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**2010 CENSUS PLANNING MEMORANDA SERIES**

**No. 177**

MEMORANDUM FOR      The Distribution List

From:                      Arnold Jackson *[signed]*  
                                 Acting Chief, Decennial Management Division

Subject:                    2010 Census Cost and Progress Assessment Report

Attached is the 2010 Census Cost and Progress Assessment Report. The Quality Process for the 2010 Census Test Evaluations, Experiments, and Assessments was applied to the methodology development and review process. The report is sound and appropriate for completeness and accuracy.

If you have questions about this report, please contact Guinevere Mills at (301) 763-5421.

Attachment

**February 24, 2012**

# **2010 Census Cost & Progress Assessment Report**

**U.S. Census Bureau standards and quality process procedures were applied throughout the creation of this report.**

**FINAL**

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# Table of Contents

<b>EXECUTIVE SUMMARY .....</b>	<b>V</b>
<b>1. INTRODUCTION.....</b>	<b>1</b>
<b>1.1 SCOPE.....</b>	<b>1</b>
<b>1.2 INTENDED AUDIENCE .....</b>	<b>1</b>
<b>2. BACKGROUND.....</b>	<b>1</b>
<b>3. METHODOLOGY.....</b>	<b>2</b>
<b>3.1 QUESTIONS TO BE ANSWERED.....</b>	<b>2</b>
<b>3.2 METHODS .....</b>	<b>4</b>
<b>4. LIMITATIONS.....</b>	<b>4</b>
<b>5. RESULTS .....</b>	<b>4</b>
<b>5.1 QUESTION 1 .....</b>	<b>4</b>
<b>5.2 QUESTION 2 .....</b>	<b>7</b>
<b>5.3 QUESTION 3 .....</b>	<b>7</b>
<b>5.4 QUESTION 4.....</b>	<b>8</b>
<b>5.5 QUESTION 5 .....</b>	<b>8</b>
<b>5.6 QUESTION 6 .....</b>	<b>9</b>
<b>5.7 QUESTION 7.....</b>	<b>11</b>
<b>6. RELATED EVALUATIONS, EXPERIMENTS, OR ASSESSMENTS.....</b>	<b>14</b>
<b>7. LESSONS LEARNED, CONCLUSIONS, AND RECOMMENDATIONS .....</b>	<b>14</b>

<b>7.1</b>	<b>LESSONS LEARNED .....</b>	<b>14</b>
<b>7.2</b>	<b>CONCLUSIONS .....</b>	<b>15</b>
<b>7.3</b>	<b>RECOMMENDATIONS.....</b>	<b>15</b>
<b>8.</b>	<b>ACKNOWLEDGEMENTS.....</b>	<b>15</b>
<b>9.</b>	<b>REFERENCES .....</b>	<b>15</b>
	<b>APPENDIX A: SCHEDULE DATA.....</b>	<b>16</b>
	<b>APPENDIX B: CHANGE REQUEST DATA.....</b>	<b>22</b>
	<b>APPENDIX C: TEST DATA.....</b>	<b>23</b>
	<b>APPENDIX D: ALERT DATA.....</b>	<b>24</b>
	<b>APPENDIX E: REPORT ACCESS DATA.....</b>	<b>26</b>
	<b>APPENDIX F: LESSONS LEARNED.....</b>	<b>40</b>
	<b>APPENDIX G: .....</b>	<b>46</b>

## LIST OF TABLES AND FIGURES

Table 1. Question 1 Data Results: Summary Table for Original Duration Variance by Lifecycle Phase. ....	5
Table 2. Question 1 Data Results: Schedule Change Requests for Baseline Start or Finish by Lifecycle Phase. ....	6
Table 3. Question 2 Data Results: Completed Change Requests by Type. ....	7
Table 4. Question 3 Data Results: Transition Phase System Testing for C&P Reports.....	7
Table 5. Question 4 Data Results: Alert Notices Posted for Inaccurate Data from February through October, 2011. ....	8
Table 6. Question 5 Data Results: Alert Notices Posted for No or Late Delivery of Data from February through October, 2011.....	8
Table 7. Question 6 Data Results: Report Accesses by Operation. ....	9
Figure 1. Distribution of C&P Reports by Percentile. ....	10
Table 8. Question 6 Data Results: Total Number of Ad Hoc Reports by Operation.....	11
Figure 2. Question 7 Data Results: Highest Number of User Logins by Month during Key Operations. ....	12
Figure 3. Question 7 Data Results: Total Reports Accessed during Peak Period.....	13
Figure 4. Question 7 Data Results: Reports Accessed by Time of Day. ....	14

## **EXECUTIVE SUMMARY**

The 2010 Census Cost and Progress System (C&P) was the official source for tracking and reporting cost and progress activities for the 2010 Census. The Decennial Management Division Management Information Systems Branch developed and maintained the 2010 Census C&P System.

This assessment determines if the estimated level of effort was sufficient for the lifecycle phases for 2010 Census C&P System reports; if the initial requirements fulfilled the operation managers' need to monitor census operations; if developed reports met customers' requirements; if data sources delivered data in the specified format and on-time; which reports were most and least frequently viewed; which were the heaviest periods of user logins; and, the cost to produce the reports.

The Elaboration Phase, when requirements were gathered from managers, was critical to the MIS staffs' ability to successfully deliver reports to operation managers during the 2010 Census. Management staff must be able to visualize the information elements that will enable them to monitor their operation. Overall, the Transition Phase, when requirements were programmed and tested, showed that the MIS staff developed reports that met requirements. Inaccurate data and late delivery from data sources reflected upon the credibility of the MIS staff to provide up-to-date cost and progress data at critical times when operation managers needed reports to monitor their operations.

The number of reports created for an operation did not necessarily translate into program managers accessing more reports. Regardless of the number of reports, most users accessed about the same number of reports, four to six, across all operations. Several users took advantage of the ad hoc functionality to create new reports tailored to their specific needs once the operations started. Users created nearly 75 percent as many ad hoc reports as the MIS staff created reports.

The peak period for user logins to view reports began with Address Canvassing in February 2009 and concluded October 2010 with Data Capture Part II. The heaviest days of the week when users accessed reports were Monday through Wednesday from 8:00-11:00 AM and slowly decreased during the work day. In all instances when system engineers performed upgrades, the MIS staff verified the system was restored to a fully functioning state.

# 1. INTRODUCTION

## 1.1 Scope

The purpose of this document is to provide an assessment of the 2010 Census Cost & Progress (C&P) System that may assist planners designing a management information system for the 2020 Census.

## 1.2 Intended Audience

This document was developed for the following audience: Decennial Management Division (DMD) Management Information System (MIS) Branch, Census Integration Group, 2020 Census planners, and decennial census operation managers.

# 2. BACKGROUND

The 2010 Census C&P System was the official source for tracking and reporting cost and progress activities for the 2010 Census. The DMD MIS Branch developed and maintained the 2010 Census C&P System.

Users accessed the 2010 Census C&P System via a single sign-on web interface, the SAS Information Delivery Portal. The SAS Information Delivery Portal provided a standardized home page with pre-defined tabular and graphic reports. The 2010 Census C&P System included reports and geospatial mapping. The depth to which maps and reports were drillable depended on the level of detail available in the data collected.

The SAS Information Delivery Portal provided several features for user personalization. In addition to the pre-defined reports, users could create their own reports and graphs using tools that simplified finding, creating, and sharing reports. The SAS Add-In for Microsoft Office enabled users to harness the power of SAS analytics and to access SAS data sources from within Microsoft Word, Excel, and PowerPoint.

The DMD MIS staff began developing the 2010 Census C&P System reports on May 5, 2008 for the Local Update of Census Addresses (LUCA) operation and will conclude October 31, 2013 for the Count Question Resolution (CQR) operation. MIS staff reviewed and analyzed requirements, generated prototypes, produced designs, developed the 2010 Census C&P System, conducted system testing, assisted user acceptance testing, submitted reports for Beta testing, and deployed the final reports. The MIS development life cycle consisted of four phases that allowed for continuous process improvement as well as future upgrades:

- Elaboration - During the Elaboration Phase the MIS staff worked with management staffs to gather high-level requirements for reports shells, column definitions, algorithms for summarizing data, and the data sources. The MIS staff developed the requirement specifications that explained the high-level requirements in greater detail for the developers. The MIS staff determined the work breakdown structure packages for an operation and entered the estimated level of effort and baseline dates into their 2010 Census schedule. The estimated levels of effort and baseline dates for a work package were based on when the MIS staff had to meet an operation's start date.

- Construction - The Construction Phase consisted of design and development. The design iteration transformed the requirements specifications into a detailed design document which outlined how the system met the defined requirements, inputs, outputs, and interfaces by providing all the technical details. The development iteration converted the design specification document into a complete information technology system.
- Transition - The Transition Phase proved that the Construction Phase satisfied the Elaboration Phase. The MIS staff conducted three cycles for system testing: Cycle 1 verified expected cost data met requirements and simulated training; Cycle 2 verified the initial days of receiving both progress and cost data simulated production; and, Cycle 3 verified that consecutive progress and cost data met requirements. The management staff conducted user acceptance testing for their operation's reports. Decennial Systems and Contracting Management Office (DSCMO) BETA Center staff verified that the 2010 Census C&P System release did not affect other systems' functionality.
- Deployment & Maintenance - The Deployment & Maintenance Phase included training for end users, implementation, maintenance, and close out. The MIS staff released the reports to management staffs and designated users. The MIS staff performed daily checks on all reports to make sure that they received correct information from the data source and that all reports opened. When an issue related to an operation's reports surfaced, the MIS staff posted Alert notices to the operation's main portal page that explained the issue. As the MIS staff resolved the issue, they posted a follow-up Alert notice. Close-out included conducting evaluations, archiving data, and documenting lessons learned.

### **3. METHODOLOGY**

#### **3.1 Questions to be Answered**

##### **3.1.1 Question 1**

Was there sufficient time in the 2010 Census Cost & Progress schedule to complete each lifecycle phase?

3.1.1.1 What was the number of tasks by phase (Elaboration, Construction, and Transition) that were early, on time, or exceeded original duration?

3.1.1.2 What was the number of schedule change requests (CRs) submitted to change Baseline Start/Finish dates by phase?

This question determines if the estimated level of effort was sufficient for the lifecycle phases of Elaboration, Construction, and Transition.

##### **3.1.2 Question 2**

Were all requirements identified in the Elaboration Phase to produce 2010 Census C&P System reports?



- 3.1.2.1 What was the number of CRs submitted to change requirements following the operation's baselined requirements specification?
- 3.1.2.2 What was the number of CRs initiated for new requirements following the operation's baselined requirements specification?

This question determines if the initial requirements fulfilled the operation manager's need to monitor a census operation.

### **3.1.3 Question 3**

Did the Transition Phase show that the Construction Phase met all the requirements?

- 3.1.3.1 What was the number of test cases that failed in the Test Cycle 1?
- 3.1.3.2 What was the number of test cases that failed in the Test Cycle 2?
- 3.1.3.3 What was the number of test cases that failed in the Test Cycle 3?

This question answers if the MIS staff developed reports that met the customer's requirement during the Construction Phase.

### **3.1.4 Question 4**

Did we receive accurate data transfers from the various source systems during the Deployment & Maintenance Phase?

This question assesses if data sources delivered data in the format and/or quantity as specified in the interface control document (ICD) during the Deployment & Maintenance Phase. When the MIS Branch staff determined that there was a problem with receiving data from a source system, they posted an Alert notice to a 2010 Census operations portal page to inform users of the problem.

### **3.1.5 Question 5**

Were the data transfers with the various source systems delivered on-time during the Deployment & Maintenance Phase?

- 3.1.5.1 What was the number of Alert notices posted to reports for late or non-delivery of progress data?
- 3.1.5.2 What was the number of Alert notices posted to reports for inaccurate or missing cost data?

This question assesses if the data transfers were received by the delivery time specified in the ICD.

### **3.1.6 Question 6**

What were the most and least frequently accessed reports by operation during the Deployment & Maintenance Phase?

- 3.1.6.1 What were the most frequently accessed reports by operation?
- 3.1.6.2 What were the least frequently accessed reports by operation?

This question assesses which reports were most or least useful to operation managers for monitoring a census operation during the Deployment & Maintenance Phase.

### **3.1.7 Question 7**

What were the heaviest and lightest periods for user access by day of the week and time period?

3.1.7.1 What were the heaviest days of the week when users accessed reports?

3.1.7.2 What were the heaviest periods of the work day when users accessed reports?

This question will be used as a benchmark to recommend the best time frame for system support to occur without impacting customer access during the Deployment & Maintenance Phase.

## **3.2 Methods**

For Question 1 we determined the variance between original and actual durations for tasks in the Elaboration, Construction, and Transition Phases. We also counted the number of schedule change requests submitted to change baseline start or finish dates for tasks. Sources: Primavera production database, 2010 Census Cost & Progress schedule.

For Question 2 we counted the CRs in the C&P tracking database that requested changes to existing requirements or added new requirements. Source: C&P Change Request database.

For Question 3 we counted the number of requirements in test cases that failed in the Test Cycles. Source: C&P System Testing Summary Logs.

For Questions 4 and 5 we counted the number of Alert notices posted to reports for late deliveries and inaccurate or missing data. Source: 2010 Census C&P System reports.

For Question 6 we used access logs that captured any access to a report. We aggregated data and sorted the number of user accesses in descending order grouped by operation. We then calculated the 25<sup>th</sup> and 75<sup>th</sup> percentile based on the rank order. Source: 2010 Census C&P System SAS BI logs.

For Question 7 we used C&P SAS BI access logs that captured any access to a report. We aggregated the data to determine the periods with the highest number of user access. Source: 2010 Census C&P System SAS BI logs.

## **4. LIMITATIONS**

This assessment does not include Census Coverage Measurement (CCM) Final Housing Unit Followup, CCM Person Matching, CCM Person Followup, Island Area Data Capture, or Count Question Resolution (CQR) reports because one or more lifecycle phases occurred on or after December 30, 2010.

## **5. RESULTS**

### **5.1 Question 1**

Was there sufficient time in the 2010 Census C&P System schedule to complete each lifecycle phase?

Elaboration Phase tasks consisted of:

- Review/Gather (2010 Census Operation) Requirements

- Receive DMD 2010 Planning Approval of (2010 Census Operation) Report Shells<sup>1</sup>
- Develop Requirements Specification for (2010 Census Operation) C&P System.

The Construction Phase task was a single task - Design & Build the (2010 Census Operation) System.

Transition Phase tasks were:

- Conduct System Test of the (2010 Census Operation) C&P System
- Conduct User Acceptance Test the (2010 Census Operation) C&P System
- Migrate (2010 Census Operation) Beta Test Site for Testing and Release (includes Functional and Security Control Testing)<sup>2</sup>.

**Table 1. Question 1 Data Results: Summary Table for Original Duration Variance by Lifecycle Phase<sup>3</sup>.**

Phase	Task	Status	Total
Elaboration	Review/Gather	Early	12
		On Time	1
		Exceeded	13
	Report Shells	Early	21
		On Time	2
		Exceeded	3
	Req. Spec.	Early	6
		On Time	6
		Exceeded	14
Construction	Design & Build	Early	10
		On Time	10
		Exceeded	6
Transition	System Test	Early	10
		On Time	7
		Exceeded	9
	User Acceptance Testing (UAT)	Early	10
		On Time	4
		Exceeded	12
	BETA	Early	16
		On Time	6
		Exceeded	4

Of the 26 operations for which MIS staff created reports at least one or more tasks in a phase exceeded original duration. The Elaboration Phase had the highest number of tasks (30) that exceeded duration. Two of the Elaboration Phases tasks, “Review/Gather Requirements” and “Develop Requirements Specification,” contributed about the same number of late tasks. In the

<sup>1</sup> Report Shells were dropped for the Response Rate Feedback Operation. The MIS staff delivered a file to DSSD. Report Shells were developed for PFU and PM as a single operation; these were later split into 2 operations for reporting purposes. Report Shells were developed for Data Capture as a single operation; these were later split into Data Capture I and II operations for reporting purposes.

<sup>2</sup> BETA Testing was dropped for Response Rate Feedback Operation; MIS delivered a file to DSSD.

<sup>3</sup> The data source for Table 1 is Appendix A: Schedule Data.

Transition Phase the tasks “Conduct System Test” and “Conduct User Acceptance Test” contributed about the same the number of late tasks.

These issues contributed to tasks exceeding duration:

- Many of the operations exceeded duration during the Elaboration Phase which impacted meeting deadlines for successor phases. The DMD Operation Managers provided the MIS staff with their requirements last and even though the Requirements Gathering task may have started on time, the final approvals/decisions/changes were made very late in the process.
- Peak period: From February-May 2010, the MIS staff released five or more reports for an operation every five to seven days. Although many of successor phases started late, MIS staff worked overtime in order to deliver reports for the start date of the operation.

**Table 2. Question 1 Data Results: Schedule Change Requests for Baseline Start or Finish by Lifecycle Phase.<sup>4</sup>**

Operation	Elaboration				Construction		Transition	
	Requirements Start	Requirements Finish	Report Shells Start	Report Shells Finish	Design & Build Start	Design & Build Finish	Test Start	Test Finish
<b>Total</b>	<b>16</b>	<b>8</b>	<b>5</b>	<b>6</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>8</b>

There were two events that resulted in the MIS staff submitting a schedule change request.

- Operation managers changed one or more task relationships or 2010 Census Baseline dates within their own operation schedule and to which tasks were linked.
- The MIS staff determined that a task would not finish within its original duration.

For the first event, in most cases the management staff notified the MIS staff of a change to their operation’s schedule that would make an impact on lifecycle phases. However, instances also occurred when management staff failed to notify MIS staff of logic changes and the schedule meetings identified a task as the predecessor delaying an operation’s “Conduct” task.

When the MIS staff determined a task would not finish within its original duration, they submitted a schedule change request, which had a trickle down effect on successors. The majority of MIS-initiated schedule CRs added days to the remaining duration for the Elaboration task “Develop Requirements Specification” while subtracting duration from Transition tasks,<sup>5</sup> which may have resulted in undetected bugs released to production.

The Elaboration Phase proved to be the most problematic phase and it impacted the succeeding phases.

<sup>4</sup> The data source for Table 2 is Appendix A: Schedule Data..

<sup>5</sup> A policy change in late 2009 prohibited operation managers from changing a 2010 Census Baseline Finish date once the task was in progress.

## 5.2 Question 2

Were all requirements identified in the Elaboration Phase to produce 2010 Census C&P System reports?

The purpose of the Elaboration Phase is for operation managers to identify all requirements for the reports. The MIS staff classified CRs as:

- A Defect CR indicated an error with the initial requirement.
- An Enhancement CR was for a modification to an existing requirement.
- A New Requirement CR was for a requirement not previously identified during the Elaboration Phase.

Table 3 shows that operation managers did identify the majority of requirements for their reports prior to report release. New requirements were due to operational changes DMD senior managers made to that operation's process or changes to data sources. Generally, the MIS Staff received defect or enhancement CRs from issues that surfaced during user acceptance testing or after the report release in the Deployment & Maintenance Phase.

**Table 3. Question 2 Data Results: Completed Change Requests by Type.<sup>6</sup>**

Defect Change Request	Percent Of Total	Enhancement Change Request	Percent Of Total	New Requirement Change Request	Percent Of Total	Total Number of Change Requests
42	30%	64	45%	36	25%	142

## 5.3 Question 3

Did the Transition Phase show that the Construction Phase met all the requirements?

The MIS staff conducted three cycles of testing. In Cycle 1 testing, the testers checked for correct report format and cost data. In Cycle 2, testers checked cost and progress data that simulated the first few days for an operation. Cycle 3 testing simulated several days cost and progress for an operation. The objective of the testing was to make sure that report data were consistent for expected cost and progress. Overall, system testing showed that the MIS staff developed reports that met specified requirements. Cycle 1 testing uncovered more defects in the first round of testing than the succeeding cycles.

**Table 4. Question 3 Data Results: Transition Phase System Testing for C&P Reports<sup>7</sup>**

System Testing Cycle	Cycle 1		Cycle 2		Cycle 3	
	Pass	Fail	Pass	Fail	Pass	Fail
Total by Cycle	184	286	356	120	417	56

<sup>6</sup> The data source for Table 3 is Appendix B: Change Request Data.

<sup>7</sup> The data source for Table 4 is Appendix C: Test Data.

By the time an operation’s reports reached Cycle 3 the majority of defects were resolved and all defects were resolved prior to release in the Delivery & Maintenance Phase.

#### 5.4 Question 4

Did we receive accurate data transfers from the various source systems during the Deployment & Maintenance Phase?

Source systems<sup>8</sup> delivered data via direct access to the source database or Product Services Message Queuing (PSMQ). PSMQ was a secure file transfer application used to deliver data between a producer (data source) and consumer (C&P System); DSCMO managed PSMQ. Source systems supported several operations concurrently and delivered approximately 4,016 cost and 4,988 progress data transmissions to the C&P System. A delivery failure impacted multiple operations. For example, if the C&P system did not receive a Decennial Applicant, Personnel, and Payroll System (DAPPS) transmission, the cost data on reports for ten operations were affected. The MIS staff conducted daily checks and informed the DMD operation mangers and system source contracts when problems occurred. When the MIS staff posted an Alert notice to an operation’s portal page, they notified management staff that the data were corrected and reports contained updated information.

Table 5 reflects the number of Alert notices posted for the operations within scope of this assessment. Inaccurate data resulted from incorrect data delivered or data delivered different from what was agreed to during the Elaboration Phase. These Alert notice issues sometimes resulted in CRs to revise and re-test requirements.

**Table 5. Question 4 Data Results: Alert Notices Posted for Inaccurate Data from February through October, 2011.<sup>9</sup>**

	Inaccurate cost data	Inaccurate progress data
Total	17	68

#### 5.5 Question 5

Were the data transfers with the various system sources delivered on-time during the Deployment & Maintenance?

Most of the time across all operations, data delivery was on time for processing into the C&P System. However, when data transmission failed or was late the only recourse for the MIS staff was to notify a data source’s Point of Contact of the problem.

**Table 6. Question 5 Data Results: Alert Notices Posted for No or Late Delivery of Data from February through October, 2011.<sup>10</sup>**

	No or Late Delivery for Cost Data	No or Late Delivery for Progress Data
Total	37	153

<sup>8</sup> Appendix D lists the fourteen systems that delivered data to the C&P system.

<sup>9</sup> The data source for Table 5 is Appendix D: Alert Data.

<sup>10</sup> The data source for Table 6 is Appendix D: Alert Data.

Data delivery failure resulted from outages to the data source system, communication failure with the middle-managing system provider (PSMQ), source provider changing delivery time, or the failure of the external electric power grid system. When the data source provider experienced problems to its own system, the MIS staff had to wait to receive the most current data.

Across all operations, there were approximately 4,016 individual transfers for cost data and 4,988 transfers for progress data. Although the total percent for inaccurate and no deliveries was less than two percent, the lack of data reflected upon the MIS staff’s ability to provide management staff with the critical information needed to assess the current status of their operations.

## 5.6 Question 6

What were the most and least frequently accessed reports by operation during the Deployment & Maintenance Phase?

Least frequently opened is defined as a report that ranked in the 25<sup>th</sup> percentile or less.

Most Frequently opened is defined as a report that ranked in the 75<sup>th</sup> percentile or higher.

Table 7 shows the number of reports least and most frequently opened by operation.

**Table 7. Question 6 Data Results: Report Accesses by Operation<sup>11</sup>.**

Operation	Total Number of Reports	Number of Reports 25th Percentile	Number of Reports 75th Percentile
ADDRESS CANVASSING	18	5	5
BE COUNTED	9	3	3
CCM INDEPENDENT LISTING	17	6	6
CCM INITIAL HU & HUFU	13	4	4
CCM PERSON INTERVIEW/REINTERVIEW	17	5	5
COVERAGE FOLLOWUP TELEPHONE	6	2	2
DATA CAPTURE/CHECK-IN	4	1	2
DATA CAPTURE/CHECK-IN (PART II)	20	6	5
ENUMERATION AT TRANSITORY LOCATIONS	11	3	3
FIELD VERIFICATION	11	3	3
GROUP QUARTERS (GQE, SBE, AND MILITARY)	16	7	4
GROUP QUARTERS ADVANCE VISIT	7	3	2
GROUP QUARTERS VALIDATION	17	6	5
LUCA	16	5	5
MAIL RESPONSE RATES (MRR)	28	7	9
NEW CONSTRUCTION	8	5	3

<sup>11</sup> The data source for this table is Appendix E.

Operation	Total Number of Reports	Number of Reports 25th Percentile	Number of Reports 75th Percentile
NON-ID PROCESSING	3	1	1
NRFU AND NRFU REINTERVIEW	41	13	11
NRFU/VACANT DELETE CHECK	22	14	6
PRINTING AND DISTRIBUTION	2	1	1
REMOTE ALASKA	9	3	3
REMOTE UPDATE/ENUMERATE	9	3	3
TELEPHONE QUESTIONNAIRE ASSISTANCE	8	2	2
UPDATE/ENUMERATE	23	6	7
UPDATE/LEAVE	16	4	5
Grand Total	351	118	105

With the exception of NRFU/Vacant Delete, the variance is very small between the number of reports in the 25<sup>th</sup> and 75<sup>th</sup> percentile. Operations that relied on the Paper-Based Operational Control System as their primary data source found their C&P reports unable to provide critical information as the Paper-Based Operational Control System (PB-OCS) was unavailable, which may have contributed to the number of reports ranked in the 25<sup>th</sup> percentile or lower.

Figure 1. Distribution of C&P Reports by Percentile.

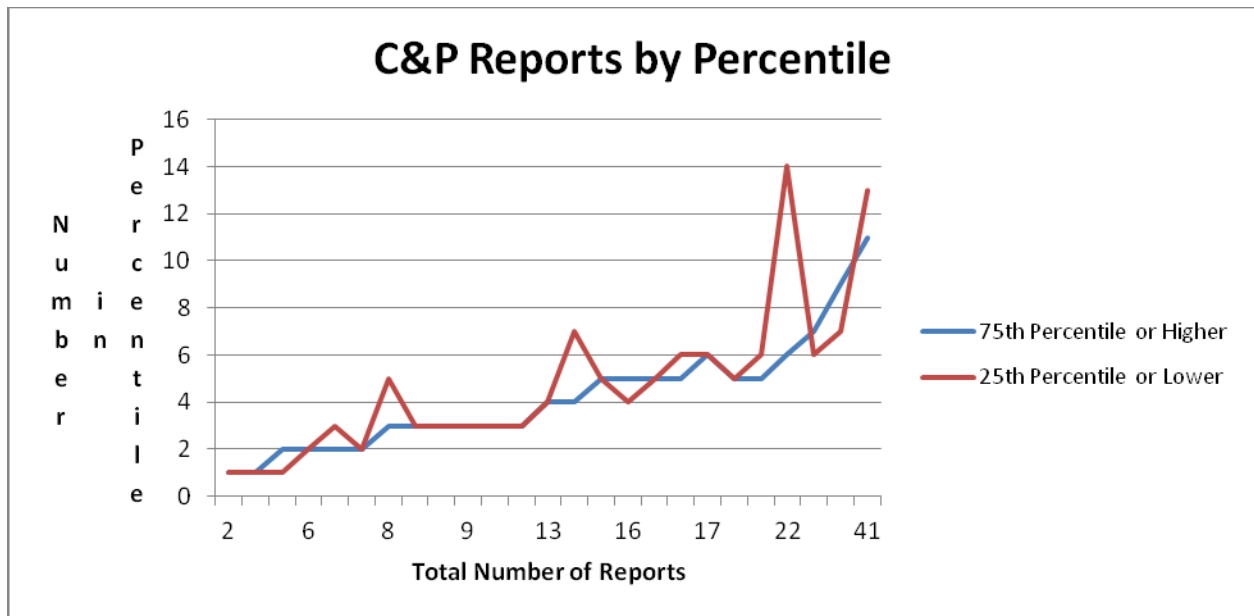


Figure 1 shows that having a larger number of reports doesn't necessarily translate into program managers accessing the majority of their C&P reports. Users accessed about the same number of reports, four to six, across all operations. Appendix E shows the number of accesses for each report by operation and which reports were ranked in the 25<sup>th</sup> or 75<sup>th</sup> percentile.

The MIS staff selected SAS BI as the best application for the 2010 Census C&P System because it provided functionality for users to easily create ad hoc reports. Several users took advantage



of this functionality to create new reports tailored to their specific needs once the operations started. Table 8 shows the number of ad hoc reports management staffs created for many of their operations. Users created nearly 75 percent as many ad hoc reports as the MIS staff created reports.

**Table 8. Question 6 Data Results: Total Number of Ad Hoc Reports by Operation.**<sup>12</sup>

Operation	Total
ADDRESS CANVASSING	5
BE COUNTED	13
CCM INDEPENDENT LISTING	5
CCM MATCHING INITIAL HU & HUFU	3
DATA CAPTURE/CHECK-IN	5
ENUMERATION AT TRANSITORY LOCATIONS	16
GQAV	5
GQV	3
GROUP QUARTERS (GQE, SBE, AND MILITARY)	12
MAIL RESPONSE RATES (MRR)	29
NRFU AND NRFU REINTERVIEW	8
NRFU/VACANT DELETE CHECK	2
REMOTE ALASKA	1
REMOTE UPDATE/ENUMERATE	3
UNKNOWN	34
UPDATE/ENUMERATE	19
UPDATE/LEAVE	69
Total	230

Ad hoc reports gave users the ability to create reports quickly. This functionality eliminated the need to submit a CR, which required the MIS staff to modify an existing report or create a new one. Users were able to share their ad hoc reports with members of their operational integration team. The number of ad hoc reports and shared access with team members may have also contributed to a lower frequency in accessing standard reports.

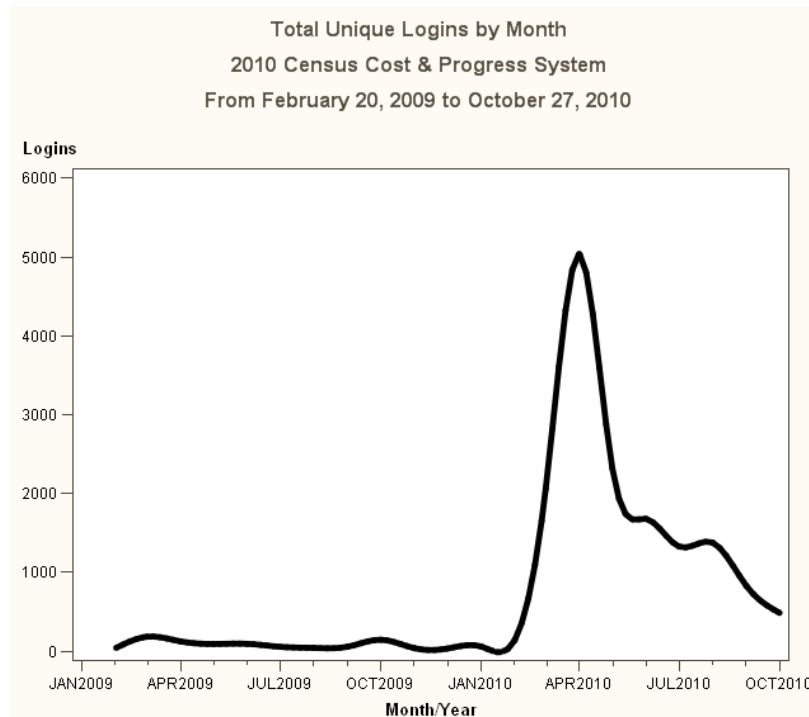
### 5.7 Question 7

What were the heaviest days of the week when users accessed reports?

This question provides data to recommend the best timeframe for system support to occur without impacting customer access and to let us know critical times when users needed reports.

<sup>12</sup> The data source for Table 8 is Appendix E: Report Access Data

Figure 2. Question 7 Data Results: Highest Number of User Logins by Month during Key Operations.



Providing a system to operation managers during key census operations was a high priority for the MIS staff. The peak period for user logins to view reports began with Address Canvassing in February 2009 and concluded October 2010 with Data Capture Part II. As Figure 1 shows, user login sharply peaked at the start of Mail Response and continued through NRFU to the end of Data Capture Part II.

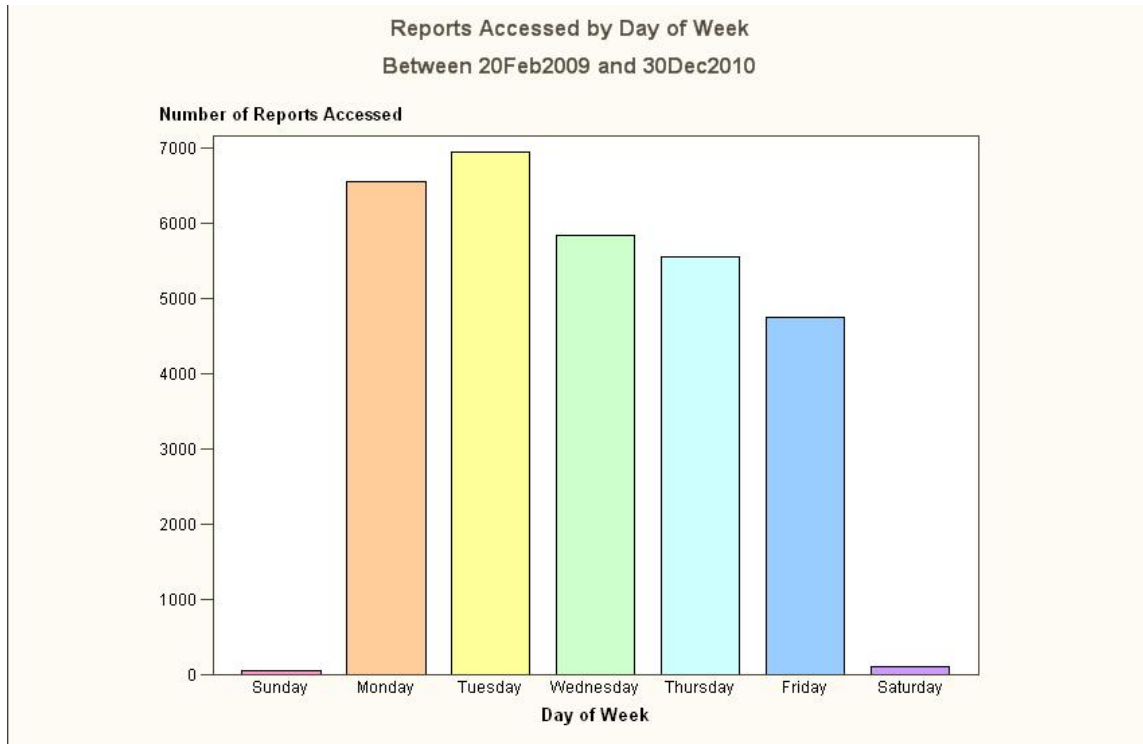
System support must be maintained to comply with security policies and software licensing agreements. The MIS staff balanced the need for operation managers to have access to view reports 24/7 with time required for critical software patches and upgrades for both the operating system and SAS BI software. The MIS staff maintained close communication with DSCMO System Integration Office (SIO) staff to perform system maintenance<sup>13</sup> with the least impact on the users' access to reports.

The MIS staff reviewed access logs to determine which days during the work week afforded the best timeframe for DSCMO-SIO system engineers to perform maintenance. Figure 2 shows that the heaviest days of the week when users accessed reports were Monday through Wednesday. MIS staff negotiated an agreement with DSCMO-SIO staff for specified notification procedures and days of the week (Thursday through Saturday) to complete non-emergency system maintenance.

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<sup>13</sup> Emergency patching for security vulnerabilities is exempt from scheduled maintenance.

Figure 3. Question 7 Data Results: Total Reports Accessed during Peak Period.



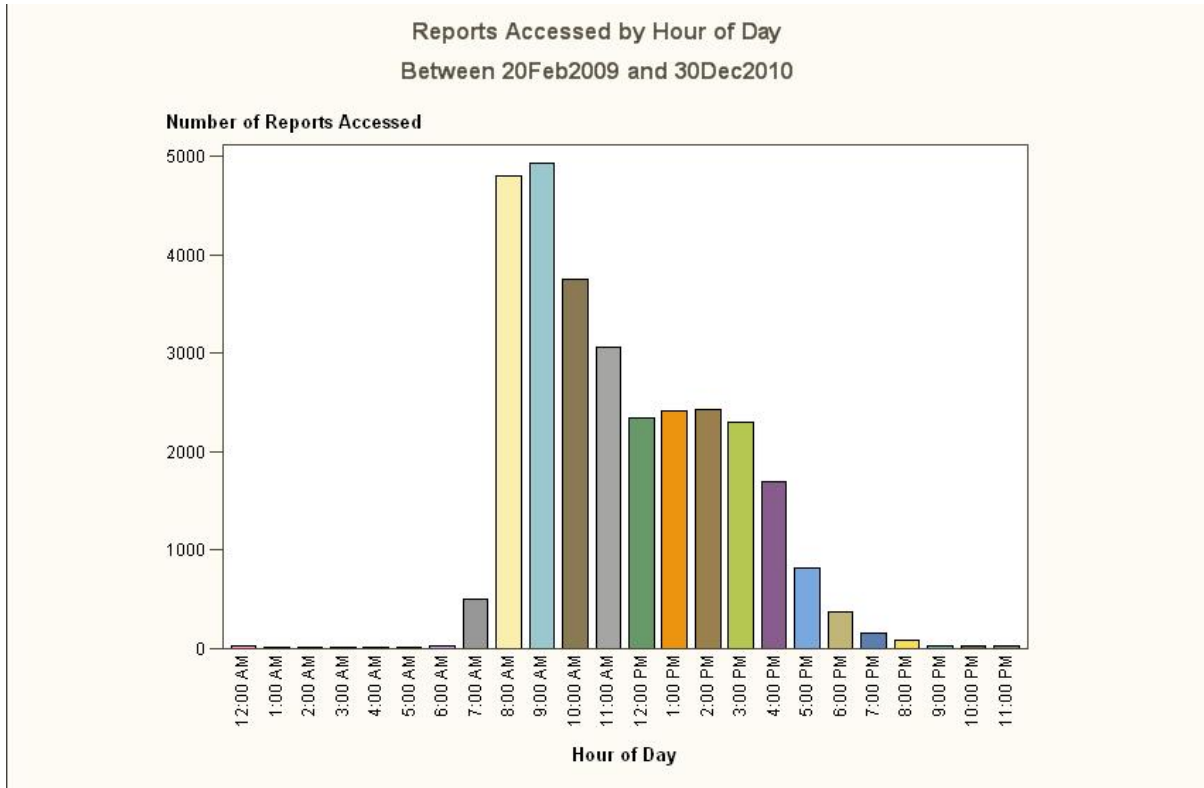
The Department of Commerce defines the core business hours as 8:30 AM-5:00 PM, Monday-Friday<sup>14</sup>. User access typically occurred in the morning hours as staff obtained information to address issues or concerns with an operation’s cost or progress. The MIS staff received a one-time delivery of data per business day<sup>15</sup> between 12:00 – 7:00 AM so the reports reflected information as of the previous business day for data collection and data capture operations.

Figure 3 shows that heaviest periods when users accessed reports were 8:00-11:00 AM and slowly decreased during the work day. Working within these constraints, both staffs agreed to a regular maintenance window of 7:00 PM Thursday – 7:00 AM Friday.

<sup>14</sup> U.S. Department of Commerce web page “Hours of Duty and Work Schedules.” [http://hr.commerce.gov/Practitioners/CompensationAndLeave/DEV01\\_006627](http://hr.commerce.gov/Practitioners/CompensationAndLeave/DEV01_006627), 03/15/2011.

<sup>15</sup> DMD senior managers decided to receive data files once per day.

Figure 4. Question 7 Data Results: Reports Accessed by Time of Day.



When the system engineers required a maintenance period for more than one business day, the MIS staff requested work to be completed Friday through Sunday. In all instances when system engineers performed upgrades, the MIS staff verified the system was restored to a fully functioning state.

## 6. RELATED EVALUATIONS, EXPERIMENTS, OR ASSESSMENTS

This section does not apply.

## 7. LESSONS LEARNED, CONCLUSIONS, AND RECOMMENDATIONS

### 7.1 Lessons Learned

Estimated duration for a phase, based on the level of effort needed when the start date for an operation’s reports are close in time, was inadequate; to design, build, and test several operational reports at the same time requires more staff resources.

Management staff should develop skills in creating ad hoc reports; this can reduce the burden on MIS staff to design, build, and test little-used reports.

Ad hoc reports can reduce the number of CRs that management staffs submit to modify existing reports or create new ones.

Appendix F contains the complete list of Lessons Learned.

## **7.2 Conclusions**

Management staffs need to provide requirements early.

The Transition Phase showed that the MIS staff developed reports that met requirements.

Regardless of the cause, both inaccurate data and late delivery of input data reflected upon the credibility of the MIS staff to provide up-to-date cost and progress data at critical times when operation managers needed reports to monitor their operations.

Report usage, in terms of number of reports accessed, was not impacted by the number of reports available for an operation.

Ad hoc reports gave users the ability to create reports quickly and share them with members of their operational integration team. The number of ad hoc reports and shared access with team members may have contributed to a lower frequency in accessing C&P standard reports.

## **7.3 Recommendations**

Recommend updates from data sources throughout a business day to provide operation managers with the kind of current information they need to react to issues in the operation's performance.

Recommend operation managers review any ad hoc reports that their staff created and use them as a starting point for 2020 Census management reports.

Recommend 2020 Census planners select a management information system that includes the functionality for users to easily learn, create, and share their ad hoc reports.

## **8. ACKNOWLEDGEMENTS**

Contributing staffs or persons.

Decennial Management Division: Andrea Brinson, Annette Quinlan Davis, Schyrle Gudger, Nevalle Wade

SAS Institute: Charles Yu

## **9. REFERENCES**

2010 Census Cost & Progress Team Management Plan.

## APPENDIX A: SCHEDULE DATA

This table is the detail data for Question 1 and shows the number of tasks by phases that met, exceeded, or were less than original duration. These data were extracted from the 2010 Census C&P schedule in the Primavera database.

Original Duration Variance by Lifecycle phase

	Elaboration Phase									Construction Phase			Transition Phase								
	Review /Gather	Review /Gather	Review /Gather	Report Shells	Report Shells	Report Shells	Req. Spec.	Req. Spec.	Req. Spec.	Design & Build	Design & Build	Design & Build	System Test	System Test	System Test	UAT	UAT	UAT	BETA	BETA	BETA
Operation	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded
ADDRESS CANVASSING	0	0	1	0	0	1	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0
BE COUNTED	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	1	0	0	0	1	0
CCM INDEPENDENT LISTING	0	0	1	1	0	0	0	0	1	1	0	0	0	0	1	0	0	1	1	0	0
CCM MATCHING INITIAL HU & HUFU	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	0	0	1	0	0	1
CCM PERSON INTERVIEW/REINTERVIEW	0	0	1	1	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	1	0

	Elaboration Phase									Construction Phase			Transition Phase								
	Review /Gather	Review /Gather	Review /Gather	Report Shells	Report Shells	Report Shells	Req. Spec.	Req. Spec.	Req. Spec.	Design & Build	Design & Build	Design & Build	System Test	System Test	System Test	UAT	UAT	UAT	BETA	BETA	BETA
Operation	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded
COVERAGE FOLLOWUP TELEPHONE	0	0	1	1	0	0	1	0	0	0	1	0	0	0	1	0	1	0	0	1	0
DATA CAPTURE/CHECK-IN	0	0	1	1	0	0	0	0	1	1	0	0	0	1	0	0	1	0	1	0	0
DATA CAPTURE/CHECK-IN (PART II)	1	0	0	0	0	1	1	0	0	0	0	1	0	0	1	1	0	0	1	0	0
ENUMERATION AT TRANSITORY LOCATIONS	1	0	0	1	0	0	0	0	1	0	1	0	1	0	0	0	1	0	0	1	0
FIELD VERIFICATION	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1
GQAV	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	1	0	0	0	0	1
GQV	0	0	1	1	0	0	0	0	1	0	1	0	1	0	0	1	0	0	1	0	0
GROUP QUARTERS (GQE, SBE, AND MILITARY)	0	0	1	1	0	0	0	0	1	1	0	0	0	0	1	0	0	1	1	0	0

	Elaboration Phase									Construction Phase			Transition Phase								
	Review /Gather	Review /Gather	Review /Gather	Report Shells	Report Shells	Report Shells	Req. Spec.	Req. Spec.	Req. Spec.	Design & Build	Design & Build	Design & Build	System Test	System Test	System Test	UAT	UAT	UAT	BETA	BETA	BETA
Operation	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded
LUCA	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0
MAIL RESPONSE RATES (MRR)	0	0	1	0	1	0	0	1	0	1	0	0	0	1	0	0	0	1	1	0	0
NEW CONSTRUCTION	1	0	0	0	0	1	0	0	1	1	0	0	0	1	0	0	0	1	1	0	0
NON-ID PROCESSING	1	0	0	1	0	0	0	0	1	0	1	0	1	0	0	0	0	1	0	1	0
NRFU AND NRFU REINTERVIEW	0	0	1	1	0	0	0	1	0	1	0	0	0	0	1	0	0	1	1	0	0
NRFU/VACANT DELETE CHECK	0	1	0	1	0	0	0	1	0	0	1	0	0	1	0	0	0	1	1	0	0
PRINTING AND DISTRIBUTION	0	0	1	1	0	0	0	0	1	0	1	0	0	0	1	1	0	0	1	0	0
REMOTE ALASKA	1	0	0	1	0	0	0	1	0	0	0	1	0	0	1	1	0	0	0	0	1



	Elaboration Phase									Construction Phase			Transition Phase								
	Review /Gather	Review /Gather	Review /Gather	Report Shells	Report Shells	Report Shells	Req. Spec.	Req. Spec.	Req. Spec.	Design & Build	Design & Build	Design & Build	System Test	System Test	System Test	UAT	UAT	UAT	BETA	BETA	BETA
Operation	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded	Early	On Time	Exceeded
REMOTE UPDATE/ENUMERATE	1	0	0	1	0	0	1	0	0	0	1	0	1	0	0	1	0	0	0	1	0
RESPONSE RATE FEEDBACK	0	0	1	0	1	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0
TELEPHONE QUESTIONNAIRE ASSISTANCE	0	0	1	1	0	0	0	0	1	1	0	0	0	1	0	0	0	1	1	0	0
UPDATE/ENUMERATE	1	0	0	1	0	0	0	0	1	0	1	0	1	0	0	1	0	0	1	0	0
UPDATE/LEAVE	0	0	1	1	0	0	0	0	1	0	0	1	0	0	1	0	0	1	1	0	0
<b>Total</b>	<b>12</b>	<b>1</b>	<b>13</b>	<b>21</b>	<b>2</b>	<b>3</b>	<b>6</b>	<b>6</b>	<b>14</b>	<b>10</b>	<b>10</b>	<b>6</b>	<b>10</b>	<b>7</b>	<b>9</b>	<b>10</b>	<b>4</b>	<b>12</b>	<b>16</b>	<b>6</b>	<b>4</b>

This table is the detail data for Question 1 and shows the number of schedule CRs submitted to change Baseline Start/Finish for the Elaboration, Construction, or Transition Phase. These data were extracted from the 2010 Census C&P schedule in the Primavera database.

Schedule Change Requests for Baseline Start or Finish by Lifecycle Phase

Operation	Elaboration				Construction		Transition	
	Requirements Start	Requirements Finish	Report Shells Start	Report Shells Finish	Design & Build Start	Design & Build Finish	Test Start	Test Finish
ADDRESS CANVASSING	0	0	0	0	0	0	0	0
BE COUNTED	0	0	0	0	0	0	0	1
CCM INDEPENDENT LISTING	0	0	0	0	0	0	0	0
CCM MATCHING INITIAL HU & HUFU	1	0	0	0	0	0	0	1
CCM PERSON INTERVIEW/REINTERVIEW	1	0	0	0	0	0	0	0
COUNT QUESTION RESOLUTION	0	0	0	0	0	0	0	0
COVERAGE FOLLOWUP TELEPHONE	1	0	0	0	0	0	0	0
DATA CAPTURE/CHECK-IN	0	0	0	0	0	0	0	0
DATA CAPTURE/CHECK-IN (PART II)	1	1	1	1	1	1	1	1
ENUMERATION AT TRANSITORY LOCATIONS	0	0	0	0	0	0	0	1
FIELD VERIFICATION	2	0	0	0	0	0	0	0
GQAV	0	0	0	0	0	0	0	0
GQV	0	0	0	0	0	0	0	0
GROUP QUARTERS (GQE, SBE, AND MILITARY)	0	0	0	0	0	0	0	0
LUCA	0	0	0	0	0	0	0	0
MAIL RESPONSE RATES (MRR)	0	0	0	0	0	0	0	0
NEW CONSTRUCTION	0	1	0	0	0	0	0	0
NON-ID PROCESSING	1	0	0	0	0	0	0	0
NRFU AND NRFU REINTERVIEW	1	0	0	0	0	0	0	0

Operation	Elaboration				Construction		Transition	
	Requirements Start	Requirements Finish	Report Shells Start	Report Shells Finish	Design & Build Start	Design & Build Finish	Test Start	Test Finish
NRFU/VACANT DELETE CHECK	2	2	1	1	1	1	1	1
PRINTING AND DISTRIBUTION	0	0	0	0	0	0	0	0
REMOTE ALASKA	0	0	0	0	0	0	0	1
REMOTE UPDATE/ENUMERATE	0	0	0	0	0	0	0	0
RESPONSE RATE FEEDBACK	2	1	1	1	1	1	1	1
TELEPHONE QUESTIONNAIRE ASSISTANCE	0	0	0	0	0	0	0	0
UPDATE/ENUMERATE	0	0	0	0	1	1	0	0
UPDATE/LEAVE	0	0	0	0	0	0	0	1
<b>Total</b>	<b>12</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>8</b>

## APPENDIX B: CHANGE REQUEST DATA

This table is the detail data for Question 2 and shows the number of Change Requests submitted. The data were extracted from the DMD MIS Tracking database. The software for The database was Microsoft (MS) Access 2003.

Change Request Data

Operation	Defect	Enhancement	New Requirement	Requirement Change	Grand Total
ADDRESS CANVASSING	5	2	3	0	10
All Field except Ad Can, GQV, IL	1	0	0	0	1
ALL FIELD OPERATIONS	2	1	3	0	6
BE COUNTED	2	1	3	0	6
CCM INDEPENDENT LISTING	3	2	1	1	7
CCM MATCHING INITIAL HU & HUFU	0	1	0	0	1
CCM PERSON INTERVIEW/REINTERVIEW	4	0	2	1	7
CM MATCHING INITIAL HU & HUFU	2	1	2	2	7
COVERAGE FOLLOWUP TELEPHONE	2	9	0	5	16
DATA CAPTURE/CHECK-IN	3	9	3	3	18
ENUMERATION AT TRANSITORY LOCATIONS	2	0	1	4	7
GROUP QUARTERS ADVANCED VISIT	0	0	0	1	1
GROUP QUARTERS VISIT	2	1	0	0	3
ISLAND AREAS	0	0	1	0	1
LUCA	3	2	0	0	5
MAIL RESPONSE RATES	0	4	6	0	10
MAIL RESPONSE RATES	0	1	0	0	1
NON-ID PROCESSING	0	2	0	0	2
NRFU AND NRFU REINTERVIEW	1	4	5	2	12
NRFU/VACANT DELETE CHECK	0	0	1	0	1
REMOTE ALASKA	0	0	0	1	1
REMOTE UPDATE/ENUMERATE	1	0	0	0	1
TELEPHONE QUESTIONNAIRE ASSISTANCE	1	1	2	1	5
UPDATE/ENUMERATE	7	0	2	0	9
UPDATE/LEAVE	1	2	1	0	4
<b>Total</b>	<b>42</b>	<b>43</b>	<b>36</b>	<b>21</b>	<b>142</b>

## APPENDIX C: TEST DATA

This table is the detail data for Question 3 and shows the number of requirements passing or failing in a test cycle. The data were extracted from System Testing Summary Cycle and DMD Quarterly Testing Status reports.

Transition phase System Testing for C&P Reports

System Testing Cycle Operation	Cycle 1		Cycle 2		Cycle 3	
	Pass	Fail	Pass	Fail	Pass	Fail
ADDRESS CANVASSING	19	0	19	0	19	0
BE COUNTED	9	3	12	0	12	0
CCM INDEPENDENT LISTING	0	25	5	20	25	0
CCM MATCHING INITIAL HU & HUFU	16	6	22	0	22	0
CCM PERSON INTERVIEW/REINTERVIEW	11	5	12	4	16	0
COVERAGE FOLLOWUP TELEPHONE	3	9	3	9	4	8
DATA CAPTURE/CHECK-IN	9	1	10	0	10	0
DATA CAPTURE/CHECK-IN (PART II) PART II	13	13	13	13	13	13
ENUMERATION AT TRANSITORY LOCATIONS	13	5	18	0	18	0
FIELD VERIFICATION	3	13	8	8	15	1
GROUP QUARTERS ADVANCED VISIT	3	10	3	10	10	0
GROUP QUARTERS VISIT	0	27	10	17	27	0
GROUP QUARTERS (GQE, SBE, AND MILITARY)	12	12	14	10	14	10
MAIL RESPONSE RATES (MRR)	3	30	33	0	33	0
NEW CONSTRUCTION	0	8	8	0	8	0
NON-ID PROCESSING	9	3	12	0	12	0
NRFU AND NRFU REINTERVIEW	13	7	26	0	26	0
NRFU/VACANT DELETE CHECK	4	29	33	0	33	0
PRINTING AND DISTRIBUTION	2	0	2	0	2	0
REMOTE ALASKA	4	11	15	0	15	0
REMOTE UPDATE/ENUMERATE	13	4	15	2	17	0
RESPONSE RATE FEEDBACK OPERATION	3	30	33	0	33	0
TELEPHONE QUESTIONNAIRE ASSISTANCE	7	2	6	3	9	0
UPDATE/ENUMERATE	4	24	4	24	4	24
UPDATE/LEAVE	11	9	20	0	20	0
<b>Total by Cycle</b>	<b>184</b>	<b>286</b>	<b>356</b>	<b>120</b>	<b>417</b>	<b>56</b>

## APPENDIX D: ALERT DATA

System sources that delivered data to the C&P System:

Automated Tracking and Control System (ATAC) - the system used check-in and track materials received from the field data collection and Census Coverage Measurement Operations at the National Processing Center (NPC).

Cost And Response Management Network (CARMN) - a cost and progress reporting system for field data-collection activities developed and maintained by Technologies Management Office (TMO).

Coverage Measurement Operational Control System (CMOCS) – a control and tracking system for CCM operations in the Regional Census Centers developed and maintained by TMO.

Decennial Applicant, Personnel, and Payroll System (DAPPS) - a system which automated the administrative functions in support of the temporary workforce performing census operations; the system was developed and maintained by the Administrative Management and Systems Division (AMSD).

Decennial Response Integration System (DRIS) – the primary system for the check-in field data collection and mailout/mailback operations; the system was developed and maintained under contract to the U.S. Census Bureau by Lockheed-Martin.

Decennial Statistical Studies Division (DSSD) Census Evaluation & Experiments (CEE) - provided statistical support and guidance for the decennial census operations, including but is not limited to coverage measurement, coverage improvement, quality assurance, evaluations, and assessments of the decennial census. The system was developed and maintained by DSSD.

DMD Cost Model provided the budget data for an operation's budget for training, fieldwork, or other type of production costs.

Field Data Collection Automation (FDCA) System – developed and maintained under contract to the U.S. Census Bureau by The Harris Corporation.

Field Verification Operational Control System (FVOCS) - a control and tracking system for the Field Verification operation in the Regional Census Centers developed and maintained by TMO.

Geography Database (GEO/MTdb) - provided delineation and maintenance of Geographic Areas, Mapping, Spatial Data Exchange, Address Geocoding, Address Matching, Geographic Data extracts, and Geographic Comparability and Equivalency Files. The MTdb was developed and maintained by GEO.

Jeffersonville Activity Reporting System (JARS) – a module within Commerce Business System (CBS) that tracked LUCA participant and response information during the 2010 Census; it was developed and maintained by AMSD and NPC cost data for all the data capture operation.

Matching, Review, and Coding System (MaRCS) – provided MaRCS data for CCM and selected field data collection operations such as Nonresponse Followup; the system was developed and maintained under contract to the U.S. Census Bureau by Gunnison Consulting Group, Inc.

Paper-based Operations Control System (PBOCS) - provided control, tracking, and reporting of enumeration work conducted in the field to complete field data collection operations. PBOCS was developed and maintained by DSCMO.

Universe Control and Management System (UCM) - provided a database of addresses and related information used to control and track the enumeration and data capture of census results. UCM was developed and maintained by DSCMO. The tables on the following pages were generated from a SAS BI operation using access log files; the tables show the number of times any user opened a report.

This table is the detail data for Questions 4 and 5; it shows the number and type of alert notice posted to the Operation Integration Team portal page. These data were extracted from the 2010 Census C&P System access log files.

Alerts Posted for No/Late Delivery or Inaccurate Data.

Operation	No/late cost file delivery	Inaccurate cost data	No/late progress file delivery	Inaccurate progress data
ADDRESS CANVASSING	3	2	10	0
BE COUNTED	4	0	0	0
CCM INDEPENDENT LISTING	2	0	1	2
CCM MATCHING INITIAL HU & HUFU	4	0	1	2
CCM PERSON INTERVIEW/REINTERVIEW	0	0	1	1
COVERAGE FOLLOWUP TELEPHONE	0	0	6	12
DATA CAPTURE/CHECK-IN	1	10	5	14
ENUMERATION AT TRANSITORY LOCATIONS	3	0	15	4
FIELD VERIFICATION	0	0	0	0
GROUP QUARTERS ADVANCE VISIT	3	0	10	4
GROUP QUARTERS VALIDATION	2	4	0	1
GROUP QUARTERS (GQE, SBE, AND MILITARY)	3	0	11	1
MAIL RESPONSE RATES (MRR)	0	0	0	1
NEW CONSTRUCTION	0	0	0	0
NON-ID PROCESSING	0	0	0	1
NRFU AND NRFU REINTERVIEW	4	0	9	5
NRFU/VACANT DELETE CHECK	0	0	1	0
PRINTING AND DISTRIBUTION	0	0	4	3
REMOTE ALASKA	2	0	18	3
REMOTE UPDATE/ENUMERATE	2	0	19	1
TELEPHONE QUESTIONNAIRE ASSISTANCE	0	0	6	2
UPDATE/ENUMERATE	2	0	17	6
UPDATE/LEAVE	2	1	19	5
<b>Total</b>	<b>37</b>	<b>17</b>	<b>153</b>	<b>68</b>

## APPENDIX E: REPORT ACCESS DATA

Question 6 Data Results: Report Accesses by Operation. Reports are rank-ordered from highest to lowest based on the number of times they were accessed. We then calculated the 25th and 75th percentile based on the rank order. Each table also shows the value for the 25<sup>th</sup> and 75<sup>th</sup> percentile as well as the reports that were included in the percentile.

Source: 2010 Census C&P System SAS BI logs.

### Operation: Address Canvassing

Rank	Report Name	Number of Times Opened	
1	2010 Current Cost and Progress	111	
2	2010 Address Canvassing Executive Report	57	
3	2010 Workload Progress	52	
4	2010 Summary Cost and Progress	42	
5	2010 Current Employee Cost -Training	38	75th Percentile
6	2010 Current Employee Cost - Field Work	34	
7	2010 QC Progress	28	
8	2010 Preliminary Total Cost	24	
9	2010 Large Block Summary Progress	22	
10	2010 Actual Progress and Cost	21	
11	2010 Total Large Block DAAL ADCAN Progress	19	
12	2010 DAAL ADCAN National Large Block Budget Costs	17	
13	2010 Actual vs. Expected Progress and Cost	16	
14	2010 DAAL ADCAN Regional Large Block Costs	15	25th Percentile
15	2010 Actual % Budget Used, Field and Train	13	
15	2010 Expected vs. Actual % Budget Used, Field and Train	13	
17	2010 Current Cost and Progress_ELCO Progress_shared	4	
18	2010 DAAL ADCAN National Level Block Budget Costs	0	
	75th Percentile	37	
	25 Percentile	15	

### Operation: Be Counted

Rank	Report Name	Number of Times Opened	
1	2010 Be Counted Executive Report	109	
2	2010 Current Employee Cost - Field Work	74	
3	2010 Summary Cost	66	75th Percentile
4	2010 Current Employee Cost - Training	65	
5	2010 Expected vs Actual % of Budget Used	64	
6	2010 Executive Report Actuals vs. Expected Cost	37	
7	2010 Preliminary Total Cost	35	25th Percentile
8	2010 Expected vs. Actual Cost	26	
9	2010 Expected vs Actual pct of Budget Used	0	
	75th Percentile	66	
	25 Percentile	35	



**Operation: Be Counted**

Rank	Report Name	Number of Times Opened
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**Operation: CCM Independent Listing**

Rank	Report Name	Number of Times Opened	
1	2010 CCM Independent Listing Executive Report	74	
2	2010 Current Employee Cost - Field Work	28	
3	2010 Current Employee Cost - Training	24	
4	2010 Listing and DQC Cluster Overview	22	
5	2010 Summary Cost and Progress - Listing DQC	19	
5	2010 Listing Production Current Cost and Progress	19	75th Percentile
7	2010 Preliminary Total Cost	18	
8	2010 Listing DQC Current Cost and Progress	16	
9	2010 Progress to Date	14	
9	2010 Expected Vs. Actual % of Budget Used, Field Work...	14	
11	2010 Summary Cost and Progress - Listing Production	10	
12	2010 Expected Vs. Actual Cost and Progress - Listing DQC	9	25th Percentile
12	2010 Listing and DQC Cluster Status	9	
14	2010 Expected Vs. Actual Cost and Progress - Listing Pro	8	
15	2010 Listing ILB Data Capture Status	5	
16	2010 Listing Map Scanning Status	1	
16	2010 Exec Report Actual vs Expected Progress and Cost	1	
	75th Percentile	19	
	25 Percentile	9	

**Operation: CCM Initial Housing Unit Followup**

Rank	Report Name	Number of Times Opened	
1	2010 IHUFU Production and QC Cluster Status	169	
2	2010 Progress to Date	153	
3	2010 IHUFU Executive Report	151	
4	2010 Preliminary Total Cost	118	75th Percentile
5	2010 Clerical Matching Progress to Date	110	
6	2010 IHUFU Production Current Cost and Progress	99	
7	2010 Executive Report Actuals vs. Exp Progress and Cost	89	
8	2010 IHUFU QC Current Cost and Progress	84	
9	2010 IHUFU Production and QC Cluster Overview	72	
10	2010 Current Employee Cost - Field Work	66	
11	2010 Expected vs. Actual Cost and Progress IHUFU and QC	59	25th Percentile
12	2010 Current Employee Cost - Training	53	

**Operation: CCM Independent Listing**

Rank	Report Name	Number of Times Opened
13	2010 Actual % of Budget Used, Field Work, Training	46
14	2010 Test	0
	75th Percentile	116
	25 Percentile	61

**Operation: CCM Person Interview and Reinterview**

Rank	Report Name	Number of Times Opened	
1	2010 CCM Person Interview and Reinterview Executive Rept	371	
2	2010 PI Progress to Date	302	
3	2010 PI Current Cost and Progress	289	
4	2010 RI Current Cost and Progress	201	
5	2010 RI Progress to Date	170	75th Percentile
6	2010 Current Employee Cost - Training	150	
7	2010 Current Employee Cost - Field Work Report	142	
8	2010 Current RI Processing Workflow for MaRCS by Stage	98	
9	2010 PI Workload Status	69	
10	2010 Final Reinterview Cases MaRCS Outcomes	57	
11	2010 Preliminary Total Cost	45	
12	2010 Expected vs Actual Cost - PI	44	
13	2010 RI Workload Counts	38	25th Percentile
14	2010 RI Workload Status	26	
15	2010 Expected vs Actual Progress - PI	19	
16	2010 Expected vs Actual Cost and Progress - PI	2	
16	2010 Expected vs Actual Cost and Progress - PIRI	2	
	75th Percentile	170	
	25 Percentile	38	

**Operation: Coverage Follow Up Telephone**

Rank	Report Name	Number of Times Opened	
1	2010 Coverage Followup Telephone Executive Report	185	
2	2010 List Penetration Report	178	75th Percentile
3	2010 Daily Cumulative Closed Cases Report	154	
4	2010 Estimated DRIS CFU Labor Cost	110	
5	2010 Executive Report	107	25th Percentile
6	2010 Open Cases Report	86	
	75th Percentile	172	
	25 Percentile	108	

**Operation: Data Capture Part 1**

Rank	Report Name	Number of Times Opened	
1	2010 Data Capture Backlog	12	75th

			Percentile
2	2010 Cumulative NPC Payroll Details	10	
3	2010 Number of Boxes Checked-In	6	25th Percentile
4	2010 Weekly NPC Payroll Details	5	
	75th Percentile	11	
	25 Percentile	6	

**Operation: Data Capture**

Rank	Report Name	Number of Times Opened	
1	2010 Cumulative Data Capture Progress	881	
2	2010 Data Capture Progress	619	
3	2010 UAA Check-In Status by DRIS Data Capture Center	203	
4	2010 Data Capture Executive Report	173	
5	2010 Questionnaires with Responses Requiring Translation	115	75th Percentile
6	2010 Data Capture Backlog	87	
7	2010 Reverse Checkins and Late Mail Returns	80	
8	2010 Number of Boxes Checked-In	63	
8	2010 Total Estimated DRIS Labor Costs by Channel	63	
10	2010 Estimated DRIS Paper Data Capture Labor Cost	59	
11	2010 Total Number of Forms Checked In Daily	54	
12	2010 Total Number of Forms Checked In Expected vs Actual	53	
13	2010 Cumulative NPC Payroll Details	42	
14	2010 Expected Check-In	40	
15	2010 Weekly NPC Payroll Details	28	25th Percentile
15	2010 Cumulative Data Quality OMR DCAR	28	
17	2010 Data Capture Check-Out Backlog	14	
18	2010 Daily Data Quality	10	
19	2010 Cumulative Data Quality	9	
20	2010 Daily Data Quality OMR DCAR	6	
	75th Percentile	94	
	25 Percentile	28	

**Operation: Enumeration at Transitory Locations**

Rank	Report Name	Number of Times Opened	
1	2010 ETL Executive Report	97	
2	2010 Summary Cost and Progress	87	
3	2010 Current Employee Cost - Training	86	75th Percentile
4	2010 Current Employee Cost - Field Work	81	
5	2010 Actual % of Total Bud Used, Field Work and Training	74	
6	2010 Current Cost and Progress	68	
7	2010 Preliminary Total Cost	65	
8	2010 Shipping and Acknowledgement	56	
9	2010 Expected vs. Actual Cost and Progress Line Graph	54	25th Percentile
10	2010 Executive Report Actuals vs. Exp Progress and Cost	28	
11	2010 Reinterview (RI)- Progress	6	
	75th Percentile	84	

**Operation: Field Verification**

Rank	Report Name	Number of Times Opened	
1	2010 Executive Actuals vs Expected	243	
3	2010 Summary Cost and Progress	192	
5	2010 Workload Progress	147	75th Percentile
7	2010 Current Employee Cost - Training	124	
9	2010 Current Employee Cost - Field Work	111	
11	2010 Actual % of Total Bud Used, Field Work and Training	110	
12	2010 QC Workload Progress	102	
14	2010 Preliminary Total Cost	96	
16	2010 Keying and Shipment to NPC	86	25th Percentile
18	2010 Actuals vs. Expected Progress and Cost - Graph	62	
20	2010 Actual Pct of Total Bud Used, Fld Work and Training	0	
	75th Percentile	136	
	25 Percentile	91	

**Operation: 2010 Group Quarters Advance Visit**

Rank	Report Name	Number of Times Opened	
1	2010 Current Cost and Progress	102	
2	2010 Exec Report Actuals vs. Expected Progress and Cost	81	75th Percentile
3	2010 Current Employee Cost - Field Work	25	
4	2010 Preliminary Total Cost	23	
5	2010 Current Employee Cost - Training	20	25th Percentile
5	2010 Expect vs. Actual % Budget Used GQs Asgnd Compltd	20	
7	2010 Expect vs. Actual Budget Used GQs Asgnd Compltd	0	
	75th Percentile	53	
	25 Percentile	20	

**Operation: Group Quarters Enumeration**

Rank	Report Name	Number of Times Opened	
1	2010 Current Cost and Progress	285	
2	2010 Executive Rep Act vs Exp Progress Cost for GQ	240	
3	2010 Executive Rep Act Progress and Cost for SBE and MIL	196	
4	2010 Current Employee Cost - Field Work	152	75th Percentile
5	2010 Summary Cost and Progress	149	
6	2010 Current Employee Cost - Training	147	
7	2010 Preliminary Total Cost	116	
8	2010 GQ Workload Progress Graph	80	
9	2010 Random Reinterview Progress	7	
10	2010 Supplemental Reinterview Progress	6	25th Percentile
10	2010 Supplemental Reinterview Outcome	6	

**Operation: Group Quarters Enumeration**

Rank	Report Name	Number of Times Opened
10	2010 Random Reinterview Outcome	6
13	2010 Total Reinterview Progress	5
13	2010 Total Reinterview Outcome	5
13	2010 GQ Military Workload Progress Graph	5
16	2010 Reinterview Workload	4
	75th Percentile	150
	25 Percentile	6

**Operation: Group Quarters Validation**

Rank	Report Name	Number of Times Opened
1	2010 Group Quarters Validation Executive Report	52
2	2010 Current Cost and Progress, Questionnaires	25
3	2010 Summary Cost and Progress	17
4	2010 Current Cost and Progress, AAs	12
5	2010 Current Employee Cost - Field Work	11
6	2010 Preliminary Total Cost	7
7	2010 Total Reinterview Progress	5
7	2010 Current Employee Cost - Training	5
7	2010 Questionnaire Data Capture	5
7	2010 Expected vs. Act % of Bud Used, Field Work Training	5
11	2010 Exp vs. Actual %s Bud Used Quest Asgnd and Compltd	4
12	2010 Reinterview Workload	3
12	2010 Random Reinterview Progress	3
12	2010 Random Reinterview Outcome	3
15	2010 Supplemental Reinterview Progress	2
15	2010 Supplemental Reinterview Outcome	2
17	2010 Expected vs. Actual Progress	1
	75th Percentile	11
	25 Percentile	3

**Operation: LUCA**

Rank	Report Name	Number of Times Opened
1	2010 LUCA Participant Response by GU Type	29
2	2010 LUCA Participation Status by GU Type	27
3	2010 LUCA Program Dropouts by GU Type	11
4	2010 LUCA Materials Produced by GU Type	8
5	2010 LUCA Materials Shipped by GU Type	7
6	2010 LUCA Program Dropouts by GU Type within RCC	3
6	2010 LUCA Participation Status by GU Type within RCC	3
6	2010 LUCA Participant Response by RCC	3
9	2010 LUCA Program Dropouts by RCC	2
9	2010 LUCA Participant Response by GU Type within RCC	2
9	2010 LUCA Materials Produced by GU Type within RCC	2
12	2010 LUCA Participation Status by RCC	1

**Operation: LUCA**

Rank	Report Name	Number of Times Opened
12	2010 LUCA Materials Shipped by RCC	1
12	2010 LUCA Materials Shipped by GU Type within RCC	1
12	2010 LUCA Materials Produced by RCC	1
16	2010 LUCA Participation Status by GU	0
	75th Percentile	7
	25 Percentile	1

**Operation: Mail Response Rates 2010**

Rank	Report Name	Number of Times Opened
1	2010 Prelim. Undup. MRR National-RCC-Tract	4417
2	2010 Prelim. Undup. MRR National-State-Tract	3002
3	2010 Mail Response Rates Executive Report	332
4	2010 Prelim. Undup. MRR Incorporated Place	171
5	2010 Prelim. Undup. MRR LCO-Tract (Puerto Rico)	131
6	2010 Prelim. Undup. MRR State-Tract (Spanish)	77
7	2010 Prelim. Undup. MRR National-RCC-LCO (Unmailables)	60
8	2010 Mail Response Rates - Graphs	55
9	2010 Prelim. Undup. MRR Municipio-Tract (Puerto Rico)	43
10	2010 Prelim. Undup. MRR Municipalities	28
11	2010 Final Undup. MRR National-State-Tract	26
12	2010 Prelim. Undup. MRR Consolidated City	22
12	2010 Prelim. Undup. MRR American Indian Areas	22
12	2010 Final Undup. MRR National-RCC-Tract	22
15	2010 Prelim. Undup. MRR Minor Civil Divisions	15
16	2010 Final Duplicated MRR National-State	14
17	2010 Final Undup. MRR State-Tract (Spanish)	11
18	2010 Prelim. Undup. MRR RCC-Tract (Spanish)	10
19	2010 Final Undup. MRR Municipio-Tract (Puerto Rico)	9
20	2010 Final Undup. MRR LCO-Tract (Puerto Rico)	4
20	2010 Prelim. Undup. MRR National-RCC-Tract (LCO-no map)	4
22	2010 Final Undup. MRR Incorporated Place	3
22	2010 Final Undup. MRR American Indian Areas	3
22	2010 Prelim. Undup. MRR National-RCC-Tract (RCC-no map)	3
25	2010 Final Undup. MRR Minor Civil Divisions	1
26	2010 Final Undup. MRR RCC-Tract (Spanish)	0
26	2010 Final Undup. MRR Municipalities	0
26	2010 Final Undup. MRR Consolidated City	0
	75th Percentile	56
	25 Percentile	4

75th Percentile

25th Percentile

**Operation: New Construction**

Rank	Report Name	Number of Times Opened	
1	2010 Participation Status by GU Type	2	
1	2010 Participant Response by GU type within RCC	2	
1	2010 Materials Produced by GU Type	2	75th Percentile
4	2010 Participation Status by GU Type within RCC	1	25th Percentile
4	2010 Participant Response by GU Type	1	
4	2010 Materials Shipped by GU Type	1	
4	2010 Materials Produced by GU Type within RCC	1	
8	2010 Materials Shipped by GU type within RCC	0	
	75th Percentile	2	
	25 Percentile	1	

### Operation: Non-ID

Rank	Report Name	Number of Times Opened	
1	2010 Process Resp Prov Addr (Type A Cases)	91	75th Percentile
2	2010 Process Resp Prov Addr (Type B Cases)	37	
3	2010 Non-ID Executive Report Processing of All Cases	16	25th Percentile
	75th Percentile	64	
	25 Percentile	27	

### Operation: Non Response Followup and ReInterview

Rank	Report Name	Number of Times Opened	
1	2010 NRFU Executive Report	737	
2	2010 NRFU Summary Cost and Progress	485	
3	2010 NRFU RI Executive Report	343	
4	2010 NRFU Tracking Data Report	339	
5	2010 Current Employee Cost - Field Work	255	
6	2010 NRFU RI Tracking Data Report	229	
7	2010 NRFU RI Summary Cost and Progress	190	
8	2010 Current Employee Cost - Training	188	
9	2010 Exp Vs. Act % of Budget Used, Field Work Training	167	
10	2010 NRFU Current Workload Status	164	
11	2010 Preliminary Total Cost	158	75th Percentile
12	2010 Current RI Processing Workflow for MaRCS By Stage	106	
13	2010 NRFU Residual Summary Cost and Progress	89	
14	2010 Final Reinterview Cases Outcomes	74	
15	2010 NRFU Residual Tracking Data	68	
16	2010 NRFU Hours and Mileage (All Emp. Type)	60	
17	2010 NRFU Hours and Mileage (Enumerator)	33	
18	2010 NRFU Expected vs. Actual Progress and Cost	23	

**Operation: Non Response Followup and ReInterview**

Rank	Report Name	Number of Times Opened
19	2010 NRFU RI Hours and Mileage (All Emp. Type)	20
19	2010 NRFU Executive Report Act vs. Exp Progress and Cost	20
21	2010 NRFU RI Exec Report Act vs. Exp Progress and Cost	19
22	2010 NRFU RI Hours and Mileage (Enumerator)	16
23	2010 NRFU Hours and Mileage (Field Operations Superv.)	13
23	2010 NRFU Hours and Mileage (Crew Leader)	13
25	2010 NRFU Hours and Mileage (Crew Leader Assistant)	9
26	2010 NRFU Shipping Report	8
26	2010 NRFU RI Hours and Mileage (Field Operations Super.)	8
28	2010 NRFURI Expected vs. Actual Progress and Cost	7
29	2010 NRFU RI Hours and Mileage (Crew Leader)	6
29	2010 NRFU RI Hours and Mileage (Crew Leader Assistant)	6
29	2010 Cumulative Progress Toward 5% Reinterview Workload	6
32	2010 NRFU Executive Summary Report	5
33	2010 NRFU Tracking Data Report - Shipping	4
33	2010 NRFU RI Shipping Report	4
35	2010 NRFU Shipping Report by Data Capture Center	3
36	2010 NRFU Reinterview % Final Outcomes	2
36	2010 NRFU RI Tracking Data Report - Shipping	2
36	2010 Shipping and Acknowledgement	2
39	2010 NRFU RI Shipping Report by Data Capture Center	1
39	2010 NRFU RI Executive Summary Report	1
39	2010 Curr Prog for RI Personal Visit vs. Tel Followup	1
	75th Percentile	158
	25 Percentile	6

25th Percentile

**Operation: NRFU Vacant Delete Check**

Rank	Report Name	Number of Times Opened
1	2010 Exec Report Actuals vs. Expected Progress and Cost	256
2	2010 Summary Cost and Progress	179
3	2010 Current Employee Cost - Field Work	96
4	2010 Exp vs Actual % Budget Used Field Work and Training	76
5	2010 Current Employee Cost - Training	50
6	2010 Preliminary Total Cost	38
7	2010 NRFU VDC Shipping Report by Data Capture Center	2

75th Percentile



7	2010 NRFU VDC Shipping Report	2	
9	2010 Expcted vs Actual PCT Bud Used Fld Work Trng1	0	25th Percentile
9	2010 Exp vs Actual Pct Budget Used Field Work Training	0	
9	2010 Exp vs Actual Budget Used Field Work and TRN	0	
9	2010 NRFU VDC Tracking Data Report - Shipping	0	
9	2010 Exp vs Actual % Budget Used Field Work and TRN	0	
9	2010 NRFU VDC Exec Report Act vs. Exp Progress and Cost	0	
9	2010 Exp vs Act Pct Bud Used Fld Work and Training	0	
9	2010 Exp vs Act Pct Bud Used Fld Work and TRN	0	
9	2010 Vacant Delete Outcome After Adjudication	0	
9	2010 VDC Summary Cost	0	
9	2010 Adjudication	0	
9	2010 Current Progress	0	
9	2010 SumCost and Prog	0	
9	2010 Shipping and Acknowledgment	0	
	75th Percentile	29	
	25 Percentile	0	

### Operation: Printing

Rank	Report Name	Number of Times Opened	
1	2010 Printing Production Report	25	75th Percentile
2	2010 Package Assembly Report	10	25th Percentile
	75th Percentile	21	
	25 Percentile	14	

### Operation: Remote Alaska

Rank	Report Name	Number of Times Opened	
1	2010 Remote Alaska Executive Report	177	
2	2010 Current Cost and Progress	129	
3	2010 Actual % of Budget Used, Field Work Training	88	75th Percentile
4	2010 Current Employee Cost - Field Work	87	
5	2010 Summary Cost and Progress	81	
5	2010 Current Employee Cost - Training	81	
7	2010 Preliminary Total Cost	71	25th Percentile
8	2010 Shipping and Acknowledgment	63	
9	2010 Actual Pct of Budget Used, Field Work Training	0	
	75th Percentile	88	
	25 Percentile	71	

**Operation: Remote Update Enumerate**

Rank	Report Name	Number of Times Opened	
1	2010 Remote Update Enumerate Executive Report	163	
2	2010 Current Cost and Progress	141	
3	2010 Current Employee Cost - Field Work	124	75th Percentile
4	2010 Current Employee Cost - Training	82	
5	2010 Summary Cost and Progress	73	
6	2010 Actual % of Budget Used, Field Work Training	56	
7	2010 Preliminary Total Cost	54	
8	2010 Actual Cost and Progress - Line Graph	33	25th Percentile
9	2010 Executive Report Actual Progress and Cost Report	28	
10	2010 Actual Pct of Budget Used, Field Work Training	0	
	75th Percentile	114	
	25 Percentile	38	

**Operation: Telephone Questionnaire Assistance**

Rank	Report Name	Number of Times Opened	
1	2010 Inbound Calls by Language	267	
2	2010 Call Resolution, Cum Inbound Calls by Type of Resol	217	75th Percentile
3	2010 Call Resolution, Cum TQA Calls by Request Type	206	
4	2010 Telephone Questionnaire Assistance Executive Report	199	
5	2010 Call Resolution, Cum Fulfillmnt Requests by IVR TQA	156	
6	2010 Call Resolution, Cum IVR Calls by Request Type	128	
7	2010 Estimated DRIS TQA Labor Cost	27	25th Percentile
8	2010 Daily Inbound Calls by Type of Resolution Graph	24	
	75th Percentile	209	
	25 Percentile	103	

**Operation: Update Enumerate**

Rank	Report Name	Number of Times Opened
1	2010 UE Production Executive Report	183
2	2010 UE Production- Current Cost and Progress	159
3	2010 UE QC - Executive Report	123
4	2010 Current Employee Cost - Field Work	93
4	2010 UE Production Summary Cost and Progress	93
6	2010 UE QC - Summary Cost and Progress	87

**Operation: Update Enumerate**

Rank	Report Name	Number of Times Opened	
7	2010 UE QC Reinterview (RI)-Current Field Progress	83	85th Percentile
8	2010 Exp vs. Actua % of Bud Used, Fld Work and Training	78	
9	2010 Current Employee Cost - Training	73	
10	2010 UE QC Executive Report	62	
11	2010 UE QC Vacant-Regular (RI) and Del Ver(DV)-Progress	53	
12	2010 Preliminary Total Cost	51	
13	2010 UE QC RI-Curr Processing WrkFlow for MaRCS by Stage	40	
14	2010 UE QC Reinterview (RI)-Final Outcome	35	
15	2010 UE Prod-Exe Report Actuals vs.Exp Progress and Cost	23	
16	2010 Expected vs. Actual Cost and Progress Graph	19	
17	2010 UE QC - Exe Report Actuals vs.Exp Progress and Cost	17	
18	2010 UE QC DQC - Outcome and Progress	13	25th Percentile
19	2010 UE QC RI - Cumulative Progress Toward 5% Workload	8	
20	2010 AA Binder Shipping and Acknowledgment	5	
21	2010 UE QC RI-PV vs Telephone Followup Current Progress	4	
21	2010 Housing Unit (HU) Shipping and Acknowledgement	4	
23	2010 Expected vs. Actual Cost Progress Line Graph	0	
	75th Percentile	85	
	25 Percentile	15	

**Operation: Update Leave**

Rank	Report Name	Number of Times Opened	
1	2010 Executive Report Actuals vs. Expected Progress-Cost	82	
2	2010 Summary Cost and Progress	44	
3	2010 Current Employee Cost - Training	23	
4	2010 Current Employee Cost - Field Work	21	75th percentile
5	2010 Production Workload Progress	18	
6	2010 Actuals vs. Expected Progress and Cost	13	
7	2010 Actual % of Total Budget Used, Field Work -Training	12	
8	2010 DQC Workload Progress	11	
8	2010 Repair, QC Complete and Shipped to NPC	11	
10	2010 NPC Workload - Check in and Keying	10	
11	2010 Preliminary Total Cost	8	
12	2010 Update Leave Executive Report	7	25th Percentile
13	2010 NPC Workload - Map Check in and Digitizing	5	

**Operation: Update Leave**

Rank	Report Name	Number of Times Opened
14	2010 Executive Report Actuals vs. Expected Prog and Cost	1
15	2010 Actual of Total Budget Used, Field Work - Training	0
15	2010 Repair, QC Complete and AA Shipped to NPC	0
	75th Percentile	19
	25 Percentile	7

Question 6 Data Results: Total Number of Ad Hoc Reports by Operation. The data were extracted from the 2010 Census C&P System log files.

Operation	Total
ADDRESS CANVASSING	5
BE COUNTED	13
CCM INDEPENDENT LISTING	5
CCM MATCHING INITIAL HU & HUFU	3
DATA CAPTURE/CHECK-IN	5
ENUMERATION AT TRANSITORY LOCATIONS	16
GQAV	5
GQV	3
GROUP QUARTERS (GQE, SBE, AND MILITARY)	12
MAIL RESPONSE RATES (MRR)	29
NRFU AND NRFU REINTERVIEW	8
NRFU/VACANT DELETE CHECK	2
REMOTE ALASKA	1
REMOTE UPDATE/ENUMERATE	3
UNKNOWN	34
UPDATE/ENUMERATE	19
UPDATE/LEAVE	69
Total	230

## APPENDIX F: LESSONS LEARNED

The DMD MIS staff held a meeting with management staff on May 17, 2011 and obtained their lessons learned.

Category	Lessons Learned Statement	Analysis	Recommendation	Impact
Requirements	Management staff designed report shells as their primary method of determining what information they needed.	Designing the end product first, i.e., the report, resulted in backward process to identify source systems, data variables, algorithms, which resulted in reports with inconsistent algorithms, column headers, or definitions for the same data variable. Reports had so many data columns that resulted in long horizontal scrolling to view it.	Operations managers focus on identifying data items. For example, start with a high level variable like Miles and then add further detail such as Training Miles Cost, Training Miles Driven, Field Work Miles Cost, and Field Work Miles Driven.	Allows more flexibility for selecting what data items are really needed on a report.
Requirements	The documentation process was too manual; it was a paper trail of documents, some of which were output from the "Composer;" there were also many documents created directly in MS Word.	A simple change to a requirement resulted in staff making the same change in requirement, development, and testing specifications.	Use a requirements management commercial-off-the shelf software (COTS) product.	Actively engage all stakeholders in a collaborative requirements process by providing access to the requirements database and integration to requirements definition capabilities. Link requirements to design items, test plans, test cases and other requirements for easy traceability
Requirements	The walk-through for C&P with the management and DMD MIS requirements, developer, and tester staff was very helpful, but they were dropped when the workload was intensive.	When walk-throughs were difficult to schedule because of the increased tempo to deliver C&P reports, management staff worked directly with programmers to explain the census operations or algorithms while the programmers tried to explain coding and limitations of SAS BI, but sometimes neither understood the other and this led to miscommunication.	A DMD MIS requirements management staff person should assist the customer throughout the lifecycle phases: Elaboration, Development, Transition, and Deployment & Maintenance.	Keeps the process moving and management staff informed about activities occurring in each lifecycle phase.

Category	Lessons Learned Statement	Analysis	Recommendation	Impact
Requirements	Column names and definitions for the same data variables were inconsistent.	Need to do a better job standardizing column names and definitions. Definitions were confusing to users.	The Decennial Directorate and its stakeholders in TMO, POP, Field, etc., should develop a Common Data Dictionary (CDD) to be used by all source systems. This should probably be adopted by the Census Bureau as a whole.	Consistent definitions for data items across all operations may promote users' understanding of an operation's status.
Requirements	Flexibility on reports needs to be developed.	There were constraints on how the reports were structured; it seemed that regardless of the operation, there were mandatory elements, especially cost elements, which were not pertinent. Example: Expected cost	Structure needs to be combined with enhancement development for the user.	Requiring reports to have mandatory cost elements should be limited to common cost fields.
Requirements	Management staff were unfamiliar with their role or responsibilities (requirements gathering, user acceptance testing, submitting change requests, etc.) for developing C&P reports.	Management staff learned by doing; since most managed several operations, by the time of their last operation they knew what they needed to do.	Develop a check list for the actions that management staff needs to do and conduct a kick-off meeting.	When all stakeholders understand the lifecycle phases, they will know what their role and responsibilities are.
Requirements	MIS staff elected to use a contractor-built tool, "The Decomposer" for requirements management and it was extremely difficult to use.	We made a mistake going with the "Decomposer" instead of COTS Doors. The graphical user interface was poorly designed; it was difficult for users to change their input; and, the reports it produced were entirely too unwieldy to use for programming or testing	The Census Bureau needs a requirement management software tool at the enterprise level.	User-friendly requirements management software will provide users the ability to manage the process flow for managing product lifecycle from start to finish. When requirements are linked to design items, test plans, test cases and other requirements for easy traceability, it will reduce the man-hours to make changes.
Development	The documentation process was too manual; it was a paper trail of documents: design documents, checklists, developer's logs, etc.	A simple change to one document resulted in staff making the same change in several documents.	Use a COTS product to automate the development process.	When requirements are linked to design items, test plans, test cases and other requirements for easy traceability, it will reduce the man-hours to make changes.

Category	Lessons Learned Statement	Analysis	Recommendation	Impact
Development	Management staff did not know the status of report development and would drop by developer's work area to inquire about how many reports were completed.	Managers could look at the C&P schedule, but it only provided high level information such as "25 percent complete" or number of remaining days for a task.	Have a process, preferably one that is automated, to keep operation managers informed about report development or any phase in the lifecycle.	Management staff can monitor the status of C&P reports through the lifecycle.
Testing	The documentation process was too manual; it was a paper trail of documents: testing plans, testing hand-off log, testing summary, etc.	A simple change resulted in staff making the same change in several documents.	Use a COTS product to automate the testing process.	When requirements are linked to design items, test plans, test cases and other requirements for easy traceability, it will reduce the man-hours to make changes.
Testing	System testers did not follow their own process.	There was incomplete or no documentation for test plans, testing hand-off log, testing summary, test data creation, test results, test metrics, etc.	Use a COTS product to automate the testing process.	Test management software can deliver insights into entire testing process by creating test cases or scripts, tracking the status of individual tests, capturing bugs or deficiencies, and recording test metrics.
Testing	There was very little or no test data from a source system for user acceptance testing (UAT).	Validating an algorithm usually occurred during the initial weeks of production and this resulted in several CRs when operation managers discovered an error in their algorithm or how it was programmed.	Operation managers need to identify UAT data from the source system as a requirement.	Identify programming errors and corrections before releasing to production.
File Transfers	Establish communications with source systems managers prior to deployment.	We found that if we had already opened communications during the testing phase things went smoothly.	Establish communication with source systems managers from the beginning and keep abreast of the names of POCs.	Contact information is vital to quickly resolving problems.
File Transfers	We had to solve our own file transfer problems when we did not receive a file from Product Services Message Queuing (PSMQ).	Messaging software didn't monitor the traffic flow passing through its pipeline.	When using software for file transfers, the messaging software manager needs to be more active and participate in monitoring data traffic.	Each part of a transmission should be monitored to identify where bottlenecks or failures occur.
Reports	For data capture, we wanted fewer reports, but were given a requirement from C&P that everything had to fit across one screen horizontally, so what	Users created ad hoc reports after C&P deployed reports to the production server.	Promote the identification of data variables that can be shared across operations and encourage management staff to build their own	Allows more flexibility for selecting what data items are really needed on a report.



Category	Lessons Learned Statement	Analysis	Recommendation	Impact
	should have been in 1 report had to be split into 4 separate reports.		reports.	
Reports	Some management staff created ad hoc reports to respond to senior managers.	Ad hoc reports save time initiating, developing, and testing CRs and gave management staff the flexibility to answer questions quickly.	Promote the identification of data variables that can be shared across operations and encourage management staff to build their own reports.	Management staff can create reports that show data analysis about a census operation.
Reports	The development of the C&P reports for the 2010 Census did not take into account the Executive staff as an audience.	Reports were not developed with the Executive staff as potential users; the reports contained sufficient information for management staff, but executive staff wanted to see comparative analysis of the data.	In gathering requirements, it should be planned that a dashboard be developed and available for the Executive staff and senior managers based on their specific C&P reporting requirements.	A dashboard will provide the Executive staff and senior managers with views of critical measures and enable them to effectively and efficiently execute strategies to initiate actions to improve an operation's performance.
Reports	C&P reports need real time data; management staff spent valuable time printing C&P reports when managers accessed other systems and obtained more up-to-date information.	DMD senior staff made a decision not to update more than once per day, so source system providers were not prepared to transmit data more than one time per day.	Have web-based access in meetings with managers to view C&P reports and refresh data more than one time per day.	Current information is critical to monitoring operations, especially those with short durations of a few weeks.
Reports	Some management staff were directed to present C&P reports with data that were not applicable for their operation. For example, CCM management staff had to report expected values for workload or costs, which do not apply to their operations.	Valuable time was wasted creating reports that operation managers did not view.	Have a few standard reports like the Executive Cost & Progress reports. Promote the identification of data variables that can be shared across operations and encourage management staff to build their own reports.	Management staff can create reports that show data analysis pertinent to their census operation.
Training	We conducted classroom training for users, but it was held too early for most users to apply what they learned.	Users forgot what they learned by the time their operation started and C&P reports were deployed.	Create web-based training so users can take it when they begin using C&P.	Web-based training will provide just-in-time training for management staff and reduce/eliminate the burden on resources needed for classroom training: MIS trainers, laptops, and classrooms.

Category	Lessons Learned Statement	Analysis	Recommendation	Impact
Training	The SAS Enterprise Guide software had a lot of bugs. For example, when creating control charts on the data end for C&P the data were not cumulative.	Users were unable to develop ad hoc reports that answered managers' detailed questions because the software had limited functionality	Access data directly from SAS and provide a deeper analysis tool by installing SAS statistical functionality.	May need to provide web-based training so management staff will know how to use the software.
Software /Hardware Problems	Management staff were unclear about how to obtain a user account for the C&P system. The Census Bureau security policy required us to rack user accounts from initiation to termination.	We relied on Operational Integration Team (OIT) members to educate their team members on how to obtain accounts. We wrote procedures, but the work was manual and required several steps to complete which made account creation a time-consuming process	Develop web-based account creation to automate the process and have accounts available in one business day.	Provides a tool for managing user accounts.
Software /Hardware Problems	System administrators did not keep SAS BI up-to-date with hot fixes and patches.	During the migration from one version of SAS BI to an updated version we identified that several hot fixes and patches the vendor released to optimize the software were not installed. We had to delay SAS BI 9.2 installation to bring SAS BI 9.13 up to date.	Make sure that the roles, responsibilities, and processes for maintaining the system are clearly defined and documented; system administrators should keep the software updated with hot fixes and patches released from the vendor.	Software can be maintained within the scope of the software site license.
Technical Support	LTSO established our userids in Remedy and we received notification to close accounts when users left the Census Bureau or transferred to a non-decennial division.	This process helped us to comply with Census Bureau security policy.	Develop web-based account creation to automate the process and have accounts available in one business day.	Provides a tool for monitoring user accounts.

Category	Lessons Learned Statement	Analysis	Recommendation	Impact
Technical Support	DMD planned early for the business needs for the C&P Reporting system including contractors, hardware and software. Requests for budget were submitted well in advance and funding was available when needed. Once the hardware was purchased the system administrators were supposed to configure and manage the hardware planned for and purchased for the C&P system. Instead, hardware purchased for the C&P system was used for other projects and C&P was moved to older and less efficient hardware. This resulted in issues with development, testing, and deployment of the C&P reports.	The hardware was inadequate for the C&P system. System performance was extremely slow and resulted in several user complaints, including those from the Executive staff.	Equipment that is purchased for a specific system should be used for that system unless there is an issue during setup with the appropriateness of the equipment for that system.	We ended up with a hardware configuration that did not meet minimal requirements for SAS BI.
Technical Support	Our support system administrators learned SAS BI through trial and error. When system problems occurred, it took more than one business day to restore C&P. The system support office did not follow suggestions from SAS consultants for configuration and this resulted in performance issues.	The system support provider should have SAS BI trained system administrators.	Insist that we have system technicians who are trained to administer software used for the Census: SAS BI, ArcGIS, Oracle, etc.	Whatever software is used, you need system administrators who understand its configuration and know how to maintain it.
Technical Support	Management staff wanted performance measures (e.g., display time) included as a requirement for C&P reports. When the C&P system was slow to display reports, management staff concluded their requirements were ignored.	During the Development phase to design and build C&P reports, developers experienced performance issues with the software and hardware configurations. Neither configuration could meet management staff's performance requirements to display reports within 1-2 minutes. The C&P system was inadequate when it was delivered to the MIS staff.	The system support administrators should follow SAS expert guidance on hardware and software configuration for SAS BI to obtain optimum performance.	When a system is poorly designed and improperly configured, it cannot deliver the necessary robustness and scalability for optimum performance.

Category	Lessons Learned Statement	Analysis	Recommendation	Impact
Schedule	When creating a schedule, identify a realistic level of effort to perform a task. Need to break down tasks to more discrete steps and watch for tasks that consume the same resource, e.g. programmers, at the same period or occur with a few days of each other.	We had the same duration for tasks regardless of the number of C&P reports we had to deliver because senior managers requested additional reports. During the increased tempo to deliver C&P reports, our resources for developing and testing were stretched to meet deliverable dates.	Create a resource-driven schedule when workload is intense for a very short period of time or workload is not predictable.	A resource-driven schedule will show when resources will be under or over committed; a resource-driven schedule can help a manager forecast when to increase/decrease resources to meet deliverable dates.
Communications	We had strong communications with our contract specialist in Acquisitions.	When we had problems with the contractor or needed to modify the contract, our Contract Specialist responded quickly and efficiently.	Establish and maintain positive communication with the Acquisition contract specialist and contracting officer because they can take the necessary action when problems arise.	Problems can escalate if there is no communication and can make deliverables late.
Contracting	The contractor provided a part-time project manager and this was insufficient to manage the number of contractor staff and meet deliverables.	Deliverables were of poor quality or missed delivery dates.	Contract should require a full-time, on-site Contract Project Manager to manage resources and deliver a quality product.	Better use of contract resources.
Contracting	MIS staff was excellent when it came to helping users with issues by responding in a timely manner.	There was a good rapport between operation managers and MIS staff.	Develop and maintain a positive relationship with operation managers and staff.	Maintaining a good working relationship is a must to achieve any goal!
Contracting	DMD MIS entered into a contract to provide persons with SAS BI, requirements management, or testing experience; many of the contractor staff brought on as developers did not have the experience shown in their resumes.	We spent too much time trying to train contractor staff about the decennial census and SAS BI; we dismissed several contractors for poor performance and this resulted in both government and remaining contractor staffs to work overtime to meet deliverable dates.	Hold the contractor fully responsible for providing contractor staff with required skills and replacing those who do not perform. Keep Acquisition staff informed of poor performance and let them take the appropriate action.	Allowing poor performers to work lowers morale and jeopardizes meeting deliverable dates.

## **Appendix G: Acronyms and Abbreviations**

<b>Acronym/Abbreviation</b>	<b>Description</b>
<b>AA</b>	<b>Assignment Area</b>
<b>Act</b>	<b>Actual</b>
<b>ADCAN</b>	<b>Address Canvassing</b>
<b>Addr</b>	<b>Addresses</b>
<b>AMSD</b>	<b>Administrative Management and Systems Division</b>
<b>ArcGIS</b>	<b>Geographic Mapping Software</b>
<b>Asgnd</b>	<b>Assigned</b>
<b>ATAC</b>	<b>Automated Tracking and Control System</b>
<b>Bud</b>	<b>Budget</b>
<b>C&amp;P</b>	<b>Cost &amp; Progress System</b>
<b>CARMN</b>	<b>Cost And Response Management Network</b>
<b>CBS</b>	<b>Commerce Business System</b>
<b>CCM</b>	<b>Census Coverage Measurement</b>
<b>CDD</b>	<b>Common Data Dictionary</b>
<b>CEE</b>	<b>Census Evaluation &amp; Experiments</b>
<b>CFU</b>	<b>Coverage Follow Up</b>
<b>CMOCS</b>	<b>Coverage Measurement Operational Control System</b>
<b>Compltd</b>	<b>Completed</b>
<b>COTS</b>	<b>Commercial Off the Shelf</b>
<b>CQR</b>	<b>Count Question Resolution</b>
<b>CR</b>	<b>Change Request</b>
<b>Cum</b>	<b>Cumulative</b>
<b>Cum IVR</b>	<b>Cumulative Inception to Date</b>
<b>Curr</b>	<b>Current</b>
<b>DAAL</b>	<b>Demographic Area Address Listing</b>
<b>DAPPS</b>	<b>Decennial Applicant, Personnel, and Payroll System</b>
<b>DCAR</b>	<b>Data Capture Audit Resolution</b>
<b>Del Ver(DV)</b>	<b>Delete Verification</b>
<b>DMD</b>	<b>Decennial Management Division</b>
<b>DQC</b>	<b>Dependent Quality Control</b>
<b>DRIS</b>	<b>Decennial Business Intelligence and Analysis</b>
<b>DSCMO</b>	<b>Decennial Systems and Contracting Management Office</b>
<b>DSSD</b>	<b>Decennial Statistical Studies Division</b>
<b>ELCO</b>	<b>Early Local Census Office</b>
<b>ETL</b>	<b>Enumeration at Transient Locations</b>
<b>Exe</b>	<b>Executive</b>
<b>Exp</b>	<b>Expected</b>
<b>FDCA</b>	<b>Field Data Collection Automation</b>
<b>FLD</b>	<b>Field Division</b>
<b>FVOCS</b>	<b>Field Verification Operational Control System</b>
<b>GEO</b>	<b>Geography Division</b>
<b>GEO/MTdb</b>	<b>Geography MAF/TIGER Database</b>
<b>GQ</b>	<b>Group Quarters</b>
<b>GQAV</b>	<b>Group Quarters Advance Visit</b>
<b>GQE</b>	<b>Group Quarters Enumeration</b>
<b>GU Type</b>	<b>Governmental Unit Type</b>

<b>HU</b>	<b>Housing Unit</b>
<b>HUFU</b>	<b>Housing Unit Follow Up</b>
<b>ICD</b>	<b>Interface Control Document</b>
<b>IHUFU</b>	<b>Initial Housing Unit Follow Up</b>
<b>IL</b>	<b>Independent Listing</b>
<b>ILB</b>	<b>Independent Listing Book</b>
<b>IVR</b>	<b>Interactive Voice Response</b>
<b>JARS</b>	<b>Jeffersonville Activity Reporting System</b>
<b>LCO</b>	<b>Local Census Office</b>
<b>LUCA</b>	<b>Local Update of Census Addresses</b>
<b>MaRCS</b>	<b>Matching, Review, and Coding System</b>
<b>MIL</b>	<b>Military</b>
<b>MIS</b>	<b>Management Information System</b>
<b>MRR</b>	<b>Mail Response Rates</b>
<b>MS</b>	<b>Microsoft</b>
<b>NON-ID</b>	<b>Nonresponse Follow-up Identification Number</b>
<b>NPC</b>	<b>National Processing Center</b>
<b>NRFU</b>	<b>Non-Response Follow Up</b>
<b>OIT</b>	<b>Operational Integration Team</b>
<b>PB-OCS</b>	<b>Paper-Based Operational Control System</b>
<b>Pct</b>	<b>Percent</b>
<b>PFU</b>	<b>Person Follow Up</b>
<b>PI</b>	<b>Person Interview</b>
<b>PIRI</b>	<b>Person Interview/Reinterview</b>
<b>PM</b>	<b>Person Matching</b>
<b>POCs</b>	<b>Point of Contacts</b>
<b>POP</b>	<b>Population Division</b>
<b>Prelim</b>	<b>Preliminary</b>
<b>PRO</b>	<b>Progress</b>
<b>Prov</b>	<b>Provided</b>
<b>PSMQ</b>	<b>Product Services Message Queuing</b>
<b>PV</b>	<b>Personal Visit</b>
<b>QC</b>	<b>Quality Control</b>
<b>RCC</b>	<b>Regional Census Center</b>
<b>Rept</b>	<b>Report</b>
<b>Resol</b>	<b>Resolution</b>
<b>Resp</b>	<b>Response</b>
<b>Resp Prov Addr</b>	<b>Respondent Provided Addresses</b>
<b>RI</b>	<b>Reinterview</b>
<b>SAS BI</b>	<b>SAS Business Intelligence</b>
<b>SBE</b>	<b>Service Based Enumeration</b>
<b>SIO</b>	<b>System Integration Office</b>
<b>SumCost and Prog</b>	<b>Summary Cost and Progress</b>
<b>Super</b>	<b>Supervisor</b>
<b>Superv</b>	<b>Supervisor</b>
<b>TMO</b>	<b>Technologies Management Office</b>
<b>TQA</b>	<b>Telephone Questionnaire Assistance</b>
<b>TRN</b>	<b>Training</b>

<b>UAA</b>	<b>Undeliverable as Addressed</b>
<b>Tel</b>	<b>Telephone</b>
<b>Quest</b>	<b>Questionnaire</b>
<b>UAT</b>	<b>User Acceptance Testing</b>
<b>UCM</b>	<b>Universe Control and Management</b>
<b>UE</b>	<b>Update Enumerate</b>
<b>Undup</b>	<b>Unduplicated</b>
<b>VDC</b>	<b>Vacant Delete Check</b>
<b>WrkFlow</b>	<b>Workflow</b>