mobile technology, but only when used in combination with a cell phone with excellent network coverage. If the two components are not present, the potential value of the mobile technology will not be obtained. This is particularly so for laptops that do not have reliable wireless access or are not set up for a data synchronization process. Deriving the most value from mobility appears to require mobile devices with ubiquitous access that provide real time entry into the central application.

Digitizing and Entering Information

Entering analog information (i.e., text from workers' paper notes or thoughts) into CONNECTIONS can require anywhere from one to as many as four or five separate steps. Different mobile devices require different sequences, that may or may not fit well with the worker's skills, preferences, or work situation. Using a telephonic dictation service, for instance, involves at least three steps: speaking the progress notes, retrieving the transcribed notes from a Web site, then cutting and pasting them into CONNECTIONS. In some cases, the workers reported extra steps of writing out the notes in advance by hand to prepare for the unaccustomed task of dictating. The use of a digital pen is similar. After writing notes on special paper, the pen is put on a docking station (usually at a personal computer), the handwritten notes are digitized and presented in multiple MS Word files, which must then be merged and cut and pasted into CONNECTIONS. The only one-step process in the pilot was the connected laptop, where notes were typed directly into CONNECTIONS, thus digitizing and entering data occurred simultaneously. However, even in these cases, establishing the access connection required additional steps. These considerations illustrate how productivity is affected by the critical link between the nature of the technology and the users' skills and work practices.

Skills and Work Practice Compatibility

Not all caseworkers are comfortable working the same way. Some are more adept at dictating notes, some prefer typing, and others writing. Although all three methods can produce the same note, the work process differences are important. Speaking progress notes in complete coherent sentences comes naturally to some and is very difficult for others. Those who prefer typing describe it as a continuous editing process where cohesive thoughts are formed in the process of revising typed documents. Thus, asking people to change the way they work requires giving them time to learn and achieve proficiency in the new skill and recognition that this can engender substantial resistance.

Mobile technologies must also fit well with individual work practices to produce value. Some caseworkers believe the only way to pay the most attention in a home visit is to rely on handwritten notes; typing can be done after the visit. This belief shapes the choice of and the location where the technology is used. For other workers, a laptop is considered a status symbol that can interfere with establishing rapport with some clients. Typing may be the preferred method for data capture, but the caseworker may not want to bring a laptop into the house. Another caseworker may want to dictate notes but does not want to do so between home visits, preferring instead to wait until there is a large block of time to dictate continuously, documenting all the day's visits at once. These individual skills and preferences shape the use, and thus the potential value of a particular technology.

Work Activity Goals

The goals for work to be done in the field will help determine the appropriate technology to support field work. Defining *what* work activities are to be completed in the field will influence the choice of mobile technology. Some work activities are simple data entry like recording progress notes and safety assessments. For this kind of work laptops, dictation services and systems, and digital pens are all appropriate. But completing additional tasks such as sending and receiving email, reviewing new cases, and adding and relating persons in the database also require access to CONNECTIONS and other Web resources. Obtaining these broader capabilities requires a laptop with mobile connectivity.

Environmental and Contextual Factors

Mobile technology use is strongly influenced by the work environment and context. Workers who rely on public transportation say they have no private place to dictate or even use a laptop, while those who use cars can use both technologies while traveling. For possible use in public transportation, a laptop must be small, have a privacy screen, and have good wireless connectivity. Dictation, by contrast, cannot be adapted to public transportation but could be done in a private courthouse location, a park, or at home. Different technology configurations require different lengths of available time for efficient use. Several home visits in one day may not allow any blocks of time large enough to complete work nor an environment that provides enough privacy for dictating or typing. Time between visits may be too short to complete work activities, whereas large blocks of time waiting in court can be very productive. Physical comfort will also shape technology use. If a laptop is too heavy or big, it will not be used. A digital pen that is uncomfortable to use for long periods will not be used. Finally, if having to carry or use a laptop in an obvious way puts caseworkers at increased personal risk, then it will also not be used.

Summary

This pilot test was initiated to help achieve an important goal: improving protection for children at risk by increasing the productivity and effectiveness of protective service workers in the field. The pilot testing began in a situation of much uncertainty about what might turn out to be the most effective mobile technologies for child protective service workers, due to a lack of research in this area. By participating in this testing and assessment, the OCFS and the Local District initiatives have added much to what is known about using mobile technologies and how to improve future technology testing, selection, and deployment. The new knowledge about mobile technology's effectiveness can be summarized in three key observations:

1. The effectiveness of any mobile technology strategy appears to depend on a combination of worker preferences, work practice demands, the capabilities of the various devices and systems deployed, and organizational support. No one technology strategy will be a good fit for all CPS workers. Some provision for individual variation should be a part of future strategies. And much attention is needed to training, technical support, and adaptation of work policies to support the mobile CPS worker.
2. In spite of numerous technical and organizational challenges in the deployment and use of these technologies, the testers most often rated them as effective and, with few exceptions, recommended continued deployment. The testers also reported sophisticated and nuanced assessments of the strengths and weaknesses of the various devices. One clear lesson is that the users' experiences and judgments must be an important part of any future tests and decisions about wider deployment.

3. The two mobile strategies that had the longest tests—the telephonic dictation system and connected laptops—showed evidence of improved timeliness in one case and overall greater work productivity for both. However, the limitations in available data about progress notes and work outcomes means that further data collection and analysis is needed before firm conclusions can be made about their effectiveness.

The promise of mobile technology to improve child protective services seems clear. But rapid progress toward achieving that promise will require significant attention to training and change management, continued investigation, and recognizing that the success of any new technology depends on human and organizational conditions at least as much as the devices and systems themselves.

District Pilot Programs

New York City Administration for Children's Services (NYC/ACS)

Pilot Project Description

The NYC Administration of Children Services (ACS) initiative to test mobile technologies in child protective services was initiated in response to Mayor Bloomberg's "Safeguarding our Children 2006 Action Plan" which included "deploy handheld computers or tablet PCs to field office workers." In response to this, ACS's Division of Child Protection (DCP) worked in conjunction with ACS Management Information Services (MIS) to implement, test, and evaluate portable wireless technologies for child protection service (CPS) caseworkers. The overall goal of the initiative was to provide remote access to CONNECTIONS and other ACS applications in order to determine if it allowed caseworkers to more effectively accomplish their work activities.

In total, twelve caseworkers (two from each of the five boroughs and two from the Office of Confidential Investigation) participated in the district's initiative. Laptops or Blackberries were assigned to each of the 12 caseworkers for two-week periods. The entire pilot lasted 12 weeks (six two-week cycles) starting in May 2006 and ending on August 9, 2006.

NYC/ACS selected devices based on weight, size, battery life, and functionality, taking into account access limitations to CONNECTIONS. Four of the six technologies had wireless access to CONNECTIONS through a virtual private network that was channeled through the NYC/ACS system. One device (Blackberry) had access to email only and one device (tablet PC) did not have access to email or the CONNECTIONS database. The following were the technologies tested in the pilot:

Technologies with wireless access to CONNECTIONS:

- Lenovo/IBM X-40 ultra-light notebook
- Lenovo/IBM X-41 ultra-light tablet
- Panasonic Toughbook W4 ultra-light notebook
- Sony PCG-4F1L ultra-light widescreen notebook

Technologies without access to CONNECTIONS:

- Blackberry
- Fujitsu P1510 ultra-light widescreen Tablet PC. (This device lacks WWAN capability and was unable to access CONNECTIONS in the field. It was used as a demonstration device for its touch capable screen and unique small form-factor design).

To assess the impact of the pilot, NYC/ACS created and administered bi-weekly surveys and held bi-weekly meetings to gather input from all 12 field testers from May 2006 to August 2006. CTG created and administered a post-pilot survey and facilitated an information gathering session with eight of the 12 testers on August 9, 2006. Finally, several NYC/ACS caseworkers and program and IT staff attended the Final Assessment Workshop in Albany, New York on October 5, 2006.

The NYC/ACS pilot was nearing its end when CTG became a part of the initiative and much of the data was already collected. CTG did not take part in the pilot design, the selection of field testers, or the device rotation schedule.

Characteristics of the Technologies

A laptop that is directly connected to CONNECTIONS allows CPS caseworkers to perform almost all work activities as if they were sitting in their office. There is no need to change the way work is done, only where and when. What does matter, however, are the different sizes, weights, and characteristics of the devices that will affect choice and use. This section reports on how participants rated the characteristics of the technologies tested in the pilot, specifically size, weight, readability, durability, battery life, portability, and quality of wireless connection. All characteristics play a role in the overall perceived ratings although two characteristics emerged as leading indicators: wireless connectivity and the physical characteristics of the device.

Wireless Connection

A laptop or tablet's usefulness is directly related to quality and reliability of wireless connectivity. With such a connection, a worker with a laptop can connect to CONNECTIONS and complete a broad range of work activities in more places and at flexible times. Without such a wireless connection or a synchronization process, the value of the laptop severely decreases.

Physical Characteristics of the Device

The size and weight of a laptop will determine if people use it. A large heavy device will not be used as much as a small and lightweight one. This is because of several factors, most importantly, the CPS worker's comfort in the field and perception of safety.

Other important characteristics are readability of the screen, quality of the transmission, battery life, and the ease of logon. Readability of the screen can be affected by sunlight and the quality of the connection depends on location. CPS workers do not always have the ability to charge their computers or have access to outlets while in the field, therefore battery life is important. Finally, the multiple logons for authentication, to access the ACS server, then the central database, caused frustration and extended the time needed to boot-up and close down.

As shown in Table 2, the Panasonic rated highest for size and weight, with the Sony Vaio not far behind in both categories. The Lenovo X41 and the SONY Vaio rated significantly above average in readability and the Lenovo X41 rated best in quality of wireless connection. The Panasonic received the best battery life rating with the Sony Vaio somewhat lower. The Sony Vaio was significantly above average for portability and durability, and the Panasonic was rated as extremely durable. The Blackberry's size received a low rating, with readability rated average and battery life rated below average.

Table 2 - Average Participants Ratings of Characteristics of the Mobile Technologies: ACS

Technical Characteristics	Blackberry (n)	Fujitsu (n)	Lenovo X40 (n)	Lenovo X41 (n)	Panasonic (n)	Sony Vaio (n)
size	2.29 (7)	2.50 (6)	3.86 (7)	4.50 (6)	2.83 (6)	2.67 (6)
weight	4.86 (7)	4.20 (6)	3.43 (7)	3.17 (6)	5.17 (6)	4.83 (6)
readability	3.67 (6)	3.83 (6)	4.86 (7)	5.00 (6)	4.83 (6)	5.00 (5)
quality of wireless connection	4.80 (5)	1.50 (6)	3.86 (7)	4.83 (6)	4.50 (6)	3.40 (5)
portability	---	---	3.86 (7)	3.50 (6)	4.67 (6)	5.00 (5)
battery life	3.20 (5)	3.80 (5)	4.00 (7)	4.17 (6)	4.83 (6)	4.60 (5)
durability	---	---	5.00 (7)	4.83 (6)	5.33 (6)	4.80 (5)

Notes: Size was rated on a 6 Point Scale (1 = “Too small” and 6 = “Too large”). Weight was rated on a 6 Point Scale (1 = “Too Heavy” and 6 = “Just right”). Readability, Quality of Wireless connection, Portability and Battery Life were rated on a 6 Point Scale (1 = “Poor” and 6 = “Excellent”). Durability was rated on a 6 Point Scale (1 = “Not at all Durable” and 6 = “Durable”).

Use in Work Activities

Types of Activities

The results in Table 3 show the most frequent work activities performed with each of the technologies. Almost two-thirds of the caseworkers used the technologies for progress notes and safety assessments (65 percent). In addition, over half (55 percent) of the caseworkers added to their to-do lists and conducted searches for people, addresses, and cases, and half of caseworkers did investigation conclusions. However, many of the caseworkers (52 percent) did not use any of the technologies for email. Of those who did, 38 percent used the laptop and 10 percent used the Blackberry (email was the only function available on the Blackberry). The Fujitsu was reported as not being used for any of the most frequent work activities.

Participants liked devices with access to CONNECTIONS because of the ability to do reporting work in the field. One participant said, “It was like having my office in my car. I got so much done in between home visits.” Another caseworker described being with a family that needed other services. With mobile access she was able to search for the needed resources and provide the family contact information for additional help. Without the laptop, this task would have taken a day or more to find and deliver that information.

Table 3 - Percentage of Workers Using Mobile Technologies for Specific Activities: ACS

Work Activities	Percentage of Caseworkers Who...			No.
	Used <i>Blackberry</i> and <i>Fujitsu</i> for work tasks (No link to CONNECTIONS)	Used the laptop for work tasks (No link to CONNECTIONS)	Did not use any mobile technology for work tasks	
progress notes	0%	65%	35%	40
safety assessment	0%	65%	35%	40
to do list	0%	55%	45%	40
searches: person, address, case, resource and staff	0%	53%	47%	40
investigation conclusion	0%	50%	50%	40
email	10% (Blackberry)	38%	52%	40
risk assessment profile	0%	45%	55%	40
event list	0%	33%	67%	40
review intake information	0%	25%	75%	40
adding/relating person	0%	20%	80%	40

Additional comments about how the devices were used:

- “My supervisor called me and gave me a new case. When I went to the address, they were not there because they were using that address as the school address. With the laptop, I was able to do a search on previous history and found another address. So I went to the new address that night instead of waiting until Monday. It took me about 20 minutes to boot up, and do the search (which is not long!). Before, when I got a new case, I would have had to go back to the office to find out the information about the case (unless my supervisor gave me some over the phone). Now it’s much quicker and efficient.”
- “One evening, I downloaded legal forms to my laptop, filled them out and then emailed them to my own email account. When I got to the office the next day, they were completed and sitting in my email. I printed them and was ready to go.”
- “Now I don’t get lost everyday! I use Mapquest and Hopstop to get directions to clients’ homes. It saves a lot of time each day.”

Work Location

Before the devices were deployed, caseworkers predicted the places they would like to use the devices. These included in the car, in court, on the train, at home, on the bus, in the park, at a school or community center, in a client’s home, on a ferry or subway, and in the office. After using the devices, three places emerged as the top locations for actual use: at home, in court, and in a car.

Many caseworkers reported new-found flexibility in working at more convenient places and times. Those who worked at home expressed appreciation for the flexibility of not having to stay at or return to the office. One said, “I did a visit on a Friday evening and without a laptop I would have had to go to the office that night to write up the notes or it would have had to wait until Monday morning. With

the laptop, I wrote up my notes that night and it went directly into CONNECTIONS. It made me feel so much better knowing that they were in the system and I could do it from home.”

In order to make time more productive, many caseworkers used the laptop while waiting in court. Previously, caseworkers would use this time to make phone calls and write notes. But with a laptop they could complete CONNECTIONS work activities.

Some caseworkers brought the laptop with them into the field everyday and used it in the car and in court. Others used it only in court because of the big blocks of time available there. Some workers chose not to use the laptops because of environmental constraints within the locations. One worker who rode public transportation found that it was too crowded for laptop use and often did not have sufficient blocks of time to work. In addition, uninterrupted wireless access was difficult to achieve primarily due to the density of the city’s landscape. This may be true for most forms of public transportation.

Overall Impact on Work

Caseworkers reported that using the laptop allowed them to be more efficient but did not add to the overall quality of their work. More specifically, in reference to progress notes, caseworkers stated that the quality of the note is the same if they enter it into a laptop (at a remote location) or at their pc in the office. It’s the ability to work at various locations and times that makes the largest impact on their work.

As shown in Table 4, caseworkers strongly agree that the use of the laptops provided time savings and agree that it helped in overall efficiency. The Sony Vaio received the highest score in overall time savings and the Panasonic rated highest in overall efficiency, though the ratings are very similar. One caseworker talked about the time it saved in driving back and forth to the office to get new cases. Case histories are read while in the field, now taking 15 minutes rather than the hour to get to the office and back out again.

Table 4 - Average Participant Ratings of Devices for Efficiency and Overall Quality: ACS

Efficiency Impacts	Blackberry (n)	Fujitsu (n)	Lenovo X40 (n)	Lenovo X41 (n)	Panasonic (n)	Sony Vaio (n)
time savings	---	---	5.43 (7)	5.50 (6)	5.33 (6)	5.60 (5)
overall quality of work	---	---	3.43 (7)	4.00 (6)	3.67 (6)	3.00 (5)
overall efficiency	---	---	4.86 (7)	5.00 (6)	5.17 (6)	4.80 (5)

Notes: Time Savings was rated on a 6 Point Scale (1 = “It added time” and 6 = “It saved time”). Overall quality was rated on a 6 Point Scale (1 = “Not at all enhanced” and 6 = “Very enhanced”). Overall efficiency was rated on a 6 Point Scale (1 = “Much Less Efficient” and 6 = “Much More Efficient”).

One caseworker said he was able catch up on backlogged progress notes, but having the device will not necessarily mean that he will not get backlogged again. NYC/ACS relaxed overtime policies for the caseworkers during the same period as the pilot test and instructed them to do as much as they could. The caseworkers used the laptops to catch up on old cases, but caseloads did not decrease because new ones were assigned. Some said due to the nature of their work, cases will get backed up again. But all went on to say that using the laptop does allow flexibility and would recommend its use.

Some caseworkers did not use the laptop regularly on field visits. They used it when they knew that blocks of time would be available. One caseworker used it during her commute on the train because it was a large block of time that she could devote to work. While others took the laptop with them all day, almost all of them did not bring the device into the client's home. This was avoided for many reasons including interfering with establishing a rapport with the family and personal safety. Some felt that opening the laptop and typing in front of the family may be inappropriate and took their attention away from the environment. Workers who traveled by car stated that using it after a visit expedited their ability to get notes written and entered into CONNECTIONS.

Those who regularly took the laptop with them reported collateral benefits. Having access to the central OCFS application allowed them to catch up on email, to research and document collateral contacts, read case histories, document progress notes, and essentially stay in touch with their supervisor. But not all impacts were positive. Some of the caseworkers felt that while they were able to complete a backlog of progress notes, working more at home disturbed their balance between work and home life. The availability of the laptop allowed, even encouraged them to work much longer hours than they might have done otherwise. Another caseworker reported a supervisor encouraging them to work in off-hours because of the mobile device. In both cases, the availability of the laptop resulted in an increase in pressure on the caseworker to work during off-hours.

The flexibility in work time and location also involves personnel policies. One caseworker said, "If I stayed at the office from 6 pm – 9pm to get my case documentation completed, I would get overtime. If I go home, feed my kids, get them to bed, and then work on the documentation from 9 pm to midnight, I don't get overtime. I know right now we can get it, because of the crisis mode. But what will happen in the long term? If the policies do not change, there is no incentive to use the laptop."

Finally, some felt that carrying the laptop with them posed a physical security risk, making them a potential target for theft or violence. If the device could not be easily concealed, then they did not bring it with them all day. Caseworkers identified high risk areas such as some clients' homes, subways, or parks.

Overall Opinions

None of the caseworkers approached using the laptop in the same way but all were satisfied in the end and would recommend its use in child protective services. As shown in Table 5, the overall satisfaction was highest with the Panasonic. Also, the Lenovo X41 and the Panasonic tied as the technology that would be most recommended to co-workers. The lowest recommendation and satisfaction rating was with the Lenovo X40, and it was still above average. Thus, all technologies (with mobile access) received above average to significantly above average ratings in satisfaction and recommendation.

These rating show that caseworkers would generally encourage the continued use of laptops in CPS work. However two factors shape those ratings:

- Having mobile access or seamless data entry
- A small and lightweight device with long battery life

Table 5 - Average Participant Overall Satisfaction & Recommendations for Laptops: ACS

Overall Evaluation	Lenovo X40 (n)	Lenovo X41 (n)	Panasonic (n)	Sony Vaio (n)
overall satisfaction	4.29 (7)	4.83 (6)	5.00 (6)	4.60 (5)
recommendation of mobile technology	4.57 (7)	5.33 (6)	5.33 (6)	5.20 (5)

Notes: Overall Satisfaction was rated on a 6 Point Scale (1 = “Not at all Satisfied” and 7 = “Very Satisfied”).
Recommendation of Mobile Technology was rated on a 6 Point Scale (1 = “Not at all Recommend” and 7 = “Strongly Recommend”).

Deployment and Security

The initiative in NYC/ACS tested only twelve users of laptops who connected to CONNECTIONS through ACS’s network. A large scale deployment of laptops may require an alternative set up.

Connectivity. A large scale deployment of laptops will require connectivity solutions that fit agency and statewide policies. This may include alternatives such as a synchronization process for when continuous connectivity is not possible.

Authentication. The logon and authentication procedures established for the pilot interfered with efficient access to the central database. The time needed to logon and the possible loss of wireless connection can inhibit effective use of the laptops.

Infrastructure. Currently the hardware, software, and connectivity infrastructure is designed for desktops. A mobile workforce may require enhanced network infrastructure, servers, or other hardware and software devices.

Hardware security. Data that can remain on portable devices poses new security risks. Encryption of all remotely stored data is essential even though data will be directly stored in CONNECTIONS as well. Use of laptops in the home environment may increase the risk of unauthorized access, damage, or theft.

Data Security. Provision for secure and reliable backup for all remotely stored data is essential. This may require user restrictions or protocols that control storing any sensitive data on laptops or other portable devices.

Technical Support. Methods for supporting mobile technologies are quite different than those for in-office technologies. It is more difficult to oversee and manage deployed equipment for such tasks as maintaining current anti-virus and operating system versions, as well as asset tracking and utilization verification and/or validation. This problem is compounded when there are multiple types of mobile technologies in use in the field.

Workforce support. The equipment may be in use in the field 24/7, requiring expanded hours and types of help and technical support, procedures when technical support is not available, and possible decentralization of some technical support functions or resources.

Westchester County Department of Social Services, Family and Children's Services

Pilot Project Description

The Westchester County Department of Social Services tested two technologies at the same time: Santrax, a third-party telephonic dictation service (the system), and cellular telephones. The pilot project spanned thirteen weeks, July 1 to September 30, 2006. Approximately thirty-four child protective service employees and preventive services/foster care caseworkers participated in the pilot from two areas within the district: White Plains and Mt. Vernon. Additional employees from Peekskill began using the technology while the pilot was in progress, however the length of time for each of these participants varied. Twenty-eight responded to the baseline survey and 16 responded to the post-pilot survey, and about 14 were involved in the information gathering sessions and the Final Assessment Workshop, organized by CTG.

The primary technology tested was a telephonic dictation system, Santrax. A service that provides a way for the user to use a cellular or landline telephone to enter data and dictate narrative progress notes. Caseworkers using Santrax call into a dedicated number where they are asked to enter some demographic information about the case using number prompts, and then are instructed to dictate their narrative into the system. The voice recordings are then transcribed by persons that are contracted by Sandata. Within twenty-four hours, the caseworker can access the narrative text in digital form through a secure Santrax Web site. Caseworkers can then cut and paste the text from the Santrax Web site into CONNECTIONS. The secondary technology, the cellular phone, was key in enabling users to access the Santrax system in the field or otherwise out of the office. The full use of both technologies requires CPS employees to connect to a computer (either at their home, office, or by laptop) in order to complete the entry of their progress notes in CONNECTIONS. CTG evaluated both the telephonic dictation system and the cellular telephone separately, though they are complementary technologies.

Characteristics of the Technologies

A variety of technical and use characteristics are associated with each technology and impact individuals' acceptance and use of the technology to do their work. Through surveys and workshops we gathered users' ratings and opinions about cell phones including: size, weight, portability, battery life, readability, durability, and quality of cellular connection. We also asked about the specific characteristics of the system including: connectivity to the system, readability and accuracy of transcribed notes, and reliability of turn-a-round (i.e., the ability of the dictation service to produce digitized progress notes in 24 hours).

Participants told us that the most important characteristics overall were:

- Reliability of cellular connection
- Quick turn-around of digitized notes

Table 6 below provides a summary of the average participant's ratings for cell phone technical characteristics. The size of the cell phone was appropriate for most individuals, as was the weight, portability, and durability of the device. The battery life and quality of wireless connection was rated closer to poor (a mean of 2.93 and 3.36 respectively on a 7-point scale). Many participants commented on how frequently the cellular service dropped calls or they encountered "no service" messages throughout their territories. The poor quality of the wireless connection was often cited as frustrating and bothersome when using the cell phone. One participant said, "I was in the middle of a removal and the call dropped on me, I had to go outside of the house and try to use it there. I was in a situation where I needed the assistance of a coworker, and I had no service."

Table 6 - Average participant ratings of technical characteristics: Westchester

Technical Characteristics	Cell Phone (n)
size	4.57 (14)
weight	3.67 (15)
portability	3.64 (14)
battery life	2.93 (14)
readability	3.29 (14)
quality of wireless connection	3.36 (14)
durability	3.93 (14)

Notes: Size was rated on a 7-point scale (1 = “Too large” and 7 = “Too small”). Weight was rated on a 7-point scale (1 = “Too heavy” and 7 = “Just right”). Portability, Battery Life, Readability, and Quality of wireless connection were rated on a 7-point scale (1 = “Poor” and 7 = “Excellent”). Durability was rated on a 7-point scale (1 = “Not at all durable” and 7 = “Durable”).

Quick turn around of digitized notes is extremely important to child protective service work. One participant emphasized the importance of a reliable dictation system because of time pressures in completing work stating, “We have deadlines, where we have to do certain things in a certain amount of time, which includes dealing with paperwork.” Early during the pilot period the Local District experienced uneven turn around of digitized notes within 24 hours. One participant said she dictated seven case notes on a Friday, but on the following Monday the notes still were not digitized (though the voice recording was there). She had to spend that morning typing the same progress notes directly into CONNECTIONS. Initially, these service glitches impacted some caseworkers’ ability to meet deadlines, while the effect also dampened enthusiasm for using the new technology. The Local District immediately took action and worked with the third party service to ensure delivery of digitized notes in 24 hours. The vendor implemented an email notification mechanism that informed the implementation team when recorded notes approached the 24-hour limit without being transcribed. Caseworkers expressed that by the end of the test period digitized notes were coming back reliably within the time period.

The system’s transcription accuracy was high. The Local District took the initiative to sample dictated voice recordings and compare them to the transcribed notes. The transcription error rate was less than three percent. In addition, many participants acknowledged that overall, the transcription was accurate. Approximately eight participants used the Santrax system to dictate progress notes in Spanish and had them transcribed and digitized in English. Some commented that this worked well for them, while others had more difficulty with reliable transcriptions because of their accents.

Caseworkers’ ability to read the digitized notes was very important. In the beginning, readability of the digitized notes from the dictation service took some getting used to. The dictation service transcribers had difficulty with punctuation, paragraph divisions, and initially refused to transcribe obscenities included in notes by caseworkers to provide an accurate account of the client’s statements. Initially, caseworkers found that the service provided notes in one continuous narrative and the worker had to break into the appropriate sections. This added additional time to editing progress notes before cutting and pasting them into CONNECTIONS. The Local District worked with the vendor throughout the pilot and the system was refined to include a separation in the digitized notes which highlighted multiple dictation sessions for a given caseworker on a that day and to ensure the obscenities were included.

Use In Work Activities

Different use characteristics are associated with the two technologies. Table 7 below summarizes the average participant ratings for usability in the post-pilot survey. The telephonic dictation service and the cell phone were rated as relatively easy to use and participants were relatively comfortable with the technology after they used it for some time (ratings averaging near 5 on a 7-point scale). Overall, many commented that accessing the Santrax system by phone and the secure Web site was easy and straight forward.

Table 7 - Average participant ratings of mobile technologies use characteristics: Westchester

Interaction Characteristics	Santrax (n)	Cell Phone (n)
ease of use	4.94 (16)	5.27 (15)
comfort with technology	4.75 (16)	5.38 (13)
quicker data entry mode	3.75 (16)	2.40 (10)
encountered technical problems	5.00 (13)	4.43 (14)

Notes: Ease of Use, and Comfort with Technology were rated on a 7-point scale (1 = “Very difficult” and 7 = “Very easy”). Quicker Data Entry, and Technical Problems were rated on a 7-point scale (1 = “Strongly Disagree” and 7 = “Strongly Agree”).

Some participants were less likely to believe that using the mobile technology was a more efficient way to enter data into the system (ratings near the middle of the 7-point scale). The speed of this process depends on workers’ abilities and preferences. In addition, the system is not one continuous process, it includes intermediary steps of retrieving digitized notes, editing, and cutting and pasting.

Participants described in detail the process to get progress notes into CONNECTIONS. After 24 hours, the workers would access the dictated notes on the secure Santrax Web site. They would then edit or add to the notes, then cut and paste them into CONNECTIONS. Some workers avoided the system and continued to type their notes into CONNECTIONS directly because they were fast typists. Others did not mind the process and were able to talk fast, and cut and paste easily.

Participants reported they encountered some technical difficulties with the technologies in the early stages of the pilot. For example, Santrax initially was set up with a three-second pause rule, i.e., that the system disconnects if there is a pause in the dictation of greater than three-seconds. This was a surprise to most caseworkers and also caused some initial frustration. Some participants reported that they could not tell that the call was disconnected, and so continued dictation without recording. Part-way through the pilot, the Local District worked with the service provider to extend the pause period to five-seconds. This allowed caseworkers additional time to collect their thoughts. This change was looked at favorably by participants. Some calls were also disconnected because of the low volume of the speaker’s voice and was interpreted as a pause. The need for a higher voice volume limited the number of places that caseworkers could use the service, due to privacy concerns.

These difficulties caused frustration for some participants. For instance, some dictated narratives multiple times because of the dictation service or the cell service dropping their calls. Many suggested it was important to have some type of back-up method for gathering your thoughts (i.e., on a piece of paper) in case there was a dropped call. Some participants reported using landlines to call the service provider to alleviate the problems.

Others were frustrated with the perceived process inefficiencies such as the template for capturing demographic data. It was considered bothersome by some and they either got used to it or developed a work around. Overall, the Local District addressed many of these concerns by working with the dictation service to extend the pause time, develop a prompt that enabled the caseworker to end a call, and requested that the voice component be available within minutes of dictation.

Participants expressed the importance of technical support. Throughout the testing period, the implementation team provided contact information for the service's technical support, consultation on problems during weekly meetings, and were available by phone or email to resolve user needs. Still, some caseworkers mentioned they did not know who to turn to in order to get the issues resolved. Some went to supervisors, while others decided not to use the system.

The participants also expressed a desire to have the system allow them to dictate notes on multiple families without hanging up and calling back. The current system allowed dictation for one case per call. Caseworkers disliked this constraint because they often have multiple visits in one day and may not dictate their notes until the end of the day. Calling back into the system four or five times is seen as tedious and time consuming. The Local District has asked the service to devise a solution.

How well a technology fits with various locations and modes of transportation is key to its effectiveness. The mode of transportation affects whether people can successfully use mobile devices. To increase the mobility of the dictation service, using a cell phone is optimal. But the service can also be used at the office or at participants' personal residences through a landline telephone. Factors such as data privacy or confidentiality are important with the system because participants are dictating sensitive case notes. Dictation will not work in all public spaces. Therefore we asked participants where and how they used each of the technologies. Their answers, based on survey and workshop data, appear below.

The system was used primarily for progress notes. Some were able to dictate supporting materials, such as arrest reports, court reports, statements from clients, and medical reports into the system for easy cutting and pasting into CONNECTIONS at a later time. The cell phone, while used in conjunction with Santrax, was also used for other necessary CPS work activities. The cell phone was described as a good tool to use in the field for staying in touch with supervisors, co-workers, and clients, as well as providing a sense of security when visiting homes, and for making collateral contacts while out in the field. Several expressed that they felt connected. Managing contacts was an important benefit of having a cell phone. One cell phone user was described by peers as a "whiz kid." When asked what the whiz kid did with the cell phone, she remarked that it was used to program clients' phone numbers into the cell phone for easy access, schedule alarms for appointments, and to listen to messages about appointments (voice mail). Not all participants were able to use the cell phone in this way, admitting that they did not know how.

The most frequent location for using the system and cell phone was in the field in a county-issued vehicle. Cell phones were used in any location where a signal was available, including the client's home, court, or in their cars while moving from one visit to another. Hands-free accessories which included headsets were provided for privacy while dictating notes. While the Local District did not suggest that caseworkers use the hands-free accessories or headsets while driving, some caseworkers found this to be an effective way to dictate notes from one visit to the next. Some stated that they did not feel comfortable using the cell phone with hands-free accessories while driving, expressing that it was bulky and they had difficulty driving while dictating notes. Therefore, they would pull over to the side of the road, in a parking lot, or down the street from the client's home. Others reported that they

did not have a cell phone or that the locations where they traveled had poor cell phone connection, so they used the system at home or in the office.

The participants unanimously selected the courthouse as the number one location where they hoped to use the mobile technology. They also reported that dictating in the courthouse was difficult because there was no space where they could call into the system in private.

The system is available at any time, anywhere, but the time available to the worker to use the system is limited. The reported time periods they logged on to the system varied from 5 to 25 minutes. There are times when the travel times between visits are lengthy and others much shorter. The non-routine flow of each day impacts the times when they can dictate notes.

Overall Impacts on Work

Overall, the advantages to using the telephonic dictation system and cell phones were:

- completing progress notes right after a visit
- having the flexibility to use it anywhere at anytime
- keeping in constant contact with supervisors or co-workers
- creating the opportunity to work outside the office
- dictating in different languages (i.e., Spanish for translation to English)

Overall, the disadvantages to using the telephonic dictation system and cell phones were:

- loss of work, or interruption of work due to failed connectivity or transcription failure
- slow learning curve that caused some backlog and job stress
- lack of skill and training in dictation for some people
- useful for narrative parts of reports, but not for data entry
- not connected directly with CONNECTIONS
- editing and copying/pasting is time consuming

Adjusting to a New Technology

The introduction of new technologies or ways of working often is accompanied by an adjustment period or learning curve. Participants expressed that initially, it was time consuming to learn to dictate, master the specialize commands associated with the system, and learn how to retrieve and work with the digitized notes. At first it was a disruption in the way they did work. Several participants concluded it was not natural for them to dictate. By the end of the testing period, some had mastered dictation and others still rejected this way of working. One participant said, “At the beginning it takes time to memorize the commands, but now it is easy.” While another person stated they “there is a learning curve and job change that goes along with it.”

Documentation and Reporting – Progress Notes

Progress notes are important casework documentation, so we examined how the technology use interacted with casework duties, such as improving recall of details, entering notes during down time, or changing work routines. The ratings shown in Table 16 provide a summary of participants’ views about timeframes for preparing and entering progress notes.

The ratings are mixed. All of the characteristics’ average ratings were slightly below the midpoint of the scale. Participants were evenly split over whether they were able to prepare progress notes during down time (43 percent disagreed; and 43 percent agreed) and when asked if they usually entered progress notes all in one sitting (37 percent disagreed; and 37 percent agreed).

Table 8 - Average participant ratings for progress notes timeframes: Westchester

Progress Notes Characteristics	Mean Prior to Pilot (n)	Mean During Pilot (n)
was able to prepare my progress notes during down time	3.81 (27)	3.71 (14)
usually entered progress notes all in one sitting	3.96 (27)	3.75 (16)
usually entered progress notes during regular working hours	3.85 (27)	3.75 (16)

Notes: Progress Notes Characteristics were measured using a 7-Point Scale (1 = “Strongly Disagree” and 7 = “Strongly Agree”).

The dictation capability may have improved the completeness of notes. Many stated that they were able to recall more details when dictating notes right after a visit. One participant said, “My field time was more productive, it’s good to be able to record, while issues are very fresh in my mind.” This advantage did not apply unless caseworkers had the chance to enter notes immediately after a visit. Others stated that the service did not help them because they were already efficient at doing progress notes or that they just did not feel comfortable with or liked using the technology.

Participants reported that the quality of progress notes were not impacted by using the technology, other than being able to recall more details if used after a visit. They said that what constitutes quality in notes varies among supervisors. Some like long, very detailed notes, while others prefer concise notes. Therefore, it was difficult to assess whether the quality of notes were improved by using the technology. In addition, the type of case and type of note determines how much detail is needed; progress notes can vary from as few as 30 to over 2000 words.

Time Savings

Participants’ ratings of the efficiency of these technologies are found in Table 9 below. The results are mixed. For example, the average participant ratings across all three questions is just above the middle of the 7-point scale. More than half (56 percent) reported that they perceived time savings with the device while 44 percent disagreed. During the workshops, some participants described the system as a terrific addition to their tool kits, while others felt that it did not work for them at all. One participant said, “[The] ability to have someone else do the typing saved me very valuable time to do other things that I had to do before and had limited time to do it.” While still another participant expressed, “I have always been up-to-date [with progress notes], I did not need additional tools to complete my job.”

Table 9 - Average Participant Ratings of Devices for Efficiency: Westchester

Efficiency Impacts	Santrax (n)	Cell Phone (n)
the device saved me time	4.06 (16)	4.00 (12)
was a more efficient way to work	3.67 (15)	4.29 (14)
the device allowed me to accomplish other tasks	3.88 (16)	3.83 (12)

Notes: Time Savings, and Accomplishment of other tasks were rated on a 7-point scale (1 = “Strongly Disagree” and 7 = “Strongly Agree”). More efficient way to work was rated on a 7-point scale (1 = “Much Less Efficient” and 7 = “Much More Efficient”).

The mixed pattern is present for cell phones also. While more participants believed that the cell phone saved them time (50 percent), another 42 percent did not. In addition to time savings, many participants commented on the increases in communication that occurred. One participant said, “I like having clients being able to reach me when I am in the field, it saves a lot of time and makes planning much easier.”

Ratings of using the system or cell phones as a more efficient way to work were mixed. While the average participant ratings for telephonic dictation were near the midpoint of the scale (3.67 on 7-point scale) and the average participant ratings for cell phones was higher (4.29 on a 7-point scale), about 47 percent reported that telephonic dictation was an efficient way to work, while 57 percent reported that the cell phone was a more efficient way to work.

There was a split response in participants' rating that the device allowed them to accomplish other tasks. Of those that stated that it allowed them to do other work, some remarked that they were able to make phone calls or spend more time with client families, or close cases, but this impact is moderate.

Stressors

Overall, normal work routines provide caseworkers with job stress (means above the mid point on a 7-point scale). The introduction of technology added some additional job stress. Many participants reported that when the system goes down or does not work properly, it causes them a lot of job stress. The problems caseworkers faced with progress notes not being digitized in 24-hours or missing were very frustrating because it put caseworkers behind schedule, they had to repeat work, and they were not sure who they had to call to fix the problem. Since management and the public law requires certain tasks to be performed by certain deadlines, technical problems that were out of the caseworkers' control caused additional job stress. The Local District attended to many of these technical issues. The data collection period did not allow CTG to determine the long term effects of job stress.

Table 10 - Average participant ratings of work-related stress during the pilot: Westchester

General Impacts on Work	Mean Value (n) During the Pilot
normally I was under a lot of work-related stress	4.69 (16)
open cases caused me a lot of stress	4.38 (16)

Notes: Work-related stress, and Stress due to open cases were rated on a 7-point scale (1 = "Strongly Disagree" and 7 = "Strongly Agree").

Changing Working Habits and Location

Many participants suggested that the use of mobile technologies changed the location in which they could work (i.e., out in the field) and the time their work got done. About two-fifths never work from home, but approximately one out of five participants work from home a few times a week. More than ten percent work from home daily.

The pattern changed for participants working after normal business hours. Almost half of participants worked after normal business hours at least a few times a week. One caseworker said, "We are paid to do a job in 7.5 hours. If you are behind, then it is your fault, if it spills over into your personal time, that is your problem."

Caseworkers did express concern that the current district policies and administration practices were not currently set up to deal with caseworkers working from home. But they were optimistic that using telephonic dictation could help reduce the amount of time they work after normal business hours.

Overall Opinions

We asked participants to rate the extent to which they were satisfied with the mobile technologies for doing their work. Overall, satisfaction with both the dictation system and the cell phone were slightly below the midpoint of the seven point scale (Table 11). Some participants were very satisfied, while others were not at all satisfied. Participants reported that they would recommend the device to do child protective (means above 5 on a 7-point scale) and the same is true for their overall opinion of the device (means above 4 and 5 on a 7-point scale). One case worker said, “the technology is helpful if it works well.” This quote expresses what we have heard throughout the evaluation, and that is the need for reliable cellular service, coupled with reliable dictation and 24-hour return of notes to win the full support and acceptance of the technologies from caseworkers.

Table 11 - Average participant ratings in overall satisfaction and recommendation of devices: Westchester

Overall Evaluation	Santrax (n)	Cell Phone (n)
overall satisfaction with device	3.93 (14)	3.77 (13)
would recommend device to be used to do child protective work	5.21 (14)	5.46 (13)
overall opinion of device for your work	4.30 (10)	5.45 (11)

Notes: Overall Satisfaction was rated on a 7-point Scale (1 = “Not at all Satisfied” and 7 = “Very Satisfied”). Recommendation of Mobile Technology was rated on a 7-point Scale (1 = “Not at all Recommend” and 7 = “Strongly Recommend”). Overall opinion was rated on a 7-point Scale (1 = “Low” and 7 = “High”).

In their overall opinion, approximately eight out of ten participants would continue to use the technologies in the field. In addition, all of the participants who answered the question would recommend the devices to their coworkers for use in the field.

Deployment and Security

Deployment

A district wide or multiple district deployment of the telephonic dictation system and cell phones needs to consider several factors such as 1) the reliability of cellular infrastructure across regions and the state, 2) third-party service quality, 3) improved process and product, 4) the need for substantial training, and 5) change management.

The current statewide cellular infrastructure is well established and several quality service providers are available. Even with relatively well established infrastructures, there are still areas without reliable cellular connections. Since the mobility benefits of using telephonic dictation are optimized on cellular phone service, assessing the reliability and networks of different carriers and their service guarantees is very important. In addition, back up plans and procedures should be evaluated and communicated to employees in case of any major cellular outage.

A system dependent on a single service provider is at risk. If that vendor fails, alternatives are needed. Planning should include assessment of the scalability of the service to hundreds, if not thousands of caseworkers and thousands of cases. Similarly, reliable user support will be important to overall success. Quality and service guarantees would need to be established for working with the third-party vendors to ensure they can deliver reliable products.

Many participants said that the system and way of working is not a turn-key process. Therefore, adequate training in dictation, the use of the system, and basic computer skills (i.e., cutting and pasting) should be provided and coordinated to ensure that caseworkers have the skills necessary to

realize process improvements. One caseworker said it would be desirable to have templates that would allow caseworkers to automatically cut and paste information into CONNECTIONS, but there are no plans to provide this enhancement to the system.

The implementation team mentioned that caseworkers' willingness to accept the technology was influenced by other coworkers. When one had difficulty, others did not try it or just stopped using it. It is possible to establish work groups that help each other learn the technology.

Security

The Local District experienced some security concerns with using a third party service provider, namely: 1) the extent to which information would be kept confidential by vendor employees transcribing notes, 2) the policies related to disposal of the information, voice recording, and records in general, 3) the security of the transmission of the notes through the Internet and, 4) the security of the server and Web interface used to access the digitized notes. Another issue mentioned, but not of major concern, was the level of privacy available when dictating progress notes in public spaces.

Monroe County Department of Human Services, Child and Family Services Division

Pilot Project Description

Monroe County tested a voice recognition software, Dragon Naturally Speaking (DNS) and digital pens. The pilot project began in mid-September with the distribution of DNS and is scheduled to end in December 2006. The test included 47 Child Protective Services (CPS) case workers and supervisors in the pilot. Of these, 23 responded to the post-pilot survey, 26 participated in the baseline survey, and 20 participated in the information gathering sessions and the Final Assessment Workshop, organized by CTG.

The two technologies differ in three main aspects: the required skill sets, the physical and operational characteristics of the technology, and mobility. The voice recognition software is a technology that requires the users to dictate their notes. Digital pen users recorded their notes by *writing* on special-purpose paper. The voice recognition software is an application that is installed on a computer, while digital pens are physically separate devices. The voice recognition software can be a mobile technology if used with some other device, such as a digital recorder or is installed on a portable computer. The digital pens are naturally mobile, but require a PC (desktop or laptop) to extract and interpret the writing stored in the pen. Both the voice recognition software and the digital pens collect analog data and convert it into text in digital format for the user to store and manipulate.

Caseworkers using the voice recognition software dictate their notes into a MS Word document and can edit the content at the same time. After completing this process, users cut and paste the dictated notes into CONNECTIONS. The voice recognition software was capable of allowing the caseworkers to dictate notes directly into CONNECTIONS, but this capability was not intended for direct entry and therefore was not fully functional and did not receive high ratings for efficiency. Caseworkers who used the digital pens wrote their notes on the special-purpose paper, storing a copy of the notes on the internal memory of the digital pen. Upon returning to the office, caseworkers downloaded the stored data onto the desktop PC, which converted the image of each page from the pen to a separate MS Word file. Caseworkers could then copy the notes into a single document, edit the recorded notes, and then paste the notes into CONNECTIONS.

Characteristics of the Technologies

This section reports on how people rated characteristics and interactions with the technologies used during the pilot. Technical characteristics are physical characteristics or technical features. Interaction characteristics reflect how users rated the technology when using and interacting with it.

Participants felt that the data entry methods used by the voice recognition software were slightly problematic and unnatural, and that the technology was not as portable as desired. Overall, participants were satisfied with the digital pen technology. Participants believed that the weight, portability, battery life, and durability of the digital pen were very good. However, ratings on the size and data entry method were slightly below average. While size, weight, battery life, and durability were not applicable to the voice recognition software, the ratings illustrate that participants consider the portability and data entry to be poor.

Table 12 - Average participant ratings of mobile technologies technical characteristics: Monroe

Technical Characteristics	Dragon Naturally Speaking (n)	Digital Pen (n)
size	NA	3.38 (13)
weight	NA	5.15 (13)
portability	2.20 (20)	5.46 (13)
battery life	NA	5.27 (11)
data entry	3.09 (22)	3.25 (12)
durability	NA	5.36 (11)

Notes: Size was rated on a 6-point scale (1 = “Too small” and 6 = “Too large”). Weight was rated on a 6-point scale (1 = “Too Heavy” and 6 = “Just right”). Portability, Battery Life and Data Entry were rated on a 6-point scale (1 = “Poor” and 6 = “Excellent”). Durability was rated on a 6-point scale (1 = “Not at all durable” and 6 = “Durable”).

During the information gathering sessions, participants identified advantages and disadvantages to using the mobile technologies. By using DNS, participants were able to enter information directly into CONNECTIONS without the need to copy and paste. Since the software was not intended for direct entry, technical issues prevented this process from working efficiently. Participants considered the digital pens to be helpful in ending the duplication of basic notes, since they can digitize the notes they are already taking. However, participants identified some disadvantages using the digital pen: they are highly sensitive to handwriting styles and were not able to interpret shorthand notes, which led to caseworkers needing to adjust the way they write. Finally, caseworkers felt that the small size of the digital pen was a liability, making it easy to lose.

Use in Work Activities

The voice recognition software was used for progress notes, e-mail, and case summaries. Caseworkers noted that dictating directly into CONNECTIONS was possible, but quite slow. In contrast, digital pens were used for general note taking in meetings and field contacts. The pens were unobtrusive and could be used with clients. CPS workers could also practice with the pens at home. Pens were used for progress notes, safety assessments, and investigation notes. In general, CPS workers complained about the cumbersome task of cutting and pasting from MS Word into the central database.

Table 13 - Percentage of workers using the mobile technology and mean time in weeks: Monroe

Mobile Technology		Use (n)	Mean Time Spent (n)
The voice recognition software		100% (23)	3.05 (20)
	Version 8	100% (17)	
	Version 9	0% (9)	
digital pen		48% (23)	1.40 (10)

All caseworkers who participated in the survey used DNS version 8. On average, they used DNS three weeks, with a range from one to six weeks. About half of the participants used digital pens for an average of about one and a half weeks, with a range from one week to three weeks.

Use and Interaction Characteristics

Regarding the interaction characteristics, DNS was not very easy to use and people did not feel very comfortable with it. Participants encountered some problems that were out of their control. They disagreed that it was quicker to enter/input/dictate their progress notes using the voice recognition software. As for the digital pen, the analysis shows that participants found it relatively easy to use and they felt comfortable with it. However, they also encountered important technical problems and thought it was not a more efficient way to enter/input/dictate their progress notes.

Table 14 - Average participant ratings of mobile technology use characteristics: Monroe

Interaction Characteristics	Dragon Naturally Speaking (n)	Digital Pen (n)
ease of use	3.62 (21)	4.00 (12)
comfort with technology	3.36 (22)	4.00 (12)
quicker data entry mode	2.74 (19)	2.60 (10)
encountered technical problems	3.62 (21)	3.91 (11)

Notes: Ease of Use was rated on a 6-point scale (1 = “Very Difficult” and 6 = “Very Easy”). Quicker Data Entry Mode, Comfort with Technology, and Encountered Technical Problems were rated on a 6-point scale (1 = “Strongly Disagree” and 6 = “Strongly Agree”).

Work Location

The voice recognition software is not a mobile technology without a digital recorder or a laptop. Therefore it was used mainly at the office. The digital pen is an unobtrusive device and can be easily used for many types of activities and in many different locations. Caseworkers felt comfortable using it on home visits. During the information gathering sessions, participants also identified one key advantage to using digital pens for CPS work in general: the digital pens are good for writing when waiting in court, which is when a caseworker would normally be documenting their cases.

Types of Activities

Slightly more than three quarters of participants used the voice recognition software for their progress notes and about half used it for Microsoft Office applications. About one-third of them used it for investigation conclusion, and only a few participants used it for the other uses shown in Table 15 (below). About a third of the participants used a digital pen for their progress notes and Microsoft Office applications. A few participants used it for investigating conclusion, e-mail, and safety assessment.

Table 15 - Percentage of Caseworkers using the Mobile Technology: Monroe

Task	Percentage of Caseworkers using the Mobile Technologies (n)	
	Dragon Naturally Speaking	digital pen
progress notes	83 % (23)	35 % (23)
adding/changing case worker or planner	4 % (23)	0 % (23)
demographics	4 % (23)	0 % (23)
safety assessment	9 % (23)	4 % (23)
risk assessment profile	9 % (23)	0 % (23)
Investigation conclusion	30 % (23)	9 % (23)
Microsoft office applications	44 % (23)	30 % (23)
e-mail	17 % (23)	9 % (23)
schedule organizer	4 % (23)	0 % (23)

Overall Impacts on Work

Some caseworkers reported using DNS to complete progress notes faster, being able to dictate faster than type. For faster typists, the DNS system did not have this effect. Increased efficiency, or the lack of it, may be related to the complexity of the DNS system, which in the beginning, requires training. In fact, the time and effort needed to become adept may be high, which produces frustration for some of the caseworkers.

Digital pens also had some impacts on overall work, but caseworkers had high expectations that were not always met. Some expected the pen output to look like a finished product, but it did not. Others wrote more and with more complete sentences, so that the notes would be closer to a finished product and more easily placed in CONNECTIONS. Some users wrote brief notes and incomplete sentences and then modified the text prior to entering it into CONNECTIONS. They also noted the potential to use the pens during opportune moments during field work to develop finished products for uploading.

Impact on progress notes

The participants rated several characteristics of their progress notes before and during the pilot (see Table 16). According to these ratings, the length of the progress notes improved during the pilot. Caseworkers also reported being able to enter their progress notes during regular office hours. In contrast, most of the other progress note characteristics worsened during the pilot. This may be a result of the problems of learning a new technology and the complexity of incorporating it in their daily work.

Table 16 - Characteristics of Progress Notes before and During the Pilot: Monroe

Progress Notes Characteristics	Mean Value (n)	
	Prior to the Pilot	During the Pilot
about right length	5.15 (27)	5.24 (21)
completeness	5.30 (27)	4.81 (21)
adequate details	5.70 (27)	5.00 (21)
up-to-date	4.44 (27)	4.43 (21)
able to prepare of progress notes out of the office	3.81 (27)	1.89 (19)
able to enter progress notes into CONNECTIONS in the field	3.84 (25)	1.15 (20)
able to enter progress notes all at one sitting	3.96 (27)	3.86 (21)
able to entered progress notes during regular work hours	3.85 (27)	4.14 (21)

Notes: Progress Notes Characteristics were measured using a 7-point scale (1 = “Strongly Disagree” and 7 = “Strongly Agree”).

Impacts on work efficiency

Participants reported that neither the voice recognition software nor the digital pens saved them much time. Participants generally disagreed that the voice recognition software or the digital pens aided in accomplishing other tasks. In addition, they concluded that using the technology is only moderately efficient for doing their work.

Table 17 - Average Participant Ratings of Devices for Efficiency: Monroe County

Efficiency Impacts	Dragon Naturally Speaking (n)	Digital Pen (n)
the device saved me time	2.52 (21)	2.25 (12)
was a more efficient way to work	3.53 (19)	3.36 (11)
the device allowed me to accomplish other tasks	2.32 (19)	1.82 (11)

Notes: Time Savings, and Accomplishment of other tasks were rated on a 6-point scale (1 = “Strongly Disagree” and 6 = “Strongly Agree”). More efficient way to work was rated on a 6-point scale (1 = “Much Less Efficient” and 6 = “Much More Efficient”).

Participants mentioned one major disadvantage of using a digital pen: they produce separate files for each page of notes written on the special-purpose paper. They are thus required to cut and paste from individual files into a single MS Word document, and then from the MS Word document into CONNECTIONS. The inability to have multiple windows open at the same time in the central data application makes this problem even worse. Note entering takes extra time as a result of this cumbersome process.

Impacts on job stress

The pilot test experience appears to have had a small impact on stress levels. Prior to the pilot, participants rated their stress levels only slightly higher than during the pilot period. The survey responses also showed that stress due to open cases was rated slightly lower during the pilot period.

Overtime issues

Prior to the pilot only a small percentage of participants worked from home on a daily basis. Only one-third of the respondents indicated they did so a few times a week, while slightly over one-fourth rarely worked from home, and nearly two-fifths stated they never worked from home. There was an overall decrease in the number of participants working from home during the pilot. No participants reported working from home on a daily basis, and only one in ten worked a few times a week. Nearly one-third of respondents rarely worked from home, and than half never worked from home. The number reporting never working from home rose from 37 percent prior to the pilot, to 62 percent during the pilot, though this may be in part a result of fewer respondents to the later survey.

Table 18 - Percentage of caseworkers that work from home or after hours to complete progress notes – Monroe County

General Impacts on Work	Prior to the Pilot					During the Pilot				
	N	Daily	A few Times/Week	Rarely	Never	N	Daily	A few Times/Week	Rarely	Never
worked from home to complete progress notes	27	4%	33%	26 %	37%	21	0 %	10%	29 %	62%
stayed in the office after normal work hours to complete progress notes	27	26%	41%	15 %	19%	21	0 %	57%	33 %	10%

In general, the technology use seems to have produced a shift: reduced extra work time spent at home and increased after hours work in the office. Prior to the pilot slightly more than one-fourth of the participants worked after hours at the office on a daily basis, less than half a few times a week, about one in ten rarely worked after hours, and about one in twenty never worked after hours. During the pilot, the daily after-hours work dropped to zero, but the occasional rate rose to 57 percent. Only one-tenth of the participants never worked after working hours. This may be a consequence of the desktop installation of DNS and the unavailability of the digital recorders.

Overall Opinions

Dragon Naturally Speaking

The most common advantage mentioned during the information gathering sessions was related to how well dictation fit with workers’ preferred way of recording information. Those caseworkers who could dictate faster than type preferred the voice recognition system. The workers also reported that dictating helps to relieve users’ wrists and hands, thus limiting the risk of repetitive stress injuries.

Caseworkers also identified disadvantages of DNS. They did not like the inability to multitask while using DNS (i.e., making phone calls while typing). The requirements for training were considered too time consuming for caseworkers’ current work-schedule. They also described DNS as often difficult to use in cubical office environments due to ambient noise and dictation often being audible across many workplaces.

Digital Pens

Participants identified several potential advantages with digital pens. The technology could be used to complete local forms. In fact, the software has a tagging capability that when used with special forms it can put the data directly into a Word document. However, these special forms would need to be ordered from the manufacturer at an additional cost.

Some participants mentioned that the digital pens are useful for taking notes or numbers, but not long narratives such as progress notes. For instance, they were useful for an administrator and an IT person to use for short meeting notes. Therefore, using the technology and the pads could be beneficial if the data captured is routine, rather than narratives. Finally, supply of special-purpose pads is also perceived as a potential problem due to its relatively high cost.

Overall Satisfaction

Table 19 shows that participants were only mildly enthusiastic about these technologies overall. Their inclination to recommend these systems for further use was not strongly positive. However when asked for a simple “yes” or “no” about future use or recommending the technologies, the users were mostly positive, though more for the digital pens (72% yes), than for the DNS (65% yes).

Table 19 - Average participant ratings in overall satisfaction and recommendation of devices: Monroe

Overall Evaluation	Dragon Naturally Speaking (n)	Digital Pen (n)
overall satisfaction with technology	3.19 (21)	3.08 (12)
would recommend device to be used to do child protective work	3.57 (21)	3.75 (12)
overall opinion of technology for your work	3.42 (19)	3.55 (11)

Notes: Overall Satisfaction was rated on a 7-point scale (1 = “Not at all Satisfied” and 7 = “Very Satisfied”). Recommendation of Mobile Technology was rated on a 7-point scale (1 = “Not at all Recommend” and 7 = “Strongly Recommend”). Overall Assessment was rated on a 7-point scale (1 = “Low” and 7 = “High”, with a “No opinion” option).

Deployment and Security

The deployment issues for DNS are typical of new workplace technologies. There was not adequate training or change management provisions included in the pilot test. The hardware did not appear to consistently meet the DNS system’s minimum requirements.⁴ DNS is a relatively complex tool and dictating is not natural for many workers nor was it a common work skill prior to the pilot project. In addition, OCFS does not currently support DNS, resulting in possible lack of technical support. Although DNS does have the advantage of being a stand alone product, rather than a system, thus requiring no ongoing expense other than periodic upgrades.

Deployment of the digital pens involves similar problems, aside from dictation skills. Further development of input capabilities would depend on support for future forms development. The full potential of digital pens will depend on investments in forms applications for easier input to CONNECTIONS.

Using a digital recorder in conjunction with the voice recognition software can pose some security concerns. The contents on a digital recorder cannot be encrypted, hence the loss or theft of a device containing notes could result in loss of confidential information. However, this problem is similar to the potential loss of paper notes which are no more secure, but in common use. In addition, dictating in public would seldom be possible, so caseworkers would need private places to use the recorders for dictation.

The digital pens present similar security concerns. The main potential issue was that there are no easy ways to secure the pens, and therefore, loss of the device would result in loss of confidential information.

⁴The minimum system requirements for DNS version 9.0 are: Intel Pentium / 1 GHz processor or equivalent AMD processor, 512 MB RAM, 1 GB free hard disk space, Microsoft® Windows® XP (SP1 or higher) Home and Professional, 2000 (SP4 or higher), and Creative® Labs Sound Blaster® 16 or equivalent sound card supporting 16-bit recording. Some of the PC used for the pilot did not meet these minimums.

Overall Deployment and Security Considerations

Large- Scale Deployment Factors

The purpose of a pilot project is to discover what works well and what does not. For this pilot, a number of valuable lessons were learned and deployment issues identified. The issues are discussed below in three categories: infrastructure, training, and IT support of the mobile technologies.

Infrastructure concerns include connectivity and hardware specifications. Connectivity refers to how the mobile technologies connect to the central database. The laptops needed a connectivity solution that enables caseworkers to connect and sustain access to CONNECTIONS. Connectivity solutions may combine various wireless infrastructures (local hotspots or LAN's, wide area cellular provider services, etc.), and wired infrastructures (in courts and schools). Connectivity for the laptops was not uniformly reliable and faces considerable technical problems because of the densely built environment in much of the city. Cellular connectivity was a major concern with the telephonic dictation service as well due to unreliable cellular service coverage, which led to relatively large numbers of dropped calls and dead-zones (limited or no connectivity). Reliable connectivity is crucial to the success of both the laptop and dictation service strategies. Dealing with these infrastructure concerns must be a core part of future strategies.

Hardware specifications are similarly important. This pertains mainly to the voice recognition software deployed on caseworkers' desktop computers. The software is a relatively complex software application that requires considerable computing power to operate effectively. IT administrators must ensure that computers operating the software have ample processor speed, sufficient memory, and adequate sound cards to meet or exceed the products' minimum requirements.

The digital pens require using special paper in order to convert the analog information to digital text. Although the device is a one time cost, the special paper will be an on going cost to all Local Districts that deploy this technology.

The second main deployment area concerns training for caseworkers. Many of the problems described above are linked to three training needs: (1) basic training dedicated to familiarizing caseworkers with the particular problems and skills required for mobile technology, such as setting-up and calibrating the specific devices and applications, and understanding how to operate them, (2) what is needed to adapt the work practices and the technology capabilities to the work requirements and incorporate it into their daily tasks, and (3) what is needed to troubleshoot the mobile technology in the event that an error or malfunction occurs.

Caseworkers had more difficulties when they were required to learn new skills to use the mobile technologies effectively, particularly with dictation. Training sessions devoted to skills and techniques that enhance caseworkers' ability to dictate their notes may have improved the overall success of the mobile technology. Some caseworkers required additional training for use of the voice recognition software, which requires users to calibrate the software so that it is capable of recognizing users' personal speech patterns and accents.

A greatly expanded mobile technology operation for CPS work will require improvements in the technical and support infrastructure and resources. The districts do not currently have adequate personnel and technical resources to manage large numbers and wide varieties of mobile technologies while caseworkers are in the field. IT support varied from one district to the other, but they all have

limited capabilities to support a wide-scale deployment of mobile technologies. The lack of IT support for caseworkers using the voice recognition software led to frustration. And IT support is not limited to providing technical support to caseworkers with mobile technologies, but includes the full range of physical and organizational resources to ensure the systems are working as intended.

Security

Much of the data caseworkers collect must remain confidential. Security provisions for older paper based systems are not adequate for digital technologies. Security measures exist on several levels, namely data security in repositories or networks, security of data transmission, and security of data in portable devices. The following is a brief overview of the security concerns for each district using these categories.

The security concerns associated with the voice recognition software were related to the devices needed to make the technology portable (digital recorder or a laptop). Existing security technologies are not capable of securing the data on the digital recorder or digital pens. If such devices are used to store identifying information (names, addresses, social security numbers, etc.) the data is subject to loss or theft. When digital recorders or digital pens are connected to a PC for downloading, however, those PC's are parts of networks that may be vulnerable. Data can be encrypted on the PC, but not on the other portable devices. Allowing work with these devices at home increases all of these risks, particularly if workers use their home PC's for part of the process. The integrity and security of those home PC's are virtually impossible to ensure or maintain.

All three security concerns are applicable to working with connected laptops. The laptops that were deployed during the pilot were capable of connecting to the Internet and public networks. The data was secured on the laptops by requiring caseworkers to have a series of logins and passwords. The data connections were secured by use of a secure socket layer (SSL), a commonly-used protocol for managing the security of data transmission over a network. While several measures were taken to secure the storage and transmission of data, the existing infrastructure did not secure the devices themselves. The laptops' hard drives that were used during the pilot were not encrypted, and did not have a central "kill switch" that could be triggered in the event that a laptop was lost or stolen.

The security concerns with the third party transcription service provider were different from the other technologies. Data was transmitted in two different phases. The first was when the caseworker called into the system and the second was when the caseworker retrieved the typed progress notes from the Web site. Caseworkers reported being very careful of their surroundings when calling in their progress notes to ensure privacy of the data. There was virtually no security concerns related to the transmission of data over the cellular provider's network. And no confidential data are stored on the phone. Initially there were concerns about how the digitized notes on the service provider's servers were encrypted, how they were secured, and what the login protocol was for retrieving the digitized notes from the Web site. In the end, all involved parties reviewed the service provider's policies and accepted the security measures taken. Finally, caseworkers accessed the typed progress notes from the service provider's Web site using their desktop computer in the office (that had basic security measures such as password protection and SSL communications), and copied and pasted them into CONNECTIONS. However, workers could also access the service provider's database from their home PC's, opening a wide range of security risks such as storing sensitive information on a non-agency device. This still needs further investigation.

Overall Recommendations

Technology initiatives are rarely just about the technology. Most are about the organizational and policy environment in which these information technologies are embedded. Therefore, based on the assessment of all technologies within the Local Districts, our recommendations are divided in three categories: (1) technology, (2) management, and (3) policy.

More specifically, information technology initiatives do not take place in a vacuum and their results are significantly affected by managerial and policy factors. Thus, the results from our assessment clearly indicate that the use of mobile technologies for CPS is not different in this regard. To realize the most value in using these technologies, it is necessary to understand and act upon the management and policy factors that shape CPS work. The following recommendations describe actions within this approach.

Technology

Continue to evaluate laptop use and connectivity.

Through this study, we found the most significant potential for using mobile technology to improve CPS work was using laptops in the field. Although the initial results suggest that this solution offers the biggest payoff, continued investigation is needed into device, user, and connectivity issues. More specifically, laptops with wireless connectivity allow caseworkers to perform a number of work activities, with time and location flexibility, but investments must still be made into infrastructure, support, and determining whether access to CONNECTIONS should be continuous or synchronized.

Test additional combinations of dictation and laptops.

The possibility exists that improvement in CPS work can be multiplied by using a dictation device and a laptop together. Some caseworkers found dictating (rather than typing) to be a more efficient way to enter progress notes. This advantage, coupled with the laptop's functionality, could potentially increase caseworker productivity, but more study is needed to verify this observation.

Management

Take a broader look at caseload management.

Much discussion surrounds caseload management within the CPS environment. As with any change in a core business process, the introduction of mobile devices provides a partial mechanism to address productivity and quality issues. A continued statewide effort, including technology, that achieves an overall comprehensive improvements in CPS, such as decreased backlogs and delays, would address the particulars raised around caseload management. Attending to improved caseload management from a technological perspective only may limit the potential for success.

Focus on change management and overall support.

The introduction of mobile devices is more than an information technology initiative; it is also a significant organization wide change in CPS. Champions for change are needed at both the state and district levels to encourage and facilitate cross-boundary planning and communication. An understanding of the implications of change in any process for users for users, support staff, and both state and county executives is essential before any large-scale deployment is considered. This is necessary for any large scale deployment.

Provide training, training, and more training.

Caseworkers are more apt to incorporate new technologies in their work if they are well-trained on the technologies. Investments are needed in training for all mobile devices in order to mitigate frustrations that accompany all new learning initiatives. Providing dedicated time and resources to learn the technology may increase the likelihood will be used.

Develop additional measures for improvement.

Additional assessments should include expanded indicators of improvements in CPS work. Enhanced productivity, decreases in the number of overdue cases, and shorter turnaround time for progress notes are all important quantitative measures of CPS performance, but they do not address essential quality concerns. Expanding the list of performance measures to include changes in quality and use of information will provide a complementary way of evaluating the effectiveness of new information technologies.

Policy

Address work place policy issues related to a more mobile workforce.

Any shift to a more mobile and connected workforce brings with it the need to revisit longstanding personnel policies. The nature of casework requires a flexible work schedule because much of the work is done in the field. The introduction of mobile technologies offers the ability to also do traditional “office work,” such as research and documentation, in the field. As a consequence, policies that govern work schedules and compensation need to be re-examined so that they reinforce rather than work against the goals associated with the use of new tools.

Align wireless security provisions with the guidance of oversight agencies.

Remote access to district and agency systems will require a shift or modification in security policies. All security policies should be developed in accordance with the NYS Office for Technology and NYS Office of Cyber Security and Critical Infrastructure Coordination forthcoming wireless security policies.

APPENDIX A: About the Center for Technology in Government

Since 1993, the Center for Technology in Government (www.ctg.albany.edu), an applied research center at the University at Albany/SUNY, has worked in close cooperation with NYS government agencies to develop well-informed information strategies that foster innovation and enhance the quality and coordination of public services. We carry out this mission through applied research and partnership projects that address the policy, management, and technology dimensions of information use in the public sector.

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Appendix B: Current Practice Research

As part of our evaluation of the three mobile technology pilots, CTG conducted an extensive review of existing initiatives of similar nature in other states. Although the use of mobile technology in Child Protective Services (CPS) is new and remains relatively unexplored, we were able to identify seven states that have begun testing and using mobile technology for their CPS workers. Our review examined Internet and print literature sources, followed by phone interviews and email exchanges with most states identified through the search. This section presents general findings of the review, followed by short descriptions of each of the seven state's projects.

General Findings

The general findings are based on a relatively short record of experience with the use of mobile technology for CPS work. All seven of the state projects examined here began within the last three years. In these cases the motivations for testing this technology focused on improved record keeping and recording of field work, with emphasis on making more efficient use of CPS workers' time and preventing tragedies through better investigations and information access. There was also concern for improving CPS worker security while in the field. The final selection was ultimately driven by the cost of the device, its technological characteristics, and its ability to integrate into existing and future IT infrastructure plans of the agency.

We identified three distinct approaches to data entry into central database systems: direct data entry over a wireless connection, synchronization of data over a wireless connection, and entering data upon return to the office either via a docking station or copying and pasting. Some states took advantage of direct data entry into a central database over a wireless connection to avoid storing confidential information on a device that could be easily lost or stolen. Other states used synchronization and in-office entry because of the unreliable nature of wireless connection in some parts of the particular state. Loss or theft of devices did not appear to be a substantial problem in these tests, but wireless connectivity was problematic to some degree in all cases.

Several important lessons for deploying mobile devices for CPS work emerged from our research. Although each state worked under somewhat different circumstances and constraints, they all faced the same basic challenges and issues. Their ability to address these challenges ultimately determined the overall success of their projects.

Worker-driven programs are most likely to succeed.

The most important condition for a project's success was the degree of technology acceptance by the CPS workers themselves. The states with the most success in implementing mobile technologies involved their CPS workers in choosing the technology and actively sought and incorporated their feedback throughout the pilot and throughout the state wide implementation. This is consistent with the general finding that people are more likely to embrace a new way of doing things if they have a say in choosing or developing the new ways.

Lessons learned:

- Worker-driven programs are most likely to succeed
- Organizational and political commitment is vital to success
- In-depth pilots are necessary to draw accurate conclusions about device's suitability for CPS work
- Elimination of double entry is crucial to workers' satisfaction
- Wireless connectivity is essential but problematic
- Adequate IT support and training are necessary for successful implementation

Strong organizational and political commitment is vital to success. Mobile technologies that were tested in all seven states required significant financial commitment from the states and the agencies. States that were successful in pursuing their mobile technology projects had a strong commitment from the leadership of the agency as well as strong support from the governor or the legislators in charge of appropriating necessary funding for the project. States that lacked similar commitment experienced significant problems with their budgets, which proved to be detrimental to the projects' outcomes.

In-depth pilots are necessary to draw accurate conclusions about device's suitability for CPS work. Pilot projects must have a substantial number of participants over several months to test technologies in order to inform decisions about the feasibility of a statewide deployment. A technology might work well when tested by a small set of workers for a short time, but fails when deployed state wide because of problems that could not be uncovered in a small pilot. Such a failure can be very costly, not only financially but also politically, by creating residual resistance to new technologies among workers' who have been failed.

Elimination of double entry is crucial to workers' satisfaction. The introduction of central databases into CPS work impacted the front-line workers in many ways. One of the effects was the emergence of additional steps in recording notes. The advent of the central database required CPS workers to first handwrite their notes in the field and then copy these notes into the computer upon their arrival in the office. Adopting mobile data entry technology into the day-to-day work can eliminate this extra step, thus making the CPS workers more efficient in the use of their time. Technologies that are useful in other ways but do not eliminate the need for double entry simply do not live up to the workers expectations and their reception is not as positive as it otherwise could be.

Connectivity is essential but problematic. Wireless connectivity is essential to eliminating double entry and making the mobile device useful beyond just data entry. A device with wireless connectivity enables the worker to not only search agency databases and enter case information, but also use the internet for day-to-day tasks, such as criminal background checks, looking up directions, or helping their clients with locating additional services. Unfortunately, the quality of wireless

connection is dependant on the quality of its supporting infrastructure, which remains problematic in many locations around the nation.

State Projects

The following section provides brief summaries of each of the seven states' mobile technology projects in CPS work.

Texas

Motion Computing
LE 1600 Tablet
with wireless
connection

The state of Texas began testing mobile technology in 2005 with 27 Adult Protective Services (APS) workers, and later expanded the test to all 502 APS workers in fall 2005. In May 2006, 94 CPS workers begun testing the tablet's use in their work and a state wide deployment of 2,950 devices is currently underway. Texas piloted the tablet PC equipped with a Sprint Wireless card, portable keyboard, and a docking station. Due to the inconsistent quality of wireless connection in some parts of Texas, they have developed a Web-based application that does not require continuous connectivity, but can synchronize with the central database Mobile Protective System. Caseworkers identified the system's functionality as fulfilling the primary information and data entry needs for work in the field. It enabled caseworkers to download assigned cases for the day onto their device, work with the case information throughout the day, and later synchronize the information with the central database over a wireless connection or a docking station in their office. In addition to the capability to access their central database, they also have access to email and Internet.

The overall results of the Texas experience are positive, with 90 percent of users reporting being very pleased with the overall performance of their tablet. In addition to the overall performance, users reported increases in documentation timeliness and quality, plus an 11 percent reduction in investigation backlogs. However, they did encounter unexpected problems, such as major increases in help desk calls resulting in the need to hire more IT personnel and higher rates of damaged equipment resulting in the purchase of additional spare devices. They also discovered that the most important feature of the device is network access from both the field and the caseworkers' homes. Without this feature, tablets were beneficial but did not meet the full expectations of the CPS workers. Additionally, they emphasized the need for sufficient training in the use and security features of the devices, for field work and reporting, and to help them organize and manage their new tools. This will help minimize workers' frustration with carrying unnecessary gear into the field.

Kentucky

Dell Latitude
D-410 laptop
with a docking
station

In November 2005, 50 Kentucky CPS workers begun a six-month long pilot of mobile technology. The Dell Latitude D-410 laptop was selected based on extensive conversations with caseworkers as to what they needed to do their work more efficiently, exploration of business processes in CPS work, and shadowing CPS workers in the field. In addition, future IT plans were taken into consideration to assure future compatibility. A state wide deployment of 1,500 devices is planned for November 2006. In addition to the laptop, CPS workers were issued cell phones and digital cameras to help them with their investigative work.

"The worst thing you can do is to give workers technology that was chosen by leadership and IT people without the input of caseworkers."
- Dr. Eugene Foster, Kentucky's Undersecretary for Children and Family Services -

Currently, they are using an investigative template designed with caseworkers' input, which is later copied and pasted into the central database upon return to the office. Although they are investigating a

possibility of wireless access, the inconsistent quality of wireless connection around the state presents a major challenge.

The overall results reported by Kentucky's CPS workers are positive, with a majority reporting that laptops allowed them to complete their work outside the office: frequently in courts and in their own homes. Additionally, workers reported increased quality of work, reduction in stress and five percent overall reduction in past due investigations. Despite the caseworkers' positive experience with the mobile technology, the pilot tester acknowledged that in order to maximize the value of the devices they will need direct access to the central database.

Ohio

HP Compaq nc8230 Notebook with wireless connection
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The state of Ohio initiated its mobile technology project on September 24, 2006, with three groups of six caseworkers testing laptop computers for a duration of 30 days. This pilot is part of a bigger project testing the SACWIS database that began in the summer of 2006. They are testing laptop computers that have the capability to connect to the SACWIS database via a wireless connection and enable direct data entry into the central database.

The pilots will be evaluated through weekly and end-of-the-pilot surveys issued to participating CPS workers, as well as tracking of activities performed on the laptops. Because of the recent initiation of this pilot, results are not yet available for dissemination.

Georgia

HP Compaq 1100 Series Tablet PC

In 2004, Georgia completed a pilot that involved 30-40 CPS caseworkers. Based on the pilot results, the state invested \$7.5 million to purchase 2,500 Tablet PCs for its CPS workers. The implementation of Tablet PCs was in conjunction with the Risk Assessment Form project, in which caseworkers were able to download a risk assessment form onto their devices and later synchronize the form directly into the central database via a wireless connection. Unfortunately, this effort has met some insurmountable difficulties, and its managers acknowledge that the project, as originally envisioned, has failed. Currently, the Tablets are used to fill out a simple risk assessment template that is later downloaded onto a local server, where the information remains.

The problems leading to the project's failure could be divided into two categories, technological and organizational. The technological problems included poor quality of wireless connectivity around Georgia and insufficient hardware infrastructure on the agency side to support state wide implementation of the devices. These deficiencies triggering repeated shut-downs causing significant loss of data. The organizational problems included weak organizational and political support resulting in budgetary problems. There was also resistance from CPS workers who were not consulted about their preferences and who were forced to adjust to a new business process (i.e., Risk Assessment Form) at the same time being asked to use a new device to do their work.

The IT personnel that we interviewed felt that the Tablet PC could be a useful tool and they hope to use it in the future after a state wide implementation of a new SACWIS database that is currently under development.

Wisconsin

Tablet PCs with wireless connection

The state of Wisconsin initiated its pilot of mobile devices with two counties in August 2003. Their selection of a Tablet PC was driven by several factors: the desire to minimize user training and impact, minimize maintenance and management costs, allow sharing of devices, and provide secure storage and transmission of data. Prior to purchasing the technology, counties are able to borrow devices for a month to ensure that they are able to support it with sufficient IT personnel and to test its usefulness in their day-to-day operations.

In order to minimize duplication and limit impact of inconsistent quality of wireless connection, they have developed the eWiSACWIS interface. It enables them to check out cases from the central database at the beginning of their day, and later synchronize their work over a wireless connection. The project materials we obtained emphasized the importance of starting small and letting users determine what functionality to implement in the future. In order to do that, they have established procedures to gather input from the end-users and incorporate their suggestions into the future development of the application.

Delaware

Laptops with digital cellular technology

The state of Delaware experimented with laptop computers equipped with digital cellular technology that enabled direct access to the central database for reviewing existing client information and entering data. They used a thin-client application with CitriX MetaFrame processing to optimize the devices' performance and minimize the effects of connectivity disruption. The MetaFrame was set up to hold each user's application for up to four hours to allow the user to reconnect without losing data in case the connection was interrupted. Although the devices reduced transit time and enabled entry of information immediately after a visit, the laptops were seen as too heavy to make them practical in the field and the quality of the wireless connectivity was problematic in certain parts of the state.

They are currently looking into the use of tablet PCs to capture data in the field and upload them into the SACWIS application. They do not have enough experience as yet to determine the system's effectiveness in general use, although preliminary results were reportedly favorable.

Oklahoma

NEC - MobilePro 880 handheld PC

Oklahoma experimented with a handheld PC that was a cross between a laptop and a palm pilot. It offered both a wireless and hard connection and its exceptionally small size (only 2.43 pounds) made it especially appealing to CPS work. Unfortunately, the program was discontinued due to budgetary issues and the device's production has been discontinued.

APPENDIX C: List of Survey Categories

The following broad categories and bulleted details represent the type of data collected by the different survey instruments. Not all Local District survey instruments addressed each area. Participants were asked to provide information on work activities, impacts on job performance and stress, the technical and use characteristics of the technology, as well as their overall opinion about the technology(ies)

Types of Work Activities and Use

- What activities are people using mobile technologies to do?
- Location of use/mobile technology
- Whether they used the mobile technology or not

Technical Characteristics

- Wireless connectivity
- Readability of screen
- Size of device
- Weight of device
- Portability of device
- Battery life of device
- Durability of device

Interaction and Use Characteristics

- Functionality of device
- Ease of use of device
- Speed of entering/inputting/dictating progress notes with device
- Comfort level with device

Technical problems encountered with device

- General Impacts
- Job stress
- Efficiency

Quality of work with device

- Frequency of working at home
- Frequency of overtime work
- Time savings experienced with device

Impacts on Progress Notes

- Indication of the length of progress notes
- Indication of how complete and detailed the progress notes are
- How up-to-date progress notes are

Opinion about the mobility of work

- Location of where progress notes were prepared and entered – office or field
- Dictation of progress notes in Spanish

Overall Assessment of Mobile Technologies

- Opinion about the continued use of the mobile technologies in the field
- Opinion about the satisfaction experienced with the device
- Opinion about recommending the mobile technologies to coworkers
- Technical attitude
- Overall assessment

APPENDIX D: Sample Surveys

Sample Survey # 1 – Monroe Post Survey

Monroe County, Local District of Social Services Type: Post Survey Created by: Center for Technology in Government Administered by: Monroe County

Background

In June 2006, the Center for Technology in Government engaged with the NYS Office of Children and Family Services (OCFS) to assess the use of mobile technologies in child protective service work in Monroe County, New York City, and Westchester County. The aim of this assessment is to evaluate how portable technologies impact child protective service work. This post evaluation survey asks about your experiences in the pilot using the mobile technologies for CPS work. **If you have questions about this survey, please contact Tom Corbett.**

Please specify which mobile technology you are using/have used during the pilot, and the number weeks you used it: *Please check all that apply.*

Technology		Time in Weeks
<input type="checkbox"/>	Dragon Naturally Speaking (<input type="checkbox"/> Version 8 <input type="checkbox"/> Version 9)	
<input type="checkbox"/>	Digital Pen	

Data Input – Process Evaluation

- 1) For the tables below, please estimate the work time in hours per week during the pilot period you spent on each task. If you used Dragon Naturally Speaking or a digital pen for that task, please check the appropriate box to the right of the task.

CONX Related Activities			
Task	Approximate Hours/Week	Dragon Naturally Speaking	Digital Pen
Progress Notes		<input type="checkbox"/>	<input type="checkbox"/>
Your To Do's		<input type="checkbox"/>	<input type="checkbox"/>
Event List		<input type="checkbox"/>	<input type="checkbox"/>
Searches: Person, Address, Case, Resource and Staff		<input type="checkbox"/>	<input type="checkbox"/>
Review Intake Information		<input type="checkbox"/>	<input type="checkbox"/>
Adding/Relating Person		<input type="checkbox"/>	<input type="checkbox"/>
Adding/Changing Case Worker or Planner		<input type="checkbox"/>	<input type="checkbox"/>
Demographics		<input type="checkbox"/>	<input type="checkbox"/>
Safety Assessment		<input type="checkbox"/>	<input type="checkbox"/>
Risk Assessment Profile		<input type="checkbox"/>	<input type="checkbox"/>
Reassigning a Stage		<input type="checkbox"/>	<input type="checkbox"/>
Investigating Conclusion		<input type="checkbox"/>	<input type="checkbox"/>
Create an FSI		<input type="checkbox"/>	<input type="checkbox"/>
Stage Progression to FSS		<input type="checkbox"/>	<input type="checkbox"/>
Changing Case Status		<input type="checkbox"/>	<input type="checkbox"/>
FASP		<input type="checkbox"/>	<input type="checkbox"/>
Other, Please explain		<input type="checkbox"/>	<input type="checkbox"/>

Non-CONX Related Activities			
Task	Approximate Hours/Week	Dragon Naturally Speaking	Digital Pen
Microsoft Office Applications		<input type="checkbox"/>	<input type="checkbox"/>
E-Mail		<input type="checkbox"/>	<input type="checkbox"/>
Managing an Address book (Storing Contacts)		<input type="checkbox"/>	<input type="checkbox"/>
Schedule Organizer		<input type="checkbox"/>	<input type="checkbox"/>
Network Drives (Containing your files)		<input type="checkbox"/>	<input type="checkbox"/>
Network Drives (Shared files with other users)		<input type="checkbox"/>	<input type="checkbox"/>
Online Person Searches		<input type="checkbox"/>	<input type="checkbox"/>
Online Address Searches		<input type="checkbox"/>	<input type="checkbox"/>
Other, Please explain		<input type="checkbox"/>	<input type="checkbox"/>

2) **During the pilot my progress notes have been/were about the right length.**

Strongly Disagree Strongly Agree

3) **During the pilot my progress notes have been/were usually complete.**

Strongly Disagree Strongly Agree

4) **During the pilot my progress notes have had/had adequate details.**

Strongly Disagree Strongly Agree

5) **During the pilot my progress notes have been/were usually up to date.**

Strongly Disagree Strongly Agree

6) **During the pilot I was usually able to prepare my progress notes while out of the office (e.g., waiting for a client, waiting at court, on the bus, etc.).**

Strongly Disagree Strongly Agree

7) **During the pilot I was usually able to enter my progress notes into CONX while out of the office (e.g., waiting for a client, waiting at court, on the bus, etc.).**

Strongly Disagree Strongly Agree

8) During the pilot a mobile technology (Dragon Naturally Speaking, and Digital Pens) allowed me to enter progress notes into CONX while in the field.

Strongly Disagree Strongly Agree

9) During the pilot I usually entered my progress notes all at one sitting.

Strongly Disagree Strongly Agree

10) During the pilot I usually entered all my progress notes during regular working hours.

Strongly Disagree Strongly Agree

11) What were your normal working hours during the pilot?

start: _____ am pm end: _____ am pm

12) During the pilot, on average how many face-to-face field contacts did you have a week?

Usefulness – Time Savings – Quality – Efficiency

13) During the pilot how frequently did you work at home to complete your progress notes?

Daily A few times/week Rarely Never

14) During the pilot how frequently did you stay in the office after normal work hours to complete your progress notes?

Daily A few times/week Rarely Never

15) During the pilot, did you have time during your regular work day for working on progress notes outside the office (i.e., waiting for a client, waiting at court, on the bus, etc.)?

Almost Always Almost Never

Questions Related to Specific Mobile technologies

16) How would you rate the EASE OF USE of each mobile technology for doing your work?

**Very
Difficult**

**Very
Easy**

Dragon Naturally Speaking
Digital Pens

17) I found it quicker to enter/input/dictate my Progress Notes using the mobile technology?

**Strongly
Disagree**

**Strongly
Agree**

Dragon Naturally Speaking
Digital Pens

18) How difficult was it to get comfortable using the mobile technology for doing your work?

**Very
difficult**

**Very
Easy**

Dragon Naturally Speaking
Digital Pens

19) After I was comfortable using it, the mobile technologies listed below saved me significant time:

**Strongly
Disagree**

**Strongly
Agree**

Dragon Naturally Speaking
Digital Pens

20) After I was comfortable using it, the mobile technologies listed below allowed me to accomplish other tasks:

**Strongly
Disagree**

**Strongly
Agree**

Dragon Naturally Speaking
Digital Pens

If so, which tasks, please check all that apply:

- Case openings/closings
- CCRS Activity
- Time spent with families
- Time spent working on FASPs
- None of the above, I am able to finish my work in less time

Please explain your answer with as much detail and examples as possible:

21) To what extent do you think the mobile technology is a MORE EFFICIENT way to do work?

**Much More
Efficient**

**Much Less
Efficient**

Dragon Naturally Speaking
Digital Pens

22) To what extent do you think the QUALITY of your work was enhanced by using the mobile technology?

	Very Enhanced	Not at all Enhanced
Dragon Naturally Speaking Digital Pens		

23) To what extent were you SATISFIED with the mobile technology?

	Very Satisfied	Not at all Satisfied
Dragon Naturally Speaking Digital Pens		

24) To what extent would you RECOMMEND the mobile technology to be used for CPS work?

	Strongly Recommend	Not at all Recommend
Dragon Naturally Speaking Digital Pens		

25) I have encountered problems with the mobile technology that were out of my control

	Strongly Disagree	Strongly Agree
Dragon Naturally Speaking Digital Pens		

Please explain your answer with as much detail and examples as possible:

26) How would you rate the SIZE of the mobile technology for doing your work?

	Too small	Too large
Digital Pens		

27) How would you rate the WEIGHT of the mobile technology for doing your work?

	Just Right	Too Heavy
Digital Pens		

28) How would you rate the PORTABILITY of the mobile technology for doing your work?

	Excellent	Poor
Dragon Naturally Speaking		
Digital Pens		

29) How would you rate the BATTERY LIFE of the mobile technology for doing your work?

	Excellent	Poor
Digital Pens		

30) How would you rate the method of DATA ENTRY of the mobile technology for doing your work?

	Excellent	Poor
Dragon Naturally Speaking		
Digital Pens		

31) How would you rate the DURABILITY of the mobile technology for doing your work?

	Durable	Not at all Durable
Digital Pens		

Job Stress

32) During the pilot, I normally was under a lot of work-related stress.

Strongly Disagree Strongly Agree

33) During the pilot my open cases caused me a lot of stress.

Strongly Disagree Strongly Agree

Data about the Technology

34) During the pilot, I considered myself to be technically savvy :

Strongly Disagree Strongly Agree

For the table below, please estimate the average work time in hours per week during the pilot period you spent in each location. If you used Dragon Naturally Speaking or a digital pen in that location please record the approximate time spent using each technology.

Location	Approximate Hours per Week		
	Doing all work activities	Using Dragon Naturally Speaking	Using a digital pen
Court			
School			
County / Private Vehicle			
Public Transportation			
Community Center			
Office			
Clients' Residence			
Facility's Residence			
Your Residence			
Other, Please explain			
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Acceptance – Attitude

35) After having used the mobile technologies, please indicate which mobile technology (Dragon Naturally Speaking, and Digital Pens) you liked the most, and for what reasons

Please explain your answer with as much detail and examples as possible:

36) After having used the mobile technologies, please indicate which mobile technology (Dragon Naturally Speaking, and Digital Pens) you disliked the most, and for what reasons

Please explain your answer with as much detail and examples as possible:

37) After having used the mobile technologies (Dragon Naturally Speaking, and Digital Pens), would you want to continue using it in the field?

YES

NO

Please explain your answer with as much detail and examples as possible:

38) After using the mobile technologies (Dragon Naturally Speaking, and Digital Pens), would you recommend to your staff/coworkers to use it in the field?

YES

NO

Please explain your answer with as much detail and examples as possible:

39) After using the mobile technologies (Dragon Naturally Speaking, and Digital Pens), are there any reasons you would hesitate to take it with you when you are in the field?

YES

NO

Please explain your answer with as much detail and examples as possible:

40) After having used the mobile technologies (Dragon Naturally Speaking, and Digital Pens), what are some of the key advantages of the mobile technology?

41) After having used the mobile technologies (Dragon Naturally Speaking, and Digital Pens), what are some of the key disadvantages of the mobile technology?

Expectations of the Technology

42) What is your opinion about the *functionality* (capabilities, features, how it would be used to do your job...etc.) of Dragon Naturally Speaking?

High Low no opinion

Please explain your answer with as much detail and examples as possible:

43) What is your opinion about the *functionality* (capabilities, features, how it would be used to do your job...etc.) of the Digital Pens?

High Low no opinion

Please explain your answer with as much detail and examples as possible:

44) What is your opinion about the *ease of use* of Dragon Naturally Speaking?

High Low no opinion

Please explain your answer with as much detail and examples as possible:

45) What is your opinion about the *ease of use* of the Digital Pens?

High Low no opinion

Please explain your answer with as much detail and examples as possible:

46) What is your overall assessment of Dragon Naturally Speaking for your work?

High Low no opinion

Please explain your answer with as much detail and examples as possible:

47) What is your overall assessment of the Digital Pens for your work?

High Low no opinion

Please explain your answer with as much detail and examples as possible:

48) Please specify which of the following mobile technologies you have used during the pilot to perform your job and explain your answer with as much detail and examples as possible:

a) Dragon Naturally Speaking:

YES NO

Pros

Cons

b) Digital Pen:

YES NO

Pros

Cons

If there is anything else you would like to add or let us know regarding this survey or Child Protective Services, please feel free to do so by attaching additional sheets to this survey with your comments.

Name: _____ Date : _____/ _____ 2006

Title: _____ Position: _____

Thank you. The survey is now complete.

Sample Survey #2 – Westchester Baseline Survey

Westchester County, Local District of Social Services Type: Baseline Survey Created by: Center for Technology in Government Administered by: Westchester County

I. BACKGROUND

In June 2006, the Center for Technology in Government (CTG) engaged with the NYS Office of Children and Family Services (OCFS) to conduct an assessment of the use of mobile technologies in child protective service work. Westchester is one of three districts in NYS participating in this assessment, the others are New York City, and Monroe County. The aim of this assessment is to evaluate how portable technologies impact the work involved in child protective service investigations. This baseline survey – to be filled out only one time per person, will gather data about experiences and expectations with mobile technologies and CPS work.

II. DATA INPUT

- 1) **For each task below that you normally perform, please record the approximate number of hours per week you spent on it prior to using the mobile device:**

CONX – Related Activities		
Activity	Approximate hours/week	Don't normally perform
Progress Notes		<input type="checkbox"/>
Your To Do's		<input type="checkbox"/>
Event List		<input type="checkbox"/>
Searches: Person, Address, Case, Resource and Staff		<input type="checkbox"/>
Review Intake Information		<input type="checkbox"/>
Adding/Relating Person		<input type="checkbox"/>
Adding/Changing Case Worker or Planner		<input type="checkbox"/>
Demographics		<input type="checkbox"/>
Safety Assessment		<input type="checkbox"/>
Risk Assessment Profile		<input type="checkbox"/>
Reassigning a Stage		<input type="checkbox"/>
Investigating Conclusion		<input type="checkbox"/>
Create an FSI		<input type="checkbox"/>
Stage Progression to FSS		<input type="checkbox"/>
Changing Case Status		<input type="checkbox"/>
FASP		<input type="checkbox"/>
Other, Please explain		

Non-CONX Related Activities		
Activity	Approximate hours/week	Don't normally perform
ACRS ^{PLUS}		<input type="checkbox"/>
CRIMCHECK		<input type="checkbox"/>
E-Mail		<input type="checkbox"/>
LTS (Legal Tracking system)		<input type="checkbox"/>
PROMIS (Preventive Organizations Management Information System)		<input type="checkbox"/>
PTS (Placement Tracking System)		<input type="checkbox"/>
Network Drive containing your files		<input type="checkbox"/>
Network Drive shared with other users		<input type="checkbox"/>
Other, Please explain		

2) Prior to the pilot my progress notes were about the right length.

Strongly Disagree Strongly Agree

3) Prior to the pilot my progress notes were usually complete.

Strongly Disagree Strongly Agree

4) Prior to the pilot my progress notes had adequate details.

Strongly Disagree Strongly Agree

5) Prior to the pilot my progress notes were usually up to date.

Strongly Disagree Strongly Agree

6) Prior to the pilot I was usually able to prepare my progress notes during down time.

Strongly Disagree Strongly Agree

7) Prior to the pilot I was usually able to use my downtimes to enter my progress notes into CONX:

Strongly Disagree Strongly Agree

8) Prior to the pilot I believed a mobile device would allow me to enter progress notes into CONX while in the field.

Strongly Disagree Strongly Agree

9) Prior to the pilot I usually entered my progress notes all at one sitting.

Strongly Disagree Strongly Agree

10) Prior to the pilot I usually entered all my progress notes during regular working hours:

Strongly Disagree Strongly Agree

**11) What were your normal working hours prior to the pilot:
_____ am to _____ pm.**

12) Prior to the pilot, on average how many face-to-face field contacts did you have a week? _____

III. USEFULNESS-TIME SAVINGS

13) Prior to the pilot how frequently did you work at home to complete your progress notes?

daily a few times/week rarely never

14) Prior to the pilot how frequently did you stay in the office after normal work hours to complete your progress notes?

daily a few times/week rarely never

IV. EXPECTATION OF SPECIFIC MOBILE DEVICES

15) Prior to the pilot I thought a transcription service would work well for progress notes.

Strongly Disagree Strongly Agree

16) Prior to the pilot I wanted to transcribe my progress notes in Spanish

Strongly Disagree Strongly Agree

V. JOB STRESS

17) Prior to the pilot, I normally was under a lot of work-related stress:

Strongly Disagree Strongly Agree

18) Prior to the pilot my open cases caused me a lot of stress.

Strongly Disagree Strongly Agree

VI. DATA ABOUT THE TECHNOLOGY

19) Prior to the pilot, I considered myself to be technically savvy :

Strongly Disagree Strongly Agree

20) Please record below the location and approximate amount of down time you had, on average, prior to the pilot.

21)

Location	Minutes/day
Court	
School	
Community Center	
ACS Office	
Clients' Residence	
Facility's Residence	
Other Residence	
Other – Please explain	

VII. EXPECTATIONS OF TECHNOLOGY

22) What was your opinion about Santrax *functionality* (capabilities, features, how it would be used to do your job...etc.) prior to the pilot?

High Low no opinion

Please explain your answer with as much detail and examples as possible:

23) What was your opinion about laptop *functionality* (capabilities, features, how it would be used to do your job...etc.) prior to the pilot?

High Low no opinion

Please explain your answer with as much detail and examples as possible:

24) What was your opinion about Santrax *connectivity* (connecting from cell phone/land-line to Santrax, accessing Santrax from the web...etc.) prior to the pilot?

High Low no opinion

Please explain your answer with as much detail and examples as possible:

25) What was your opinion about laptop *connectivity* (wireless connectivity, connecting to the Internet and other online applications...etc.) prior to the pilot?

High Low no opinion

Please explain your answer with as much detail and examples as possible:

26) What was your opinion about Santrax ease of use for your work prior to the pilot?

High Low no opinion

Please explain your answer with as much detail and examples as possible:

27) What was your opinion about laptop ease of use for your work prior to the pilot?

High Low no opinion

Please explain your answer with as much detail and examples as possible:

28) What was your overall opinion about Santrax for your work prior to the pilot?

High Low no opinion

Please explain your answer with as much detail and examples as possible:

29) What was your overall opinion about laptops for your work prior to the pilot?

High Low no opinion

Please explain your answer with as much detail and examples as possible:

VIII. PAST EXPERIENCES WITH MOBILE TECHNOLOGIES

30) Have you used Dragon Naturally Speaking in your work? Yes No

If yes, for what tasks? _____

What do you like about using it? _____

What do you not like about using it? _____

31) Have you used a digital voice recorder in your work? Yes No

If yes, for what tasks? _____

What do you like about using it? _____

What do you not like about using it? _____

32) Have you used a laptop in your work? Yes No

If yes, for what tasks? _____

What do you like about using it? _____

What do you not like about using it? _____

33) What other mobile technology have you used in your work?

Other mobile technology _____

For what tasks? _____

34) Are you currently using Santrax? Yes No

Name: _____ Date: _____ / _____ / 2006

Title: _____ Position: _____



**New York State
Office of
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