



House Committee on Oversight and Government Reform
and the
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Archives

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Critical Operations of
The 2010 Census

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1 Introduction

The MITRE Corporation is a not-for-profit organization chartered to work in the public interest. MITRE manages three Federally Funded Research and Development Centers (FFRDCs): one for the Department of Defense, one for the Federal Aviation Administration, and one for the joint-partnership between Internal Revenue Service and the U.S. Department of Veterans Affairs. A Federally Funded Research and Development Center (FFRDC) is a unique organization that assists the United States government with scientific research and analysis, development and acquisition, and/or systems engineering and integration. FFRDCs address long-term problems of considerable complexity, analyze technical questions with a high degree of objectivity, and provide creative and cost-effective solutions to government problems.

Governed by Part 35.017 of the Federal Acquisition Regulations, FFRDCs operate in the public interest with objectivity, independence, freedom from conflict of interest, and full disclosure of their affairs to their respective sponsors.

The Decennial Census is an enormous undertaking, requiring the U. S. Census Bureau to develop or acquire technology-based solutions that improve quality and efficiency. However, technology itself is not a panacea. The technology requires changes in the roles of the people and the processes they implement. Planning, acquisition, and coordinating the changes to this combination of people, processes, and technology are very complex and filled with risk. This complexity spurred the Census Bureau to request MITRE assistance in 2004.

Today's testimony responds to the topics listed in the hearing invitation from Chairman Clay dated February 13, 2009. These topics include:

- Integration and Testing of the Information Technology Systems
- Analysis of the December 2008 Operational Field Test of the Handheld Computers
- Preparations for Address Canvassing
- Reliability of the Cost Estimate
- Reliability of the Field Infrastructure for Non-Response Follow Up and Other Operations.
- Implementation of the 2010 Census Local Update of Census Address (LUCA) program

We are providing no comments on the Local Update of Census Address program, because MITRE has not been involved in any phase of the LUCA operation. The other topics are addressed in each of the following sections.

2 Integration and Testing of the Information Technology Systems

MITRE has had limited involvement with the integration and testing of information technology (IT) systems required to support conducting the 2010 Decennial Census. Our involvement consisted of observations of some tests of the Address Canvassing system, as described in Sections 3 and 4.

In addition, MITRE assisted the Census Bureau in the development of a program monitoring portal, called the electronic Census Operations Center. The electronic Census Operations Center helps Census Bureau leaders track the overall status of preparations for the Decennial Census, including Information Technology Integration and Testing. The electronic Census Operations Center provides Census Bureau leaders easy access to plans, schedules, status, risks, issues, decision memoranda, and other reference information so they can monitor and control program activities for a successful 2010 Decennial Census.

Overseen by Assistant Director of Decennial Programs, Dr. Dan Weinberg, and created with the help of the Geography and Decennial Management Divisions, the electronic Census Operations Center gathers, coordinates, and disseminates decennial census-related information from across the Census Bureau, including:

- Program Management Reviews, Risk Registers, and approved Detailed Operational Plans for each of the major Census operations
- Weekly schedule reports and the 60-day look-ahead for all activities
- Status on program-level issues, such as Testing, Address Canvassing Workload, and Fingerprinting
- Contact information for each issue manager
- Testing status of eight major operations
- Recent presentations by Census Bureau staff at conferences around the United States.

The Decennial Census Testing Officer provides weekly status updates to the electronic Census Operations Center. This information is available to everyone with access to the Census Intranet and helps integrate information technology activities and uncover critical dependencies.

Finally, an executive-level snapshot of status is extracted and communicated monthly to Census Bureau managers and to the Department of Commerce in a 2010 Census Monthly Status Report.

3 Analysis of the December 2008 Operational Field Test of the Handheld Computers

MITRE was tasked by the Census Bureau to observe the Address Canvassing Operational Field Test of the 2010 Census Field Data Collection Automation (FDCA) System held in Fayetteville, North Carolina during the week of December 8th, 2008. We documented our observations to characterize issues and provide recommendations to assist preparations for the full Address Canvassing operation.

The goals of this observation survey were:

- To understand the Census Address Canvassing Field Operations environment and its use of software, infrastructure, and operational/management procedures in achieving the mission
- To observe the operational and technical workings of an Early Local Census Office (ELCO), particularly with respect to system usage and how operational procedures influence and are influenced by systems
- To identify how the current FDCA system is being used to conduct Address Canvassing and to observe specific examples of system interfaces being exercised
- To observe operational use of the handheld computer by Field Listers for Address Canvassing from a systems perspective to help validate and improve understanding of current FDCA systems operational behavior.

It should be noted that the software under test in the Operational Field Test was not the final version of the software that will be used for Address Canvassing.

Using non-disruptive techniques MITRE documented observations and verbal accounts relative to the support for and conduct of the FDCA-related field operations for Address Canvassing. Several personnel were interviewed to better understand the Early Local Census Office operational support and technology infrastructure and to gain a better understanding of the operational procedures within the Address Canvassing Operation.

Findings

MITRE's observations focused on two specific portions of the Operational Field Test:

- Early Local Census Office Support for Address Canvassing Field Operations
- Address Canvassing Field Operations using the handheld computer.

The Fayetteville ELCO provided an efficient environment for the Address Canvassing operational field test support. Operational management responsibilities and staff boundaries were clear and well understood. The ELCO was a self-contained unit operating in a single facility. All necessary computer hardware, software, and local area networking were provided in-house. Remote access to Census Headquarters systems was provided by commercial carrier network link running as part of the Census FDCA Network.

The field use of the handheld computer by listers and crew leaders provided an efficient means of automating the listing, timesheet, and assignment tracking processes. Based on our observations and information reported during the Fayetteville Address Canvassing Operational Field Test, the operations control system and handheld computer worked effectively and provided the necessary capabilities to perform Address Canvassing. Specific conclusions with respect to FDCA system functionality, performance, stability and usability for Address Canvassing are given below:

Functionality

The FDCA handheld computer and operation control system have acceptable functionality to support Address Canvassing. Office staff, Crew Leaders, and Quality Control Crew Leaders were able to create and update assignments. Listers and Quality Control Listers were able to locate and successfully work their Assignment Areas.

Performance

The FDCA handheld computers demonstrated acceptable performance. Listers and Crew Leaders were able to use the handheld computer device and software to perform their required tasks without undue delay. The FDCA handheld computer transmission performance and operation control system performance were adequate for a single ELCO. A transmission load test involving the simultaneous transmission by more than 60 listers using handheld computers demonstrated acceptable performance. This test simulated the load of a much larger number of users, as transmissions in full operations will occur randomly and will not be synchronized. The risk of performance problems merits continued testing and monitoring until Address Canvassing is completed due to the huge number of workers accessing the system.

Stability

The handheld computer solution performed well. A known anomaly was observed, but the anomaly was reported to the help desk and was resolved by the lister in the field using an operational “workaround.” As a result, the desired work was completed successfully. The known workarounds are documented in the full Address Canvassing training materials. The workarounds are being provided to the Help Desk staff as knowledge base articles that can be used to help users in the field.

Usability

The handheld computer solution was usable by Crew Leaders and listers for both Address Canvassing and Quality Control. Several procedural issues were observed and reported that related to the limited degree of the Operational Field Test refresher training. However, these issues will be covered during the full Address Canvassing training activities.

Overall, the Address Canvassing Operational Field Test observations indicate that the tools and operational concepts being employed for Address Canvassing in the ELCO and for field work are fundamentally sound and provide a workable model for the upcoming 2010 Decennial Address Canvassing. The existing issues are manageable, and the FDCA Program Management Office and the contractor continue to address the issues that have been identified through the testing. Continued attention to the remaining risks is recommended until the completion of Address Canvassing considering the size and complexity of the operation.

4 Preparations for Address Canvassing

MITRE was asked to assist with several preparatory tasks for Address Canvassing as described in the rest of this section.

Contingency Software Development:

Former Director Steve Murdock tasked MITRE to develop contingency software and an end-to-end system design that could be used during Address Canvassing if the primary solution experienced catastrophic problems. MITRE worked with the Census Bureau to identify existing Census software that could be re-used and to establish the bare minimum requirements for an Address Canvassing contingency system.

The user requirements were documented and analyzed to develop a set of minimum system requirements needed to conduct Address Canvassing. The Census Contingency architecture included an Operation Control System based on the Census Operation Control System used during the 2006 Census Operational Test. New software was developed for handheld computers for listers and crew leaders, although it was developed to run on laptop computers and handheld computers that the Census Bureau had already acquired.

Agile Development methodologies were employed in the Census Contingency software development. The methodologies included frequent user reviews of functionality and “as-built” software demonstrations. Five demonstration reviews were held during the four month development period

The end-to-end Contingency system, demonstrated in November 2008, included both Operation Control System capabilities and handheld computer capabilities. The effort was halted in December 2008, because the primary solution became sufficiently robust for the Census Bureau to decide an end-to-end contingency was no longer needed.

Operational Readiness Review

The Associate Director for Decennial Census, Mr. Arnold Jackson, asked MITRE to attend the Address Canvassing Operational Readiness Review for the FDCA System held in January 2009. The contractor reviewed the readiness of the FDCA System solution for Address Canvassing and responded to Census questions and comments. An action item list was jointly developed by the contractor and Census for follow up to specific questions and issues raised during the review. MITRE is currently engaged with the Census FDCA Program Management Office on several

tasks relating to Address Canvassing, including post-Operational Readiness Review action items and FDCA Address Canvassing performance analysis and tuning.

System Performance Testing

Mr. Jackson requested a MITRE review of the FDCA system performance testing that was being conducted by the contractor. A major concern was the ability of the FDCA infrastructure to handle the load created by the use of approximately 150,000 handheld computers and the associated number of Local Census Offices during the full Address Canvassing operation.

MITRE worked with FDCA Program Management Office staff to review and assess the FDCA performance requirements and design, performance tests, and performance models. MITRE also toured the contractor's performance testing facility and questioned their engineers about their tools and methodologies. MITRE concluded that the contractor's methodology was consistent with current best practices and was an effective way to estimate performance and scalability of the system. MITRE continues to work with the FDCA Program Management Office in reviewing results of the ongoing contractor testing effort.

Overall Observations

The FDCA Program Management Office and the contractor appear to be collaborating effectively on testing and preparations for Address Canvassing operations. The contractor is executing a structured test program that conforms to best practices and appropriate tools and processes in the areas that MITRE has observed. The levels of cooperation and communication between the FDCA Program Management Office and the contractor have improved significantly in the past year.

Although we are cautiously optimistic about the Address Canvassing operation, risks remain within it and other operations for the 2010 Decennial Census. These risks are natural for such large programs. Census Bureau personnel update and monitor these risks on a regular basis, and constant attention will be required until the Decennial is completed.

5 Reliability of the Cost Estimate

In April 2008, MITRE received direction from Director Murdock to update the FDCA Independent Government Cost Estimate. This was partially in response to a request from Chairman Clay for a review of the costs by MITRE during an April 9, 2008 joint hearing on the FDCA contract by the House Committee on Oversight and Government Reform and the Subcommittee on Information Policy, Census, and National Archives.

The original Independent Government Cost Estimate was produced by MITRE in April 2005 to assist the Census Bureau in the initial planning and acquisition processes for FDCA. The original Independent Government Cost Estimate was \$622 million for the lifecycle of the FDCA program. All three proposals from industry were within a 10 percent margin of the MITRE estimate, including the Harris Corporation proposal of \$596 million. Census awarded the FDCA contract to the Harris Corporation in March of 2006.

Since the time of contract award, there were several significant program changes that affected the estimated cost of the program. As a result, the FDCA Independent Government Cost Estimate was updated by June 2008 to prepare the Census Bureau for re-negotiating the contract with Harris. The June update is the previous estimate that was provided to this committee.

In August 2008, MITRE was asked to calculate an “estimate to complete” cost to aid contract negotiations that addressed the rebalancing of work from the contractor to the government. The Estimate to Complete reflected all approved changes of scope, the costs incurred to date (aka, “sunk costs”), and the estimated costs of the remaining work. The Harris Corporation and the Census Bureau completed contract re-negotiations in September 2008.

Table 1 provides a brief history of the estimates of the costs of the FDCA contract.

Table 1. Cost Estimate History

Description	Estimates at Time of Contract Award (March 2006)	June 2008 Update	Estimate to Complete
Harris	\$596M	\$1,306M (Rough Order of Magnitude)	\$798M (September 2008)
MITRE Independent Government Cost Estimate	\$622M	\$726M	\$795M (August 2008)

MITRE also reviewed the cost estimates for scope of work that had been transferred to the Census Bureau and found the estimates to be reasonable.

MITRE continues to assist the FDCA Program Management Office on an as-needed basis in evaluating Change Requests (CR) that reflect adjustments to the scope of work. The FDCA Program Management Office has established a firm baseline with the contractor that should facilitate the orderly evaluations of the CRs.

The Census Bureau also requested acquisition guidance from MITRE during the contract negotiations in August 2008. The Census Bureau modified the fee structure and established an Incentive Fee Plan that is better suited to the remaining Harris work. The Incentive Fee Plan establishes a more objective measure of cost and technical performance. Consistent with the Federal Acquisition Regulations, the cost incentives include a target cost, a target fee, and a fee adjustment formula. The technical incentives employ a metrics-based to substantiate claims of fee eligibility.

The new Incentive Fee Plan has only been in operation for one fee period, so it is too soon to determine the effectiveness of the incentive fee structure. The Incentive Fee Plan has effectively established reasonable and attainable performance targets that are clearly communicated with the contractor.

6 Reliability of the Field Infrastructure for Non-response Follow-up and Other Operations

MITRE is not directly involved in the preparations of the infrastructure for Non-Response Follow-Up. Status and testing information is provided to Census Bureau leaders through the electronic Census Operations Center as mentioned earlier. One aspect of that reporting that merits mention is the Census Bureau's approach to risk management.

MITRE assisted the Census Bureau in developing the current procedures to identify and quantify the magnitude of the risks that are identified by Census Bureau personnel. The Census Bureau maintains a risk register that contains the risks that are related to infrastructure for non-response follow-up and other operations. The risk register is reviewed by the Risk Review Board on a weekly basis, and risks are documented in the monthly status report reviewed by the Associate Director for Decennial Census. The report is provided to the Department of Commerce, too.

The risk quantification process employs a generally accepted approach that defines five levels of probability and impact. Each risk is periodically reviewed, providing Census Bureau leaders with an up-to-date list of risks that is ordered by severity. Mitigation plans for the risks of greatest concern are in place to reduce either the probability of occurrence or the impact of a particular risk if it occurs. The Census Bureau is in the process of developing the remainder of the mitigation plans by the end of March 2009.

Appendix A Acronyms

FDCA	Field Data Collection Automation
FFRDC	Federally Funded Research and Development Center
LUCA	Local Update of Census Addresses