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October 27, 2011

**2010 CENSUS PLANNING MEMORANDA SERIES**

**No. 154**

MEMORANDUM FOR      The Distribution List

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

Subject:                    Operational Assessment of the Development of the 2010  
                                 Demographic Analysis Estimates

Attached is the Operational Assessment of the Development of the 2010 Demographic Analysis Estimates. 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 study plan, please contact Kirsten West at (301) 763-6131.

Attachment

October 24, 2011

# **Operational Assessment of the Development of the 2010 Demographic Analysis Estimates**

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

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**Population Division**



## Table of Contents

<b>LIST OF TABLES .....</b>	<b>III</b>
<b>EXECUTIVE SUMMARY .....</b>	<b>IV</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>2.1 HISTORY OF OPERATIONAL ASSESSMENT .....</b>	<b>1</b>
<b>2.2 SCHEDULE OF ACTIVITIES .....</b>	<b>2</b>
<b>2.3 MONITORING OF SCHEDULE: RISK REGISTER.....</b>	<b>3</b>
<b>2.4 STAFFING .....</b>	<b>3</b>
<b>2.5 OUTREACH .....</b>	<b>4</b>
<b>3. METHODOLOGY .....</b>	<b>5</b>
<b>3.1 QUESTIONS TO BE ANSWERED.....</b>	<b>5</b>
<b>3.2 METHODS .....</b>	<b>5</b>
<b>4. LIMITATIONS.....</b>	<b>6</b>
<b>5. RESULTS .....</b>	<b>7</b>
<b>5.1 QUESTION 1: HOW DID ACTUAL START AND COMPLETION DATES     COMPARE TO PLANNED START AND COMPLETION DATES?.....</b>	<b>7</b>
<b>5.2 QUESTION 2: WERE PROJECT MANAGEMENT TOOLS HELPFUL TO THE     MANAGEMENT OF THE OPERATION? .....</b>	<b>8</b>

<b>5.3</b>	<b>QUESTION 3: WAS THE RISK REGISTER USEFUL AND DID ANY RISKS REQUIRE MITIGATION? .....</b>	<b>8</b>
<b>5.4</b>	<b>QUESTION 4 AND QUESTION 5: DID THE TEAMS HAVE ENOUGH STAFF? DID THE STAFF HAVE THE RIGHT LEVEL OF EXPERIENCE? .....</b>	<b>11</b>
<b>5.5</b>	<b>QUESTION 6: DID THE STAFF RECEIVE ADEQUATE TRAINING ON DEMOGRAPHIC ANALYSIS TECHNIQUES? .....</b>	<b>12</b>
<b>5.6</b>	<b>QUESTION 7: WAS THE TECHNICAL WORKSHOP AN EFFECTIVE STRATEGY FOR SOLICITING EXTERNAL EXPERT INPUT? .....</b>	<b>13</b>
<b>5.7</b>	<b>QUESTION 8: WHAT ASPECTS WORKED WELL.....</b>	<b>15</b>
<b>5.8</b>	<b>QUESTION 9: WHAT NEEDS IMPROVEMENT FOR THE 2020 DA OPERATION? .....</b>	<b>16</b>
<b>6.</b>	<b>RELATED EVALUATIONS, EXPERIMENTS, AND/OR ASSESSMENTS .....</b>	<b>19</b>
<b>7.</b>	<b>LESSONS LEARNED, CONCLUSIONS, AND RECOMMENDATIONS .....</b>	<b>19</b>
<b>8.</b>	<b>ACKNOWLEDGEMENTS .....</b>	<b>19</b>
<b>9.</b>	<b>REFERENCES.....</b>	<b>20</b>
	<b>APPENDIX A: DEBRIEFING PROTOCOLS .....</b>	<b>22</b>
	<b>APPENDIX B: DEBRIEFING QUESTIONNAIRE .....</b>	<b>23</b>
	<b>APPENDIX C: RISK REGISTER MITIGATIONS .....</b>	<b>25</b>
	<b>APPENDIX D: MEMORANDA SERIES.....</b>	<b>29</b>

## **List of Tables**

- Table 1. Question Number, Areas of Assessment, and Data Collection Methodology
- Table 2. Question, Lessons Learned, and Recommendations: Schedule
- Table 3. Question, Lessons Learned, and Recommendations: Project Management Tools
- Table 4. Question, Lessons Learned, and Recommendations: Risk Register
- Table 5. Question, Lessons Learned, and Recommendations: Staffing
- Table 6. Question, Lessons Learned, and Recommendations: Training
- Table 7. Question, Lessons Learned, and Recommendations: Technical Workshop
- Table 8. Question, Lessons Learned, and Recommendations: What Went Well
- Table 9. Question, Lessons Learned, and Recommendations: What Needs Improvement
- 
- Appendix C. Table 1. Items That Required Risk Register Mitigations
- Appendix D. Table 1. Demographic Analysis Technical Documentation Memo Series

## **Executive Summary**

The 2010 Demographic Analysis operation produced national-level estimates of the population on April 1, 2010 by age, sex, and limited race detail. These estimates were then compared to the 2010 Census counts. The comparisons and analysis results will be presented in a separate report.

The assessment of the 2010 Demographic Analysis operation focuses on the overall schedule, staffing, and outreach. The assessment data come from the schedule, the risk register, and oral and written debriefings of team members, team leaders, and the Population Division management.

Schedule goals were met. The operation released two sets of estimates. One set pertained to the Black/Non-Black population. The second set pertained to the Hispanic population. Each set had a series of five estimates. The estimates were released on December 6, 2010 before the 2010 Census results were released. The release of Hispanic estimates for the population age 19 and under was a first. National media and the press took part in the release.

The staffing structure worked. A team structure was adopted for the production of the estimates. This was paramount to meeting the schedule needs. The structure also allowed for training of new staff by pairing up members with varying educational backgrounds, experiences, and skill sets.

The goal was to be transparent in all aspects of the operation. This goal was achieved. The estimates were produced with inputs from internal and external experts. All aspects of the operation were documented in methodological statements, working papers, posters, and conference presentations.

A workshop was held to share strengths and weaknesses of the methodology with recognized experts in the field. This communication effort worked well. The operation structure and the schedule allowed for the input to enhance the methodology and improve the quality of the estimates.

The recommendation is to utilize a similar approach in 2020. It is recommended that the schedule be extended to allow for more in depth research activities and to include the evaluation of the census results.

# 1. INTRODUCTION

## 1.1 Scope

This report documents the assessment of the 2010 Demographic Analysis (DA) operation. The assessment is intended to provide information on the effectiveness of the operation and to make recommendations for the 2020 Census planning cycle.

The assessment focuses on three aspects of the operation:

- Schedule
- Staffing
- Outreach

The assessment of the schedule is done to establish if milestones were met for producing national DA population estimates by age, sex, and limited race characteristics (Black and Non-Black) and experimental estimates for the Hispanic male and female population ages 0 to 19 in 2010. It is of value for the planning of the 2020 DA operation to know how much time to allow for the production of each component of the DA estimate and of the components in combination.

The assessment of the staffing of the project (staff time and level of expertise) is done to assess the relationship between staffing and scheduling needs, but also to learn about the team approach to production.

The assessment of the outreach focuses on a number of key activities. Each activity is assessed based on its effectiveness for not only communicating information about the program to the U.S. Census Bureau and our customers, but also seeking, receiving and incorporating feedback about the estimation methodology from external experts. The operation was structured to handle both goals.

Lessons learned about the scheduling, the staffing and the outreach efforts include recommended strategies for the 2020 DA operation. The goal of the DA operation included the production of a range of estimates of the population by limited race groups validated through external expert review. While it is believed that they were substantial, the benefits and value of the DA operation to the 2010 Census efforts are not discussed here.

## 1.2 Intended Audience

The intended audience for this document is the 2020 Census management as well as the Population Division program managers and staff responsible for planning the 2020 DA operation. This document will also serve as a source of information for decennial oversight groups and other interested parties.

# 2. BACKGROUND

## 2.1 History of Operational Assessment

DA estimates have been compared to the national population count in every census since 1950 (see Coale, 1955; Siegel and Zelnik, 1966; U.S. Census Bureau, 1974, 1988; and Robinson et al.,

1993 for the demographic evaluations of the 1950-1990 censuses and the U.S. Census Bureau, 2001 and Robinson et al., 2002 for evaluation of Census 2000).

Prior to 2010, there have been no formal assessments of the DA operation although once produced, a substantial number of studies internal and external to the Census Bureau have focused on the outcome, i.e., examined the plausibility of the DA estimates, the soundness of the methodology, and the quality of the data used to develop the components. For example, the National Research Council has issued reviews and recommendations spanning the last three decades regarding the DA program (National Research Council, 1985, 1994, 2008). Himes and Clogg (1992) reviewed the 1990 DA program. Likewise, the Census 2000 Monitoring Board provided a review of the 2000 DA estimates (U.S. Census 2000 Monitoring Board, 2001). The Monitoring Board's report included a thorough evaluation of the 2000 DA methodology and estimates by Passel (2001).

In the past, the external reviews were done after the DA estimation was completed. For the 2010 DA operation, a more proactive approach was adopted. The new approach included early outreach to customers internal and external to the Census Bureau and an effort to build understanding and appreciation for the demographic analysis approach prior to the release of the estimates.

The operational activities to be assessed include scheduling, staffing, and outreach. As a background to the assessment, brief descriptions of these activities are provided in the following sections.

## **2.2 Schedule of Activities**

The schedule was to accommodate the production of two sets of estimates: one by race characteristics (Black and Non-Black), sex and age; another by Hispanic origin, sex and limited ages. Each set in turn consisted of five estimates (low, low middle, middle, high middle and high). The official delivery date to the public for both sets was December 6, 2010. A risk register was developed and used to monitor the schedule.

To achieve the target date for public release, a number of internal deliveries were scheduled and documented using the Population Division's Production Automation Database System. The internal deliveries reflected incorporation of updated component data and the sensitivity of the estimates to varying methodological assumptions. These dates in turn produced separate research, production and review schedules within each team. The internal delivery dates are shown in the schedule below:

Delivery 1 - March 31, 2010 (BNB),  
Delivery 2 - June 23, 2010 (BNB),  
Delivery 3 - July 1, 2010 (HNN),  
Delivery 4 - August 2, 2010 (BNB),  
Delivery 5 - August 24, 2010 (BNB & HNN),  
Delivery 6 - November 4, 2010 (BNB & HNN),



where BNB refers to the Black and Non-Black estimates by age and sex and HNH refers to the Hispanic and Non-Hispanic estimates by age and sex.

### **2.3 Monitoring of Schedule: Risk Register**

The schedule was monitored through a risk register. One overall risk register was developed for the operation. The teams provided input to this risk register.

The risk register for the 2010 DA operation was developed in the spring of 2009. The process started on April 4, 2009 with a request from the Decennial Management Division. The Decennial Management Division and the MITRE Corporation provided the template for creating the register along with guidelines for identifying risks and preparing mitigation and contingency plans. Chapter 5 of the 2010 Census Risk Management Plan was particularly useful for this purpose (U.S. Census Bureau, 2008). In May of 2009, a Population Division staff member was identified to serve in the role of risk manager. In July of 2009, the completed register was uploaded and posted to the decennial 2010 Operations website. Then, in April of 2010, the register was reassessed and new risks were added. Most of the risks were closed out by December 6, 2010. The register was last updated on January 31, 2011.

### **2.4 Staffing**

The 2010 DA operation adopted a new staffing structure. In the past, a small staff consisting of a senior demographic researcher and several assistants developed the DA estimates in the year leading up to the Census and then along with other Census Bureau staff and external experts engaged in the evaluation of the census count once the census results were available for comparison to the DA estimates.

For this census, the operation used an intra-divisional team approach. The team members were drawn from the six branches in the Population Estimates and Projections Area of the Population Division. The members were organized in five teams - three component teams (vital statistics and race characteristics, net international migration, population aged 65 and over), and the Hispanic origin and core production teams. The component estimates were delivered to the production team that assembled them to form the DA estimates.

The goals for the teams were to maintain high levels of data quality through assurance checks and estimates review. They were to develop through existing and enhanced methodology not one but a series of estimates. The sensitivities of the estimates to methodological assumptions were to be captured. Finally, they were to prepare and maintain thorough documentation of methodology and processing steps. The teams were encouraged to use project management tools.

The team approach was thought to promote transparency in estimation methodology and to be a tool for transferring knowledge to employees with less tenure at the Census Bureau. The team approach was also intended to serve as a safeguard against the effect of staff attrition. We wanted to make sure we had trained staff available to complete the DA operation in the event of attrition among key staff members during the operation.

The teams were responsible for organizing their own meetings and communication for their members as needed. All teams adhered to the standards established for the Population Division's Population Estimates Program to ensure quality and timeliness of estimates. Training of staff on demographic analysis techniques, documentation of data manipulations, and methodology were paramount activities.

All members were invited to a weekly project meeting. The one-hour meeting time was set aside for status reports from the teams. This meeting time was also intended to create a common core of knowledge for the team members on demographic analysis techniques. The weekly agendas were wide-ranging and included topics pertaining to the assignment of consistent race categories to the components, how to deal with missing data, strategies for processing, and tools for data review. Guest lecturers were brought in on occasion to talk about decennial activities. Staff from the Census Coverage Measurement program discussed the use of sex ratios to correct for correlation bias.

## **2.5 Outreach**

A number of activities were undertaken to reach out to internal and external Census Bureau customers. Contacts were established early in the production process to ensure that non-Census Bureau demographers and other outside experts weighed in on methodological issues in time for their input to be incorporated in the estimates.

The outreach to experts involved several activities. For example, on January 8, 2010, a technical one-day workshop was convened at the Census Bureau. Twenty-two experts from academia, the National Academy of Sciences, federal and state government agencies, and statistical agencies in Mexico and Canada were invited to attend. Technical papers on the history of DA, the use of vital statistics to estimate the population under age 65, Medicare enrollment to estimate the population aged 65 and over, and methodologies relying on data from the American Community Survey to estimate net international migration were sent to the participants before the meeting. Transcripts of the meeting deliberations were prepared and made available to staff.

The DA 2010 operation took advantage of the Statistical Research Division Summer at Census Program. Scholars from the University of Michigan, Pennsylvania State University, and the University of Pennsylvania reviewed our work on race classifications, foreign born estimation, and the distribution of super-centenarians (those people older than 100) on the Medicare file. They helped us evaluate the overlap in estimates for ages 65-74 created by the component-based approach and the Medicare-based enrollment data.

Other outreach activities took the form of briefings. The Department of Commerce Under Secretary for Economic Affairs was briefed along with the Director of the Census Bureau. Throughout the operation, there was a close working relationship with the Associate Director for Demographic Programs and the Census Bureau's Public Information Office.

Team members engaged in many professional activities. The methodology for producing the estimates was outlined at an invited session at the 2010 annual meeting of the American Statistical Association. A panel session was organized around the topic of demographic analysis at the 2010 annual meeting of the Population Association of America with panelists from the Pew Hispanic Center, the New York City Department of City Planning, and the National Center

for Health Statistics. Presentations were given to the 2010 State Data Center Steering Committee annual meeting and the Applied Demography Conference. Staff members prepared papers and posters for presentations at the 2009 and 2010 Southern Demographic Association annual meetings and DA was represented at the Statistics Canada's International Methodology Symposium in Ottawa. The Federal-State Cooperative for Population Estimates (FSCPE) and the Population Association of America Committee on Population Statistics were kept abreast of our activities throughout the operation.

The decennial management was briefed once a month at the Census Integration Group meeting and the operation was reviewed quarterly in the Program Management Review meetings.

Finally, on December 6, 2010, a technical off-site meeting was convened. Members of the press were invited. During this open session, the DA methodology and the production of the estimates were described and the Director of the Census Bureau, Robert M. Groves, released the DA estimates to the public. Next, team members presented technical information describing each component. These presentations were followed by a formal discussion, and ample time was allowed for audience participation. Each presentation was supported by a visual display. Posters were strategically placed in areas where staff members could interact with participants and be available to answer questions about the components and their methodological underpinnings.

Invitees to the meeting included demographers and statisticians from population research centers, universities, and federal agencies in the United States, Mexico and Canada. The chief statistician from the U.S. Office of Management and Budget was in attendance along with representatives from the National Academy of Sciences.

### **3. METHODOLOGY**

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

Nine questions were formulated for this assessment.

1. How did actual start and completion dates compare to planned start and completion dates?
2. Were project management tools helpful to the operation?
3. Was the risk register useful and did any risks require mitigation?
4. Did the teams have enough staff?
5. Did the staff have the right level of experience?
6. Did the staff receive adequate training on demographic analysis techniques?
7. Was the technical workshop an effective strategy for soliciting external expert input?
8. What aspects worked well?
9. What aspects need improvements in future operations?

#### **3.2 Methods**

The data to answer the questions come from different sources, but primarily from oral and written accounts. The team leaders, the risk register manager and the management for the operation were debriefed separately. The debriefings were conducted by two Population

Division staff members who did not work on the production. A debriefing protocol of questions to ask was prepared (see Appendix A). All team members were given an opportunity to provide their assessment by completing a questionnaire sent to their e-mail account (see Appendix B). There were no personally identifiable data on the questionnaires. The completed questionnaires were to be printed out and returned to a folder kept in a neutral location. Finally, Population Division management was debriefed about lessons learned.

Table 1 shows the assessment area and the data collection methodology associated with each of the eight questions.

Table 1. Question Number, Areas of Assessment, and Data Collection Methodology

Question	Area to be Assessed	Data Collection Methodology
1	Schedule	Schedule
2	Project Management Tools	Debriefings of team leaders
3	Risk register	Risk register, debriefing of risk register manager
4 and 5	Staffing	Debriefings of team leaders
6 and 7	Outreach	Questionnaire, debriefings of team leaders and managers
8 and 9	Schedule, Staffing, Outreach	Questionnaire, debriefings of team leaders and managers

The responses to the questionnaires and the debriefing results were summarized by the authors and used in the preparation of this report.

#### 4. LIMITATIONS

The assessment is targeted to the operation, not the perceived validity of the DA estimates. The potential exists for there to be a discrepancy between the Census Coverage Measurement (CCM) estimates and the DA estimates, which may lead to the DA operation being perceived as less successful regardless of the effectiveness of the DA operation. Thus, if this aspect of the operation is to be included in the overall assessment, the outcome of the assessment of the operation cannot be considered definitive until the fall of 2012 when the CCM estimates are available for benchmarking.

## 5. RESULTS

### 5.1 Question 1: How did Actual Start and Completion Dates Compare to Planned Start and Completion Dates?

The inspection of the production schedule for DA indicated that planned and actual start and finish dates for the project milestones were concurrent. However, some interim planned start and finish dates had to be revised to meet that goal. Also, overtime was authorized to make sure the schedule deadlines could be met.

The workshop on January 8, 2010 and the public release of the estimates at the conference on December 6, 2010 became the milestone dates for both the research and the production aspects of the DA operation. Especially to meet the release dates in December, the core processing team had to move up its production schedule. In turn, the teams producing the component estimates (vital statistics, net international migration, and Medicare) revised their research schedules to accommodate the production needs of the core processing team.

The team that produced estimates by the Hispanic origin characteristics started later, but adhered to the same deadlines as the other teams.

Table 2. Question, Lessons Learned, and Recommendation: Schedule

Question	Lessons Learned	Recommendation
<p>How did actual start and completion dates compare to planned start and completion dates?</p>	<p>The conversations with the team leaders about the schedule suggested that there was a sense that the milestones evolved with the project. The dates were not fixed before the project started. It was suggested that to the extent possible, the master schedule for the project should be finalized early in the project cycle. Then, the key milestone dates for the production of components would follow. This would work better, because the teams develop their schedules to accommodate the team milestones.</p> <p>The team leaders felt that more time in the overall schedule should be allocated for research tasks. For the 2010 DA operation, there was a tendency to let the production schedule dictate the research schedule. To the extent possible, avoid letting operational needs (estimates production) curtail the research needs.</p> <p>In reviewing the schedule and in the conversations with the team leaders it also became clear that the schedule did not allow time for preparation and review of materials for dissemination.</p>	<p>Fix team milestones early in the production cycle.</p> <p>Allow time for research as well as production.</p> <p>Allow time for dissemination preparation and review.</p>

**5.2 Question 2: Were Project Management Tools Helpful to the Management of the Operation?**

Product management tools were used to document the methodology and the process by which the estimates were developed.

The project management tool most commonly used for the overall project was the risk register. The teams also used team charters, research task planning documents, and work breakdown structures. Other sources of team management documentation included team requirements documents, product program logs, configuration management documents, and audit forms. Often, leaders would create their own unofficial documents and spreadsheets to keep their team on schedule.

Table 3. Question, Lessons Learned, and Recommendation: Project Management Tools

Question	Lessons Learned	Recommendation
Were project management tools helpful to the operation?	The team leaders agreed that the project management tools were very useful and should be used again for 2020 DA operation. However, one team leader noted that the operation is sufficiently unique that everyone should be encouraged to tailor the tools to their needs.	Use project management tools for the 2020 DA operation.

**5.3 Question 3: Was the Risk Register Useful and Did Any Risks Require Mitigation?**

The DA risk register was not driven by cost and staffing issues. It was associated with a schedule, but a flexible schedule. Some risks were revised, once the overall project schedule was established. The two workshops, January 8, 2010 and December 6, 2010 became the two milestone dates around which all risks revolved and most risks were closed out after the December 6, 2010 release.

The items on the risk register were tied together through the risks for the core processing team (if the teams did not produce a component estimate, then the core processing team would not be able to produce the DA estimate). However, the items on the DA 2010 operation risk register were not tied to items on other decennial operation registers, i.e., there were no dependencies outside the DA operation. (The delivery of the DA estimates to the CCM operation in mid-2011 was not shown on the operation schedule).

Seventy-two items/activities pertaining to the project or the data and sub-sections pertaining to requirements and methodology were monitored in the risk register. The risk manager worked with team leaders and team members to create the register. The process worked well to highlight milestones, for the teams to think about the impediments to achieving the milestones, to consider the consequences of missing deadlines, and to plan and establish contingency plans. All risks

were recorded as “if-then” statements. The Notes Section served as an unofficial tool for documenting events as they occurred.

The operation had a staff member dedicated to the task of managing the register. Once the risk register was created, the monthly work load involved contacting team leaders to request updates to the register and then entering and uploading the input to the decennial website. The risk manager estimated that she used three hours per month on this task. In addition, the risk manager participated in the weekly meeting for all the teams. Here, she listened for any aspect that could be a potential risk to the DA 2010 operation as identified on the register. If she found cause for concern, she would follow up with team leaders in e-mail communications. In general, the risk manager was always on the alert for potential risks to the project schedule or the tasks identified on the register.

During the DA 2010 operation, the initial risk manager was detailed to a decennial field office and a new risk manager had to be identified. There were enough written materials and oral accounts available to make the transition smooth.

When making recommendations for 2020, the team leaders suggested that it would complete the operation to have risk items pertaining directly to the quality of the “end product.” The end product is a series of estimates of the national population by age, race (Black/Non-Black) and sex and Hispanic origin for the population age 19 and under. The “end product” is compared to the census count when available. The comparisons may find discrepancies that may require additional research into validity of assumptions and methodologies. Thresholds should be established a priori, i.e., before comparisons to the decennial results. “If-then” statements should indicate what level of discrepancy is tolerable, and what aspects of the DA operation (component input files, processing steps and/or methodological assumptions) should be scrutinized to explain the discrepant outcomes.

Table 4. Question, Lessons Learned, and Recommendation: Risk Register

Question	Lessons Learned	Recommendation
<p>Was the risk register useful?</p>	<p>The team leaders felt it was valuable to create and maintain an exhaustive and comprehensive risk register. It kept the schedule and the co-dependencies salient. Towards the end of the operation, the register provided guidelines on the agreed upon mitigation and contingency strategies.</p> <p>The goal of the risk register was to identify areas where a mitigation strategy might be needed and to communicate project risks to senior management. The DA operation met that goal.</p> <p>The risk report was monitored and monthly or quarterly status reports were given at the Census Integration Group meetings and at the Program Management Reviews.</p> <p>The risk register was developed for the production. Incorporate the outcome of the production in the register.</p>	<p>Develop the risk register as early as possible in the process, but not until tasks can be identified and milestones can be established.</p> <p>Establish a formal schedule for updates to the register status. Encourage ad hoc requests to record events as they happen. Do a ‘mid-term assessment’ of the plan.</p> <p>Be open to adding new risks during the process.</p> <p>Dedicate a staff member as risk manager.</p> <p>The risk register should be associated with the outcome as well as the production of the outcome.</p>
<p>Did any risks require mitigation?</p>	<p>Two risks required mitigation (see Appendix C). In both cases, the register had a plan in place for mitigation and contingency.</p>	<p>Have a plan in place for the mitigation and the contingency.</p>



#### **5.4 Question 4 and Question 5: Did the Teams Have Enough Staff? Did the Staff Have the Right Level of Experience?**

The debriefings of the team leaders focused on staffing. Most of the team leaders said that they had enough members on their team, but occasionally they had to request additional people especially towards the end of the operation. Only one team leader said that the team had too many members, and that not all of the members had enough work. Another leader said that one team member had too many obligations, which put more work on the rest of the team. This team could have used one more member with a specific skill set (data manipulations). The team could have accomplished more of its research agenda with an additional member.

Most of the team members had already worked on the subject matter, but there was a lot of independent research and innovative team-work that went on as well. The work that was done in 2000 was a good starting point. And, the ability to consult with experts outside of the team was very important.

The leaders felt that their team had the right combination of skills. The most commonly needed skills were SAS programming, reviewing expertise, and subject-matter expertise. All teams looked outside of their team for additional help from other subject-matter experts. Most of the skills that were needed were already found in the team members, however all members had to pick-up new skills and knowledge along the way.

The team structure worked well overall, but it was not always clear if the decision making power for methodological enhancements and data processing needs was with the teams or with the management. A process was discussed, but it was never fully implemented.

Table 5. Question, Lessons Learned, and Recommendation: Staffing

Question	Lessons Learned	Recommendation
Did the teams have enough staff?	<p>The team leaders thought that the team structure worked well. The teams were small enough to be effective and large enough to get tasks accomplished. The structure encouraged a sense of ownership and responsibility amongst team members.</p> <p>The autonomy of the teams in decision making and the structure for making decisions was not always clear.</p>	<p>Implement the team structure in the 2020 DA operation.</p> <p>Have separate teams for each component.</p> <p>Establish an agreed upon structure between team leaders and management for making decisions.</p>
Did the teams have the right level of experience?	<p>The team structure allowed for expertise to be utilized. The teams were assembled to ensure that all skill sets were represented. A balance between senior and junior staff was sought.</p>	<p>Staff teams with a balance of skill sets.</p> <p>Staff teams with a balance of junior and senior level staff.</p> <p>Have access to subject matter experts.</p>

**5.5 Question 6: Did the Staff Receive Adequate Training on Demographic Analysis Techniques?**

The teams were formed with members with different levels of expertise in programming, organizational and management skills. The staff also had varying levels of demographic expertise. Only a handful was familiar with the 2000 DA estimates production or had received formal training on demographic analysis.

The team members felt they reached a good understanding of demographic analysis. At the end of the operation, they said they could explain the approach to a non-demographer. They felt that they learned how each component was produced, the methodological challenges associated with the components (particularly their own components) and how the components related to each other.

The weekly project meeting time served the purpose of training on demographic analysis techniques. Some members felt the efforts made to provide a common core of background knowledge could have been achieved outside this structure. Others felt that they gained their understanding of DA estimation through the guest speakers and special demonstrations.

Table 6. Question, Lessons Learned and Recommendation: Training

Question	Lessons Learned	Recommendation
Did the staff receive adequate training on demographic analysis techniques?	The team members had varying levels of formal demographic training and formal exposure to demographic analysis.	Structure formal training needs to staff needs.

### 5.6 Question 7: Was the Technical Workshop an Effective Strategy for Soliciting External Expert Input?

The technical workshop in January 2010 was considered a success by the management and an effort they recommend be repeated in 2020.

In order to make the conference come about, the schedule needs to accommodate preparation of conference materials.

The technical workshop was conducted about nine months into the operation and about ten months before the release of the series of estimates. The workshop was structured around a historical introduction to the topic followed by presentations on the key components of the estimates. Formal discussants critiqued the papers. Background papers were prepared and forwarded to discussants in advance. This structure necessitated that the papers be ready in draft form about six weeks before the conference. The teams were able to meet this timeline, but only because they had previously given thought to the methodological challenges associated with each component and prepared materials for professional conferences. A list of the presenters and discussants is presented in Appendix D.

In order to receive meaningful input from the conference, it is important to engage expert discussants and to include persons familiar with the issues among the invitees.

The best use of the workshop is to get expert input early in the process so that the methodology for producing the estimates is known ahead of time, is discussed and agreed upon. This is only possible if potential customers of the estimates are included as partners. A list of attendees in the workshop is presented in Appendix D

In order to utilize the lessons learned from the conference, there has to be a mechanism in place for incorporating the input into the production process.

The input from the external experts was used to enhance the estimates. The input came from transcripts and notes. The transcripts of the entire conference were prepared by a contractor. The transcripts were made available to the team leaders a short time after the meeting. Each team prepared “What We Learned” statements based on the transcripts and individual notes. These statements in turn were used to assess how the discussants’ concerns were dealt with in the existing methodology and what needed to be improved. A research agenda was prepared. This agenda was evaluated for time and resource constraints and used to guide the activities leading up to the production of final estimates.

Table 7. Question, Lessons Learned, and Recommendation: Technical Workshop

Question	Lessons Learned	Recommendation
<p>Was the technical workshop effective strategy for soliciting external expert input?</p>	<p>The workshop was a valuable source for soliciting external expert input.</p> <p>It takes time to prepare for the workshop.</p> <p>The workshop needs to be technical, not just a “show” case.</p> <p>The invitees have to represent a diverse group of experts.</p> <p>In order to result in methodological enhancements, the input must be relevant, critical and constructive.</p> <p>It takes time to incorporate feedback.</p>	<p>Repeat in 2020.</p> <p>Allow time in the schedule for preparation of materials.</p> <p>Seek input from recognized external experts.</p> <p>Spend time identifying participants.</p> <p>Encourage constructive criticism.</p> <p>Allow time in the schedule to accomplish research goals.</p>

## 5.7 Question 8: What Aspects Worked Well

Perhaps the most notable difference between the 2000 DA and the 2010 DA operation was the release of the DA estimates prior to the release of the Census data. Multiple estimates were developed, each based on a different set of plausible assumptions. This strategy was very well received and the creation of a schedule to accommodate an early release of not just one but several estimates were viewed as evidence of a successful operation. During the production, the schedule was monitored through the risk register.

The early release also emphasized the fact that the DA operation was kept independent of the decennial operation. The DA staff was not involved in the processing or production of decennial data. Decennial staff did not work on the DA operation.

Another difference between the 2010 DA operation and the DA operations in the past was the team structure that allowed for sharing of knowledge. The production became a learning experience guided by what had worked in the past, but also what needed improvement.

The proactive stance of enhancing the methodology while building the estimates rather than waiting to evaluate the estimates against the census or the results from the post-enumeration survey paid off. The research in specific areas improved the estimates. The research areas included the use of the American Community Survey for the immigration component, the number of births to American parents abroad, the assignment of race to birth records missing the information, and the use of the Census Bureau's Person Characteristics file to distribute the Medicare race categories to the DA categories of Black and all others, and review of the methodology to assign components to cohorts. The DA estimates were also produced for the Hispanic population age 19 and under, thus starting to address repeated calls for the DA estimation to be expanded to cover Hispanic origin for all ages.

The intent was to make the 2010 DA operation transparent. This goal was reached.

Internally, the 2010 operation achieved more and better documentation of the methodology and the processing steps. This was accomplished through the team structure. Methodological statements were prepared in conjunction with each estimate production to document the sensitivity analyses.

A Demographic Analysis Technical Documentation Memo Series was established. The purpose of the series was to have an avenue for documenting research questions that came up during the DA process. Because the documentation of the methodological issues and their resolutions was intended as a record of events, the documents went through a less formal review process than is normal for a methodological statement. The process was in particular well suited for documenting the issues associated with preparing the vital statistics input. A list of the topics in the series is presented in Appendix E.

The outreach efforts worked. DA became a high profile subject. The Census Bureau Director had a blog about DA on several occasions (January 22, 2010, December 2, 2010 and February 7, 2011.) The DA estimates were integrated with the release of other 2010 Census products.

Table 8. Question, Lessons Learned, and Recommendation: What Went Well

Question	Lessons Learned	Recommendation
What aspects worked well regarding the schedule?	<p>The release of the DA estimates before the decennial estimates was well received.</p> <p>The risk register worked well when tied to the schedule.</p>	<p>Create a research and production schedule that accommodates early release.</p> <p>Use risk management registers to monitor the schedule.</p>
What aspects worked well regarding the staffing?	<p>Tasking teams to research and develop specific components was an effective use of resources.</p> <p>The teams documented the production process and methodology for each component.</p>	<p>Use the team structure to produce the DA estimates.</p> <p>Require documentation of methodology and processing.</p>
What aspects worked well regarding the outreach?	<p>Active involvement of staff in professional activities was encouraged.</p> <p>Internal and external experts were brought together.</p>	<p>Encourage staff to participate in professional conferences.</p> <p>Conduct conferences and workshops.</p>

### 5.8 Question 9: What Needs Improvement for the 2020 DA Operation?

The research activities were directed to the specific needs of the 2010 DA production and the 2010 Census, but the schedule did not provide the best balance between research and production. Time was also needed for documenting outcomes and presenting alternatives.

It should be a long term goal to expand the timeframe for conducting research. While research was started and conducted in conjunction with the production, there was not enough time to go to a desirable depth. These research activities need to be ongoing and not restricted to the years

leading up to the census. The research activities for the production of the DA estimates benefit and support the Population Division's Estimates and Projection Program in general.

While the process for making methodological decisions was effective in the overall time frame of the project, it was not clearly communicated at what level methodological decisions were being made. Initially, the intention was to have decisions made through the DA EGG (Executive Guidance Group). However, a formal meeting schedule was not maintained for the DA EGG and a more informal process evolved. While priority was given to DA issues, the process by which decisions would be made and what issues needed to be elevated remained unclear throughout the project.

Hard deadlines and a number of complex unresolved research questions that evolved as the research progressed, presented challenges in terms of keeping production on time, completing the necessary research, and providing/communicating the information necessary for methodological decisions to be made.

Decisions to alter production methodology rest on the outcome of research and interpretation of results. This process and the exchange of information between the teams conducting the research and the planned management structure seemed to be more complex and time consuming than anticipated. For the process to be timely and effective, it requires that management be presented with sufficient data from the teams to make informed decisions (statement of problem and cost/benefit analyses of alternative strategies).

Knowledge of other teams' processes and schedules improves understanding of the overall process. The communication between the teams was difficult in the beginning of the operation. The weekly project team meeting time was available for this purpose, but it could be better utilized to foster these relationships. Management should encourage dialogue between teams to identify and resolve issues before they escalate to larger problems that pose a risk to the success of the project.

Towards the middle of the operation, a website for Census Coverage Measurement was created as a joint venue with the Sampling and Estimation area in the Decennial Statistical Studies Division. It would have been beneficial to have the site in place. The website is intended to make available technical papers, presentations prepared for professional meetings, and historical materials on census coverage measurement. The website is meant to provide easy access to Census Bureau materials on this topic. In addition to being a valuable tool for research, it will save staff time when dealing with requests for external customers.

The "Summer at Census" program, and the technical workshop were useful for establishing a dialogue with professionals about methodological assumptions and the sensitivities of the data. The input was received in time to be incorporated in the production. If the scholars could be sworn in as special Census Bureau employees their participations could go even further.

Table 9. Question, Lessons Learned, and Recommendation: What Needs Improvement

Question	Lessons Learned	Recommendation
<p>What needs to improve regarding the schedule?</p>	<p>Research and production needs were not always balanced and competed for available time.</p> <p>Dissemination is part of the production. Time should be allocated to activities associated with this step.</p> <p>Time for activities past the release date was not clear.</p>	<p>Develop schedules that distinguish between applied and developmental research.</p> <p>Allow time in the schedule for dissemination activities.</p> <p>Extend the operation to include additional research and evaluation of the census results.</p>
<p>What needs to improve regarding the staffing?</p>	<p>It was not clear who made what decisions: the team manager, the team sponsor or upper management.</p> <p>The process for getting sign off to move to the next step was not clear.</p> <p>Supporting documentation was not always available or adequate enough for decisions to be made.</p> <p>Communication across teams is essential for maintaining consistency across components.</p>	<p>Define the management decision-making roles.</p> <p>Establish a clear decision making process.</p> <p>Expand the methodological documentation to include alternatives to current method.</p> <p>Facilitate communication across teams.</p>
<p>What needs to improve regarding outreach?</p>	<p>The Census Coverage Measurement (CCM) website was developed, but not in place at the start of the operation.</p> <p>External experts do not have access to internal data files.</p>	<p>Maintain a CCM website.</p> <p>Use established processes to allow experts data access privileges.</p>



## **6. RELATED EVALUATIONS, EXPERIMENTS, AND/OR ASSESSMENTS**

Staff worked with the Decennial Census Testing Officer to develop an operational testing plan. The plan was to do a systems test of ability to process the input data (compile the components estimate) and create the output (the DA estimate) by single year of age, sex and race. Data from the 2000 DA operation was used for this purpose. The processing test began on July 1, 2009. It was completed on September 16, 2009.

The test followed general testing techniques. The specific steps were:

1. Acquisition: Obtain input data
2. Evaluation: Ensure that the input data are demographically sound and meet requirements
3. Production: Manipulate the input data by building the estimates cohort by cohort; then assemble the estimates for age segments to produce the total population
4. Acceptance: Before the estimates are accepted, verify that they are internally and longitudinally consistent

The test did not reveal anything that would impact the actual production. However, previous DA estimates production (total DA) was done in a spreadsheet environment, rather than a formal program development. For the 2010 DA estimates production it was recommended that processing be done in SAS as well as Excel. The use of SAS provides a stable and documented production environment that is consistent with other production processes in the Population Division's Estimates and Projections area.

Unit testing, operational tests or user tests were considered out of scope for this operation.

The full report is available upon request (Memorandum prepared by Kirsten West for Enrique J. Lamas, Chief, Population Division: "The Demographic Analysis 2010 Operation System Test." Dated December 30, 2009).

## **6. LESSONS LEARNED, CONCLUSIONS, AND RECOMMENDATIONS**

The overall recommendation is to repeat the 2010 DA operation in 2020. The schedule was met with the team approach to processing. Efforts to communicate with internal and external customers worked well. The process was open and input was encouraged. All aspects of the operation should be transparent and well documented. It is recommended to start research activities as early as possible and to extend the schedule to include evaluative activities.

## **7. ACKNOWLEDGEMENTS**

The authors wish to thank the DA team members, the team leaders, the risk register managers, and the senior management for allowing us to debrief them about their experiences with the 2010 DA operation and sharing their visions for 2020 DA operation.

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## **APPENDIX A: DEBRIEFING PROTOCOLS**

### **I. Lessons Learned Questions for Managers:**

- 1) Thinking about the DA operation, what aspects of the operation would you recommend be repeated for 2020?
- 2) Communication with the Census Bureau managers, with the press and with the outside world was a goal for the 2010 operation. Do you feel you succeeded?
- 3) How did the conference come about? Is there anything you wish you had done differently (timing, invitees, and format of workshop)?
- 4) Was the technical workshop effective for soliciting external expert input?
- 5) Overall, what could be improved for the DA 2020 Operation?

### **II. Lessons Learned Questions for Senior Demographers:**

- 1) What went well?
- 2) Differences Between the DA 2000 Operation vs. DA 2010 Operation?
- 3) What could be improved for the DA 2020 Operation?
- 4) Additional comments:

### **III. Lessons Learned Questions for Team Leaders:**

Assessment of the schedule: How did actual start and completion dates compare to planned start and completion dates?

Assessment of specific project management tools, such as research task planning documents, work breakdown structures, and risk registers: Were these tools helpful to the management of the operation?

Debriefing of the team leaders focusing on staffing: Did the teams have enough staff and did the staff have the right level of experience? Did the staff receive adequate training on demographic analysis techniques?

## APPENDIX B: DEBRIEFING QUESTIONNAIRE

### Assessment of the DA 2010 Operation Lessons Learned Questionnaire

The primary purpose of the assessment of the 2010 Demographic Analysis (DA) Operation is to provide information on the operation and produce valuable data for the planning cycle for the 2020 Census. The goal is to find out what worked, what did not work, and to come up with recommendations. Kirsten West is leading the DA Assessment, and Yeris Mayol-Garcia and Tiffany Thompson are working with her on this team.

This questionnaire is being sent out to all DA members. This questionnaire is anonymous, so please do not leave any identifying marks on this paper. We encourage you to be as forthcoming and honest as possible, as we consider your responses to be extremely useful in evaluating the success of the 2010 DA Operation. Although most of the questions require simple yes/no answers, we encourage you to elaborate on your responses. Please print and then hand-write your answers directly on this paper. If you have any questions, or would like to discuss anything personally, feel free to let either Yeris (6H592C/x39964) or Tiffany (6H592N/x37979) know.

Please complete this questionnaire by **Friday, March 4<sup>th</sup>**, and drop it in the DA Assessment Questionnaires folder with DeeDee Sewell in the Projections Branch (6H090H/x36287). We appreciate your participation. We would like to base our assessment on responses from all team members.

Thank you.

- 1) What skills did you bring to your team?
- 2) Do you feel your team had the right combination of skills?
- 3) How would you describe the usefulness of the subteam structure to complete the DA 2010 Operation?
- 4) Could you explain the DA approach to a non-demographer? Please elaborate.
- 5) What was your level of understanding for the component for which your team was responsible? Please circle one:  
  
                  very high    high    moderate    low    very low
- 6) How did your team share information (weekly meetings, e-mails, etc.)?
- 7) Do you have suggestions for improving communication within teams in the future?
- 8) From the beginning, were you aware of the DA 2010 schedule?
- 9) From the beginning, were you aware of how your team fit into the DA 2010 schedule?

10) How would you describe the balance between research and production for your team?

Please circle one:

All research    Mostly research    Evenly Balanced    Mostly Production    All Production

11) What was your team’s process for ensuring quality of your estimate?

12) What are your suggestions for improving that process?

13) What was your team’s process for documenting the methodology for producing your component?

14) What are your suggestions for improving that process?

15) How informed were you about the activities of other teams? Please circle one?

Completely    Very    Fairly    Somewhat    Very  
informed    informed    informed    uninformed    uninformed

16) How often did you work with another team?

17) Do you feel that your work was adequately recognized?

18) Questions about the DA Team weekly Wednesday team meetings:

Please “X” either Yes or No	Yes	No
Were the weekly team meetings helpful to your understanding of the DA estimates?		
Were the weekly team meetings a good use of your time?		
Do you think the frequency of the meetings (One a week) was appropriate?		
Do you feel you could express your opinions openly and be heard?		
Do you feel others could express their opinions openly and be heard?		
Do you feel that the guest speakers and special demonstrations were worthwhile?		

19) What worked well with the team approach?

20) What did not work so well?

21) Any additional comments?

## APPENDIX C: RISK REGISTER MITIGATIONS

Appendix C. Table 1. Risk Register Items That Required Mitigations

Risk	If/then	Mitigation Plan	Contingency Plan	Risk history/Notes
# 51 Immigration	If there are large discrepancies in the migration components, then the CORE processing team may not be able to bridge Net International Migration values from 2000 to 2001 forward.	Research/test bridging methods, draw on 2000 research.	Collapse all immigration components into 'native' and 'foreign born.'	It was determined that the components could not be bridged, so the contingency plan was successfully implemented and the components were collapsed.
# 23 Medicare	If the vintage 2010 Medicare file cannot be obtained, then there could be schedule delays and/or costs.	Obtain the Medicare file ahead of the required schedule for delivery to Population Division from Data Integration Division.	Project the 2009 file to April 1, 2010	As of 04/01/10 it is anticipated that the vintage 2010 will be received around July. If this does not happen, then vintage 2009 will be projected forward to 04/01/10. The vintage 2010 file was received from CAPS on 10/08/10, reviewed, rerun and finalized by 10/21/2010. Because it was not available on schedule, the contingency plan was successfully implemented, and DA estimates were produced and delivered in time for the 12/06/2010 conference.

## **APPENDIX D: TECHNICAL WORKSHOP ON DEMOGRAPHIC ANALYSIS FOR THE 2010 CENSUS, JANUARY 8, 2010: PRESENTERS, DISCUSSANTS AND ATTENDEES**

### Introductions

Howard Hogan, U. S. Census Bureau

### Background for Workshop

Howard Hogan, U.S. Census Bureau

### Objectives of the Meeting

Presenter - Victoria Velkoff, U.S. Census Bureau

### History of Demographic Analysis

Presenter - Gregg Robinson, U.S. Census Bureau

### The Use of Vital Statistics in Demographic Analysis

Presenter - Jason Devine, U.S. Census Bureau

Discussant - Robert Hummer, University of Texas

### Estimates of Net International Migration

Presenter - Renuka Bhaskar, U.S. Census Bureau

Discussant - Jeffrey Passel, Pew Hispanic Center

Presenter - Melissa Scopilliti, U.S. Census Bureau

Discussant - Jeffrey Passel, Pew Hispanic Center

### The Use of Medicare Data in Demographic Analysis

Presenter - Kirsten West, U.S. Census Bureau

Discussant - Irma Elo, University of Pennsylvania

### U.S. Census Bureau Attendees:

Tori Velkoff, Workshop Chair

Renuka Bhaskar

Rachel Cortes

Bethany Desalvo

Jason Devine

Robert Groves

Christine Guarneri

Greg Harper



Frank Hobbs  
Howard Hogan  
Fred Hollmann  
Eric Jensen  
Rodger Johnson  
Christa Jones  
Alexa Kennedy-Puthoff  
Enrique Lamas  
Luke Larsen  
Tom Mesenbourg  
Caleb Miller  
Freddie Navarro  
Jennifer Ortman  
Gregg Robinson  
Melissa Scopilliti  
Larry Sink  
Dave Waddington  
Nathan Walters  
Kirsten West  
David Whitford  
Tommy Wright

Outside Participants:

Barbara A. Anderson, University of Michigan  
Elizabeth Arias, NCHS  
Victor Alfredo Bustos, INEGI  
Michael Lee Cohen, Committee on National Statistics  
André Cyr, Statistics Canada  
Kenneth Darga, Michigan Department of Information Technology/CSSTP  
Huber Denis, Statistics Canada  
Irma T. Elo, University of Pennsylvania

Steve Goss, Social Security Administration  
Herman Habermann, Consultant  
Brian Harris-Kojetin, Office of Management and Budget  
Robert A. Hummer, University of Texas at Austin  
Michael Hoeffler, DHS Office of Immigration Statistics  
Jennifer H. Madans, NCHS  
Jeffrey S. Passel, Pew Hispanic Center  
Gerald Riley, Centers for Medicare and Medicaid Services  
Nancy Rytina, DHS Office of Immigration Statistics Policy  
Joseph Salvo, New York City Department of City Planning  
Carl Schertmann, Florida State University Population Center  
Edward J. Spar, COPAFS  
Stephanie J. Ventura, NCHS  
Alice Wade, Social Security Administration

## APPENDIX E: MEMORANDA SERIES

Appendix E. Table 1. Demographic Analysis Technical Documentation Memo Series

Number	Topic
A-1	Births to Non-Resident Mothers
A-2	Record Weighting of Births by State Prior to 1985
A-3	Imputation of Age at Death: 1980-2007
A-4	Use of Provisional Monthly Birth Records and Projecting Births
A-5	Deaths to Non-Residents in the United States
A-6	Delays in Registration of Births
A-7	An Alternative Estimate of the 65+ Population Using CPS Labor Force Participation on the Medicare Enrollment Data File
A-8	Sensitivity Analysis of DA Population Estimates in 2010 to Alternative Assumptions about Completeness of Infant and Young Children (1-4 years and 5-9 years) Death Registration
A-9	Imputing Month of Birth in the Deaths Master file
A-10	Accounting for U.S. Citizens Born Abroad to American Parents
A-11	Comparison of Published Registered Births and DA Registered Births
A-12	Source of Birth Data (1935-1980) for United States and Territories and Source of Puerto Rico Death Data (1938-1980)
A-13	An Examination of the Potential Impact of Incorrect Birth Distribution Assumptions