2020 CENSUS

Continued Management Attention Needed to Mitigate Key Risks Jeopardizing a Cost-Effective and Secure Enumeration

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Accessible Version

2020 CENSUS

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Why GAO Did This Study

One of the Bureau's most important functions is to conduct a complete and accurate decennial census of the U.S. population. The decennial census is mandated by the Constitution and provides vital data for the nation. A complete count of the nation's population is an enormous undertaking as the Bureau seeks to control the cost of the census, implement operational innovations, and use new and modified IT systems. In recent years, GAO has identified challenges that raise serious concerns about the Bureau's ability to conduct a cost-effective count. For these reasons, GAO added the 2020 Census to its high-risk list in February 2017.

GAO was asked to testify about the Bureau's progress in preparing for the 2020 Census. To do so, GAO summarized its prior work regarding the Bureau's planning efforts for the 2020 Census. GAO also included preliminary observations from its ongoing work examining the 2018 End-to-End Test. This information is related to, among other things, progress on key systems to be used for the 2018 End-to-End Test, including the status of IT security assessments, and efforts to update the life-cycle cost estimate.

What GAO Recommends

Over the past decade, GAO has made 84 recommendations specific to the 2020 Census to address the issues raised in this and other products. The Bureau generally has agreed with the recommendations. As of April 2018, 30 recommendations had not been fully implemented.
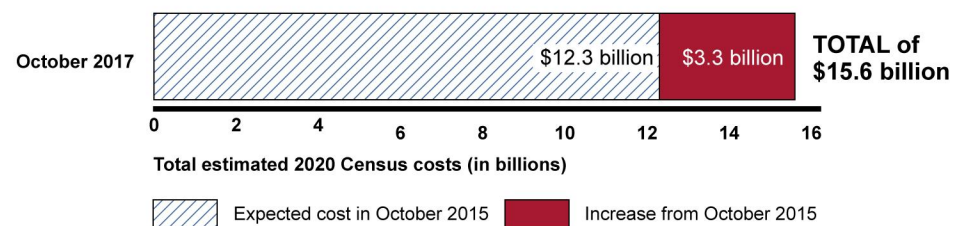
What GAO Found

The Census Bureau (Bureau) is planning several innovations for the 2020 Decennial Census, including re-engineering field operations by relying more on automation, using administrative records to supplement census data, verifying addresses in-office using on-screen imagery, and allowing the public to respond using the Internet. These innovations show promise for controlling costs, but they also introduce new risks, in part, because they have not been used extensively in earlier enumerations, if at all. As a result, robust testing is needed to ensure that key systems and operations will function as planned. However, citing budgetary uncertainties, the Bureau canceled its 2017 field test and then scaled back its 2018 End-to End Test. Without sufficient testing, operational problems can go undiscovered and the opportunity to improve operations will be lost, as key census-taking activities will not be tested across a range of geographic locations, housing types, and demographic groups.

The Bureau continues to face challenges in managing and overseeing the information technology (IT) programs, systems, and contracts supporting the 2020 Census. For example, GAO's ongoing work has determined that the schedule for developing IT systems to support the 2018 End-to-End Test has experienced several delays. Further, the Bureau has not addressed several security risks and challenges to secure its systems and data, including making certain that security assessments are completed in a timely manner, and that risks are at an acceptable level. Given that operations for the 2018 End-to-End Test began in August 2017, it is important that the Bureau quickly address these challenges.

In addition, the Bureau needs to control any further cost growth and develop cost estimates that reflect best practices. In October 2017, the Department of Commerce announced that it had updated its October 2015 life-cycle cost estimate and now projects the life-cycle cost of the 2020 Census will be $15.6 billion, a more than $3 billion (27 percent) increase over its earlier estimate (see figure). The higher estimated life-cycle cost is due, in part, to the Bureau's earlier failure to meet best practices for a quality cost estimate. The Bureau provided GAO with the documentation used to develop the $15.6 billion cost estimate. Based on its preliminary analysis, GAO has found that the Bureau has made improvements in its cost estimation process across the best practices.

Increases to the 2020 Census Life-Cycle Costs Estimated by the Census Bureau

Total estimated 2020 Census costs (in billions)

October 2017: $12.3 billion | $3.3 billion | **TOTAL of $15.6 billion**

Legend: Expected cost in October 2015 | Increase from October 2015

Source: GAO analysis of Census Bureau data. | GAO-18-416T

United States Government Accountability Office

Chairman Culberson, Ranking Member Serrano, and Members of the Subcommittee:

We are pleased to be here today to discuss the U.S. Census Bureau's (Bureau) progress in preparing for the 2020 Decennial Census. Conducting the decennial census of the U.S. population is mandated by the Constitution and provides vital data for the nation. The information that the census collects is used to apportion the seats of the House of Representatives; redraw congressional districts; allocate billions of dollars each year in federal financial assistance; and provide a social, demographic, and economic profile of the nation's people to guide policy decisions at each level of government. Further, businesses use census data to market new services and products and to tailor existing ones to demographic changes.

For 2020, a complete count of the nation's population is an enormous undertaking. The Bureau, a component of the Department of Commerce (Commerce), is seeking to control the cost of the census while it implements several innovations and manages the processes of acquiring and developing information technology (IT) systems. In recent years, we have identified challenges that raise serious concerns about the Bureau's ability to conduct a cost-effective count of the nation, including issues with the agency's research, testing, planning, scheduling, cost estimation, systems development, and IT security practices.

Over the past decade, we have made 84 recommendations specific to the 2020 Census to help address these and other issues. Commerce has generally agreed with those recommendations and has made progress in implementing them. However, 30 of our recommendations had not been fully implemented as of April 2018, although the Bureau had taken initial steps to implement many of them.

We also added the 2020 Decennial Census to GAO's high-risk list in February 2017.[1] As preparations for the next census ramp up, fully

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[1] GAO, *High-Risk Series: Progress on Many High-Risk Areas, While Substantial Efforts Needed on Others*, GAO-17-317 (Washington, D.C.: Feb. 15, 2017). GAO maintains a high-risk program to focus attention on government operations that it identifies as high risk due to their greater vulnerabilities to fraud, waste, abuse, and mismanagement or the need for transformation to address economy, efficiency, or effectiveness challenges.

implementing our recommendations to address the risks jeopardizing the 2020 Census is more critical than ever.

Currently, the Bureau is conducting the 2018 End-to-End Test, which began in August 2017 and runs through April 2019. This effort is the Bureau's final opportunity to test all key systems and operations to ensure readiness for the 2020 Census.

Our testimony today will describe (1) why we added the decennial census to our high risk list, including challenges in implementing and securing IT systems; and (2) the steps that Commerce and the Bureau need to take going forward to mitigate the risks jeopardizing a cost-effective census.

The information in this statement is based primarily on prior work regarding the Bureau's planning efforts for 2020.[2] For that body of work, we reviewed, among other things, relevant Bureau documentation, including the 2020 Census Operational Plan; recent decisions on preparations for the 2020 Census; and outcomes of key IT milestone reviews. We also discussed the status of our recommendations with Commerce and Bureau staff. Other details on the scope and methodology for our prior work are provided in each published report on which this testimony is based.

In addition, we included information in this statement from our ongoing work on the readiness of the Bureau's IT systems for the 2018 End-to-End Test. Specifically, we collected and reviewed documentation on the status and plans for system development, testing, and security

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[2]For example, GAO, *2020 Census: Actions Needed to Mitigate Key Risks Jeopardizing a Cost-Effective Enumeration,* GAO-18-215T (Washington, D.C.: Oct. 31, 2017); *2020 Census: Continued Management Attention Needed to Oversee Innovations, Develop and Secure IT Systems, and Improve Cost Estimation,* GAO-18-141T (Washington, D.C.: Oct. 12, 2017); *2020 Census: Bureau Is Taking Steps to Address Limitations of Administrative Records,* GAO-17-664 (Washington, D.C.: July 26, 2017); *2020 Census: Bureau Needs to Better Leverage Information to Achieve Goals of Reengineered Address Canvassing,* GAO-17-622 (Washington, D.C.: July 20, 2017); *2020 Census: Sustained Attention to Innovations, IT Systems, and Cost Estimation Is Needed,* GAO-17-584T (Washington, D.C.: May 3, 2017); *2020 Census: Additional Actions Could Strengthen Field Data Collection Efforts,* GAO-17-191 (Washington, D.C.: Jan. 26, 2017); *Information Technology: Better Management of Interdependencies between Programs Supporting 2020 Census Is Needed,* GAO-16-623 (Washington, D.C.: Aug. 9, 2016); *2020 Census: Census Bureau Needs to Improve Its Life-Cycle Cost Estimating Process,* GAO-16-628 (Washington, D.C.: June 30, 2016); and *2020 Census: Additional Actions Would Help the Bureau Realize Potential Administrative Records Cost Savings,* GAO-16-48 (Washington, D.C.: Oct. 20, 2015).

assessments for the 2018 End-to-End Test. This includes the Bureau's integration and implementation plan, solution architecture, and memorandums documenting outcomes of security assessments. We also interviewed relevant agency officials.

We provided a copy of the new information that we are reporting in this testimony to the Bureau for comment on April 4, 2018. The Bureau provided technical comments, which we addressed as appropriate.

We conducted the work on which this statement is based in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

The cost of counting the nation's population has been escalating with each decade. The 2010 Census was the most expensive in U.S. history at about $12.3 billion, and was about 31 percent more costly than the $9.4 billion 2000 Census (in 2020 dollars).[3] According to the Bureau, the total cost of the 2020 Census is now estimated to be approximately $15.6 billion, more than $3 billion higher than previously estimated by the Bureau.

Moreover, as shown in figure 1, the average cost for counting a housing unit increased from about $16 in 1970 to around $92 in 2010 (in 2020 dollars). At the same time, the return of census questionnaires by mail (the primary mode of data collection) declined over this period from 78 percent in 1970 to 63 percent in 2010. Declining mail response rates has led to higher costs because the Bureau sends temporary workers to each non-responding household to obtain census data.

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[3]According to the Bureau, these figures rely on fiscal year 2020 constant dollar factors derived from the Chained Price Index from "Gross Domestic Product and Deflators Used in the Historical Tables: 1940–2020" table from the Fiscal Year 2016 Budget of the United States Government.

Achieving a complete and accurate census has become an increasingly daunting task, in part, because the population is growing larger, more diverse, and more reluctant to participate in the enumeration. In many ways, the Bureau has had to invest substantially more resources each decade to conduct the enumeration.

Figure 1: The Average Cost of Counting Each Housing Unit (in 2020 Dollars) Has Escalated Each Decade, While the Percentage of Mail Response Rates Has Declined
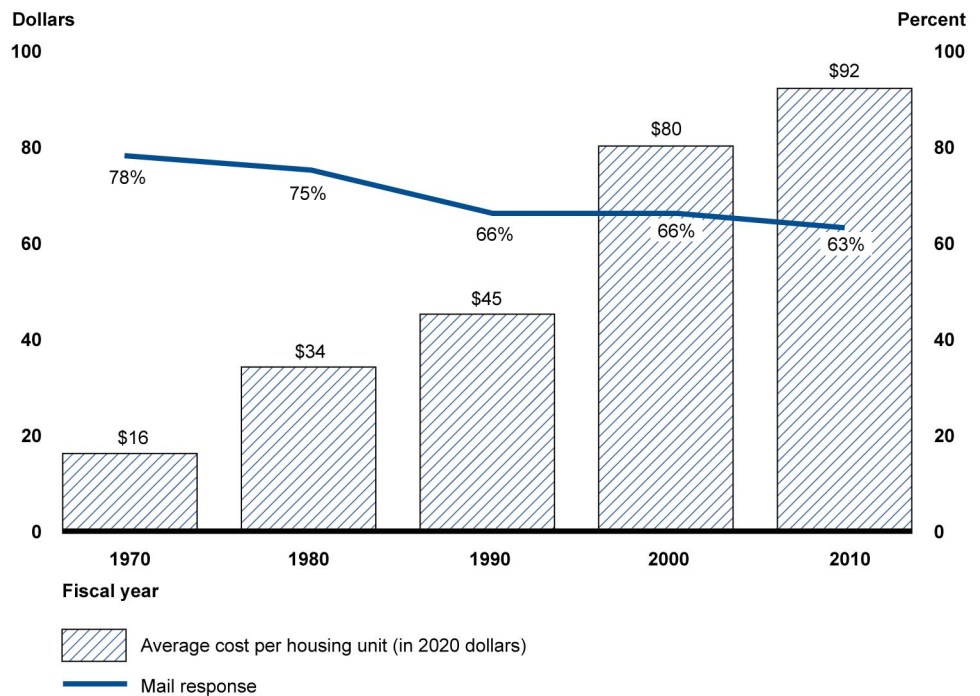
Source: GAO analysis of Census Bureau data. | GAO-18-416T

In addition to these external societal challenges that make achieving a complete count a daunting task, the Bureau also faces a number of internal management challenges that affect its capacity and readiness to conduct a cost-effective enumeration. Some of these issues—such as acquiring and developing IT systems and preparing reliable cost estimates—are long-standing in nature.

At the same time, as the Bureau looks toward 2020, it also faces newly emerging and evolving uncertainties. For example, on March 26, 2018, the Secretary of Commerce announced his decision to add a question to the decennial census on citizenship status. In our prior work we have noted the risks associated with late changes of any nature to the design

of the census if the Bureau is unable to fully test those changes under operational conditions.

The Bureau also faced budgetary uncertainties that, according to the Bureau, led to the curtailment of testing in 2017 and 2018. However, the Consolidated Appropriations Act, 2018 appropriated for the Periodic Censuses and Programs account $2.544 billion, which more than doubles the Bureau's request in the President's Fiscal Year 2018 Budget of $1.251 billion.[4] According to the explanatory statement accompanying the act, the appropriation, which is available through fiscal year 2020, is provided to ensure the Bureau has the necessary resources to immediately address any issues discovered during the 2018 End-to-End Test, and to provide a smoother transition between fiscal year 2018 and fiscal year 2019.[5] Moreover, according to Bureau officials, this level of funding helps the Bureau to complete testing and carry out other activities as planned.

The Bureau Plans to Rely Heavily on IT for the 2018 End-to-End Test and the 2020 Census

The Bureau plans to rely heavily on both new and legacy IT systems and infrastructure to support the 2018 End-to-End Test and the 2020 Census operations. For example, the Bureau plans to deploy and use 44 systems in the 2018 End-to-End Test.[6] Eleven of these systems are currently being developed or modified as part of an enterprise-wide initiative called Census Enterprise Data Collection and Processing (CEDCaP).[7] This initiative is a large and complex modernization program intended to deliver a system-of-systems to support all of the Bureau's survey data

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[4]Consolidated Appropriations Act, 2018, Pub. L. No. 115-141, Division B, Title I (Mar. 23, 2018).

[5]Joint explanatory statement of conference, 164 Cong. Rec. H2045, H2084 (daily ed. Mar. 22, 2018) (statement of Chairman Frelinghuysen), specifically referenced in section 4 of the Consolidated Appropriations Act, 2018, Pub. L. No. 115-141, § 4 (Mar. 23, 2018).

[6]In October 2017, we reported that the Bureau planned to use 43 systems in the 2018 End-to-End Test. Since that time, the Bureau has added 3 systems to the system list for the 2018 End-to-End Test and removed 2 systems. As of March 2018, the Bureau plans to use 52 systems during 2020 Census operations.

[7]The Bureau is pursuing enterprise-wide technology solutions intended to support other major surveys the Bureau conducts as well, such as the American Community Survey and the Economic Census.

collection and processing functions, rather than continuing to rely on unique, survey-specific systems with redundant capabilities.[8]

To support the 2018 End-to-End Test, the Bureau plans to incrementally deploy and use the 44 systems from December 2016 through the end of the test in April 2019. These systems are to be used to support the operations involved in the test, including address canvassing,[9] self-response (i.e., Internet, phone, or paper), field enumeration, and tabulation and dissemination.

Key Risks Are Jeopardizing a Cost-Effective Enumeration

We added the 2020 Census to our list of high-risk programs in February 2017 because (1) innovations never before used in prior enumerations are not expected to be fully tested, (2) the Bureau continues to face challenges in implementing and securing IT systems, and (3) the Bureau's October 2015 cost estimate was unreliable.[10] If not sufficiently addressed, these risks could adversely impact the cost and quality of the enumeration. Moreover, the risks are compounded by other factors that contribute to the challenge of conducting a successful census, such as the nation's increasingly diverse population and concerns over personal privacy.

Key Risk #1: The Bureau Has Redesigned the Census with the Intent to Control Costs, but Has Scaled Back Critical Tests

The basic design of the enumeration—mail out and mail back of the census questionnaire with in-person follow-up for non-respondents—has been in use since 1970. However, a lesson learned from the 2010

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[8]As a result of the Bureau's challenges in implementing key IT internal controls and its rapidly approaching deadline for conducting the decennial census, we identified CEDCaP as an IT investment in need of attention in both our February 2015 and February 2017 high-risk reports.

[9]The purpose of address canvassing is to deliver a complete and accurate address list and maps for enumeration purposes.

[10]GAO-17-317.

Census and earlier enumerations is that this traditional design is no longer capable of cost-effectively counting the population.

In response to its own assessments, our recommendations, and studies by other organizations, the Bureau has fundamentally re-examined its approach for conducting the 2020 Census. Specifically, its plan for 2020 includes four broad innovation areas: re-engineering field operations, using administrative records, verifying addresses in-office, and developing an Internet self-response option (see table 1).

If they function as planned, the Bureau initially estimated that these innovations could result in savings of over $5 billion (in 2020 dollars) when compared to its estimates of the cost for conducting the census with traditional methods. However, in June 2016, we reported that the Bureau's initial life-cycle cost estimate developed in October 2015 was not reliable and did not adequately account for risk.[11] As discussed earlier in this statement, the Bureau has updated its estimate from $12.3 billion and now estimates a life-cycle cost of $15.6 billion, which would result in a smaller potential savings from the innovative design than the Bureau originally estimated.[12]

Table 1: The Census Bureau (Bureau) Is Introducing Four Innovation Areas for the 2020 Census

Innovation area	Description
Re-engineered field operations	The Bureau intends to automate data collection methods, including its case management system.
Administrative records	In certain instances, the Bureau plans to reduce enumerator collection of data by using administrative records (information already provided to federal and state governments as they administer other programs).

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[11]GAO-16-628.

[12]The historical life-cycle cost figures for prior decennials as well as the initial estimate for 2020 provided by Commerce in October 2017 differ slightly from those reported by the Bureau previously. According to Commerce documents, the more recently reported figures are "inflated to the current 2020 Census time frame (fiscal years 2012 to 2023)," rather than to constant 2020 dollars as the earlier figures had been. Specifically, since October 2017, Commerce and the Bureau have reported the October 2015 estimate for the 2020 Census as $12.3 billion; this is slightly different than the $12.5 billion the Bureau had initially reported.

Innovation area	Description
Verifying addresses in-office	To ensure the accuracy of its address list, the Bureau intends to use "in-office" procedures and on-screen imagery to verify addresses and reduce street-by-street field canvassing.
Internet self-response option	The Bureau plans to offer households the option of responding to the survey through the Internet. The Bureau has not previously offered such an option on a large scale.

Source: GAO analysis of Census Bureau data. | GAO-18-416T

While the planned innovations could help control costs, they also introduce new risks, in part, because they include new procedures and technology that have not been used extensively in earlier decennials, if at all. Our prior work has shown the importance of the Bureau conducting a robust testing program, including the 2018 End-to-End Test.[13] Rigorous testing is a critical risk mitigation strategy because it provides information on the feasibility and performance of individual census-taking activities, their potential for achieving desired results, and the extent to which they are able to function together under full operational conditions. To address some of these challenges we have made numerous recommendations aimed at improving reengineered field operations, using administrative records, verifying the accuracy of the address list, and securing census responses via the Internet.

The Bureau has held a series of operational tests since 2012, but according to the Bureau, it has scaled back recent tests because of funding uncertainties. For example, the Bureau canceled the field components of the 2017 Census Test including non-response follow-up, a key census operation.[14] In November 2016, we reported that the cancelation of the 2017 Census Test was a lost opportunity to test, refine, and integrate operations and systems, and that it put more pressure on the 2018 End-to-End Test to demonstrate that enumeration activities will function under census-like conditions as needed for 2020.

However, in May 2017, the Bureau scaled back the operational scope of the 2018 End-to-End Test and, of the three planned test sites, only the Rhode Island site would fully implement the 2018 End-to-End Test. The

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[13]GAO-17-622.

[14]In non-response follow-up, if a household does not respond to the census by a certain date, the Bureau will conduct an in-person visit by an enumerator to collect census data using a mobile device provided by the Bureau.

Washington and West Virginia sites would test just one field operation. In addition, due to budgetary concerns, the Bureau decided to remove three coverage measurement operations (and the technology that supports them) from the scope of the test.[15]

Without sufficient testing, operational problems can go undiscovered and the opportunity to improve operations will be lost, in part because the 2018 End-to-End Test is the last opportunity to demonstrate census technology and procedures across a range of geographic locations, housing types, and demographic groups. We plan to issue a report in the spring of 2018 on address canvassing at the three test sites.

Key Risk #2: The Bureau Continues to Face Challenges in Implementing and Securing IT Systems

We have previously reported that the Bureau faces challenges in managing and overseeing IT programs, systems, and contractors supporting the 2020 Census. Specifically, we have noted challenges in its efforts to manage the schedules, contracts, costs, governance and internal coordination, and security for its systems. As a result of these challenges, the Bureau is at risk of being unable to fully implement the systems necessary to support the 2020 Census and conduct a cost-effective enumeration. We previously recommended that the Bureau take action to improve its implementation and management of IT in areas such as governance and internal coordination.[16]

Schedule management

Our ongoing work has determined that the Bureau faces significant challenges in managing its schedule for developing and testing systems for the 2018 End-to-End Test that began in August 2017. As of April 2018, 30 of the 44 systems in the test had completed all development activities, while the remaining 14 were in the process of completing these activities. Figure 2 summarizes the development status for the 44 systems planned for the 2018 End-to-End Test, as of April 2018.

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[15]Coverage measurement evaluates the quality of the census data by estimating the census coverage based on a post-enumeration survey.
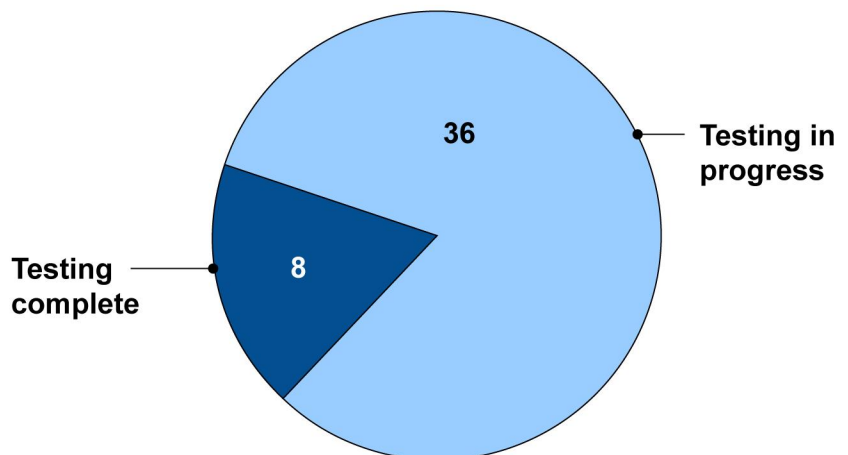
[16]GAO-16-623.

Figure 2: Development Status for the 44 Systems in the 2018 End-to-End Test, as of April 2018
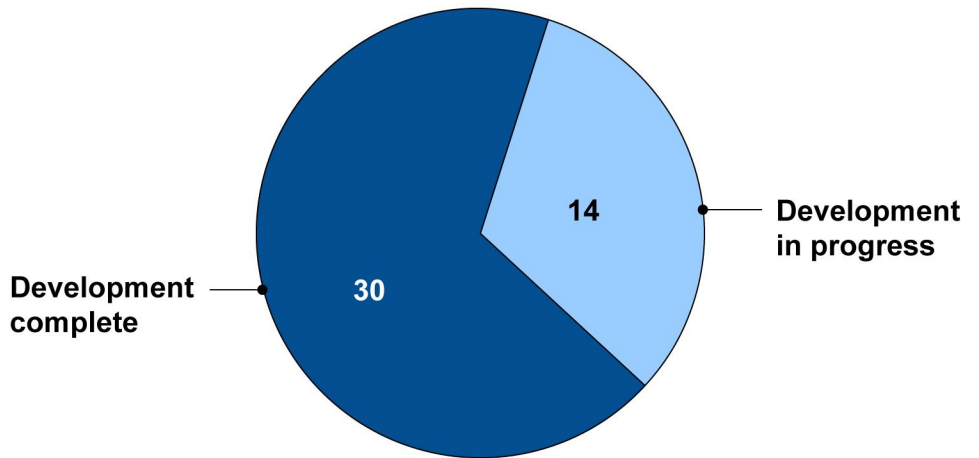
Source: GAO analysis of Census Bureau data. | GAO-18-416T

In addition, as of April 2018, 8 of the 44 systems had completed all testing activities (e.g., system and integration testing) for the 2018 End-to-End Test, while the remaining 36 were in the process of completing these activities. Figure 3 summarizes the status of testing for the 44 systems in the 2018 End-to-End Test. In addition, appendix I includes additional details about the status of development and testing for these systems.

Figure 3: Testing Status for the 44 Systems in the 2018 End-to-End Test, as of April 2018

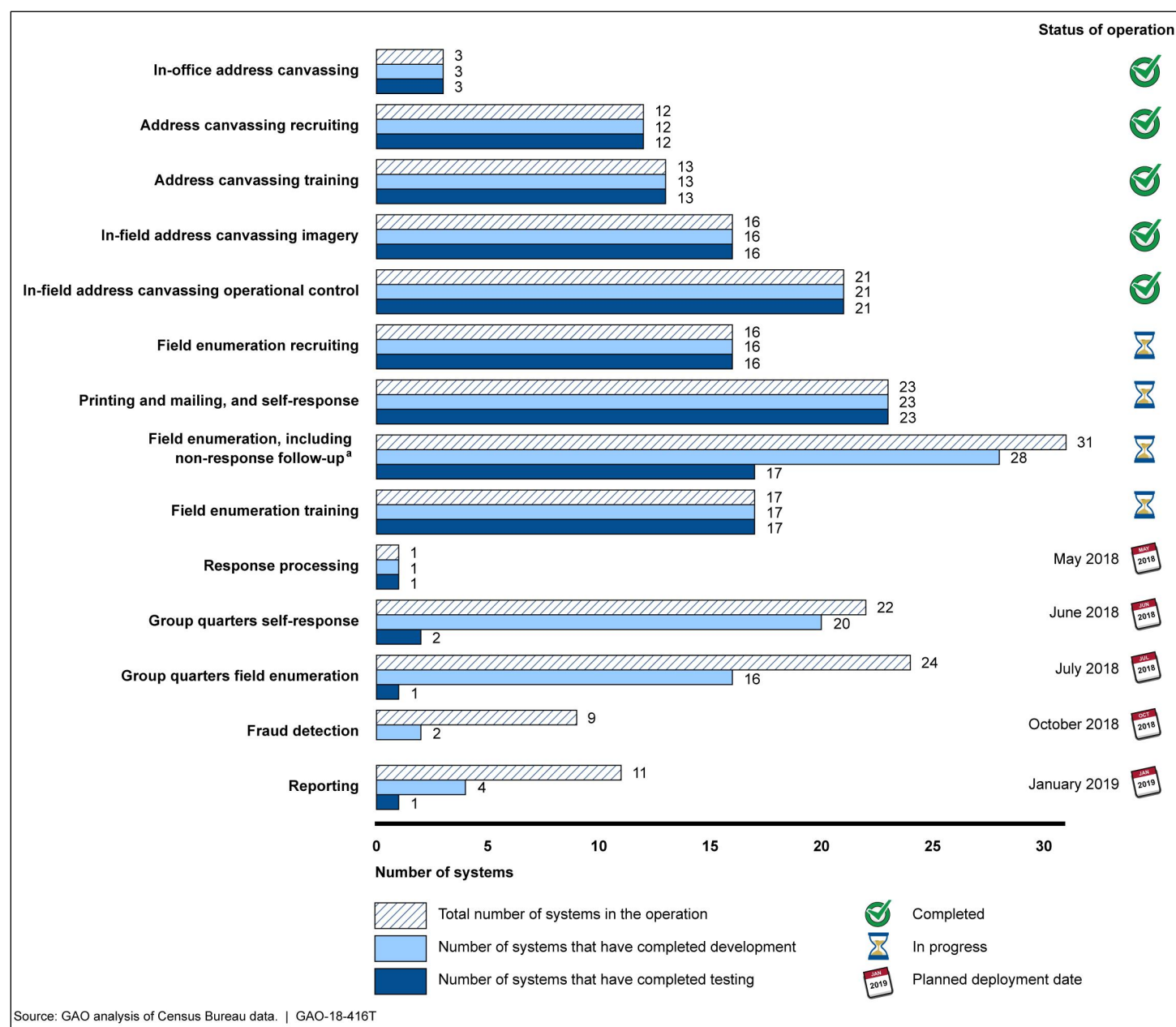Source: GAO analysis of Census Bureau data. | GAO-18-416T

Nevertheless, significant development and testing work remains to be completed. As stated previously, the 44 systems in the test are to be deployed multiple times in a series of operations (such as field enumeration). As of April 2018, 40 of the 44 systems had deployed at least a portion of functionality to support operations that have already occurred. The remaining system development and testing work is needed to support the 2018 End-to-End Test operations that are in process or planned.

Specifically, as of April 2018, the Bureau had completed the development and testing for all of the systems supporting 9 of the 14 operations in the 2018 End-to-End Test, such as in-field address canvassing and response processing. However, the agency was in the process of completing system development and testing to support the remaining 5 operations. These 5 operations include 1 that is in progress—field enumeration—and 4 others that are planned for the future, including group quarters[17] enumeration and fraud detection. Figure 4 depicts the total number of systems supporting each operation, the number of systems that have completed development and testing, and the status of the operation.

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[17]Group quarters refer to college dormitories, nursing homes, and other facilities typically owned or managed by an entity providing housing, services, or both for the residents.

Figure 4: Development and Testing Status for System Operations in the 2018 End-to-End Test, as of April 2018

Operation	Total	Dev	Test	Status
In-office address canvassing	3	3	3	Completed
Address canvassing recruiting	12	12	12	Completed
Address canvassing training	13	13	13	Completed
In-field address canvassing imagery	16	16	16	Completed
In-field address canvassing operational control	21	21	21	Completed
Field enumeration recruiting	16	16	16	In progress
Printing and mailing, and self-response	23	23	23	In progress
Field enumeration, including non-response follow-up[a]	31	28	17	In progress
Field enumeration training	17	17	17	In progress
Response processing	1	1	1	May 2018
Group quarters self-response	22	20	2	June 2018
Group quarters field enumeration	24	16	1	July 2018
Fraud detection	9	2		October 2018
Reporting	11	4	1	January 2019

Number of systems

Legend:
- Total number of systems in the operation
- Number of systems that have completed development
- Number of systems that have completed testing
- Completed
- In progress
- Planned deployment date

Source: GAO analysis of Census Bureau data. | GAO-18-416T

[a]In addition to non-response follow-up, field enumeration also includes operations such as update/leave and coverage improvement. In update/leave, listers update a housing unit's address and leave a questionnaire to allow the household to self-respond. The goal of coverage improvement is to resolve erroneous enumerations (such as people counted in the wrong place or more than once) and omissions.

However, due in part to challenges experienced during systems development, the Bureau has delayed by several months key IT milestone dates (e.g., dates to begin integration testing) for 9 of the 14 operations in the 2018 End-to-End Test. For example, the Bureau has moved the test readiness review date for the fraud detection operation from April 2018 to July 2018–a delay of 3 months—and the test readiness review of the group quarters field enumeration operation from October 2017 to April 2018—a delay of 6 months. Figure 5 depicts the delays in the key IT milestone dates for the operations in the 2018 End-to-End Test, as of April 2018. In total, since August 2017, the Bureau has delayed the final deployment date for 19 systems supporting the 14 operations.[18] Appendix I includes additional details about the delays in deployment dates since August 2017 for the 44 systems in the 2018 End-to-End Test.

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[18]According to officials within the Bureau's 2020 Census Systems Engineering and Integration office, the delays in the final deployment date for these systems are due to changes in the timing of the operations that the systems are supporting for the 2018 End-to-End Test.

Figure 5: Delays in Key Information Technology Milestone Dates for System Operations in the 2018 End-to-End Test, as of April 2018
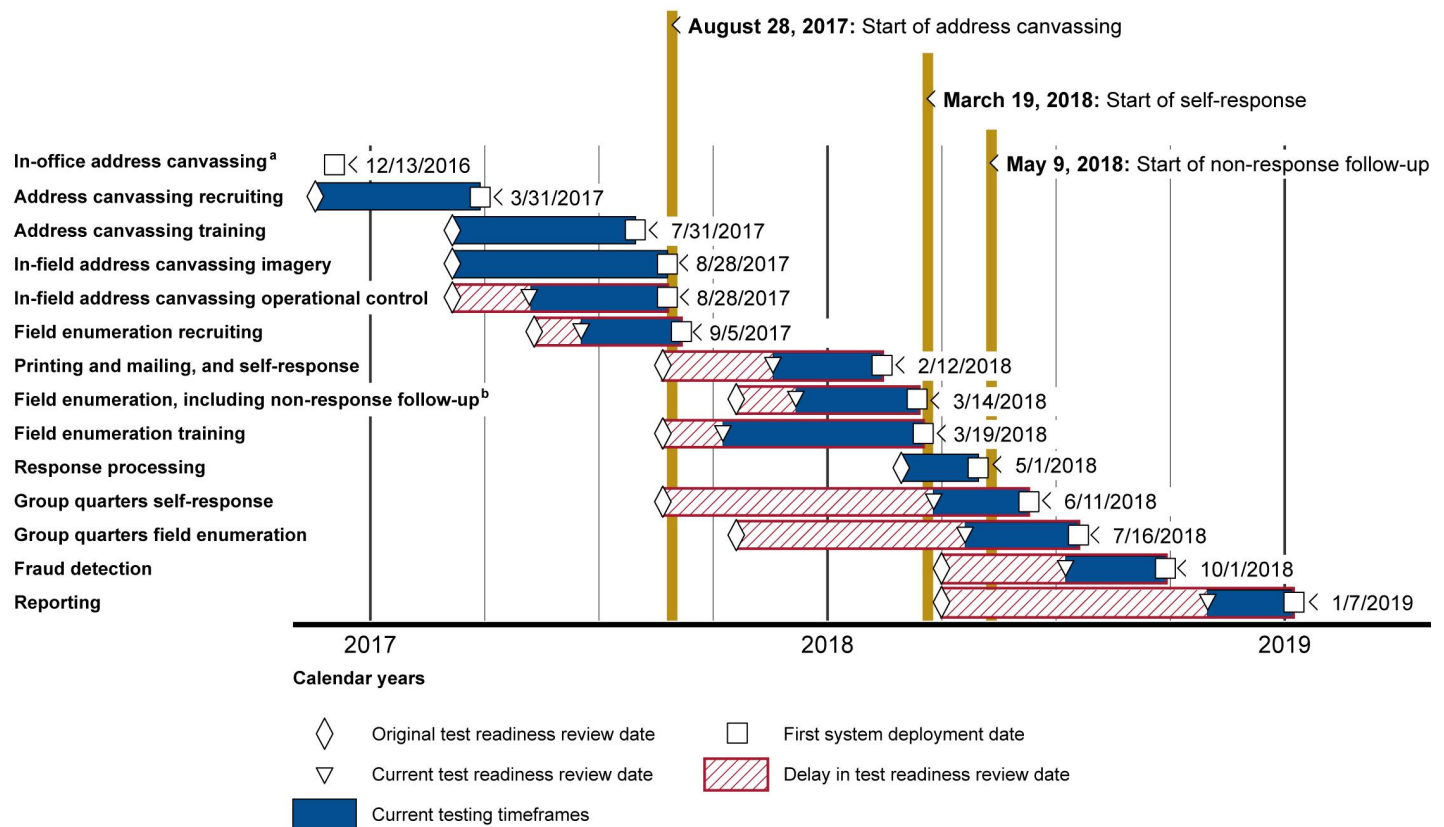
Source: GAO analysis of Census Bureau data. | GAO-18-416T

[a]The systems that supported the in-office address canvassing operation were in operations and maintenance and did not require additional testing before in-office address canvassing.

[b]In addition to non-response follow-up, field enumeration also includes operations such as update/leave and coverage improvement. In update/leave, listers update a housing unit's address and leave a questionnaire to allow the household to self-respond. The goal of coverage improvement is to resolve erroneous enumerations (such as people counted in the wrong place or more than once) and omissions.

We previously testified in May 2017 that the Bureau had faced similar challenges leading up to the 2017 Census Test, including experiencing delays in system development that led to compressed time frames for security reviews and approvals.[19] Specifically, we noted that the Bureau did not have time to thoroughly assess the low-impact components of one

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[19]GAO-17-584T.

system and complete penetration testing[20] for another system prior to the test. Nonetheless, the Bureau's Chief Information Officer (CIO) accepted the security risks and uncertainty due to compressed time frames before the planned deployment. We stressed that, for the 2018 End-to-End Test, it is important that these security assessments be completed in a timely manner and that risks be at an acceptable level before the systems are deployed.

As a result of the delays in system development and testing, the Bureau has had (and likely will continue to have) reduced time available to conduct the security reviews and approvals for the systems being used in the 2018 End-to-End Test. Officials in the Bureau's Office of Information Security stated that the original plan was to have at least 6 to 8 weeks to perform security assessments for each system.

However, given the compressed time frames, Bureau officials informed us that, in some instances, they have had 5 to 8 days to complete certain assessments. As a result, the security of all system components may not be assessed before deployment. According to the Bureau's Chief Information Security Officer, components that do not have all controls assessed are to be tracked until the assessments are completed, even if it is after the system deploys.

If the Bureau continues to experience delays in meeting development and testing milestones for the 2018 End-to-End Test, it may not be able to fully test production-level systems and operations in a census-like environment prior to the 2020 Census. As stated earlier, without sufficient testing, operational problems can go undiscovered and the opportunity to improve operations will be lost.

Additional System Development and Testing Planned After the 2018 End-to-End Test

After the 2018 End-to-End Test, the Bureau still has additional system development and testing activities planned leading up to the 2020 Census. The Bureau plans to use a total of 52 systems in 2020 Census

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[20]The National Institute of Standards and Technology defines penetration testing as security testing in which evaluators mimic real-world attacks in an attempt to identify ways to circumvent the security features of an application, system, or network. Penetration testing often involves issuing real attacks on real systems and data, using the same tools and techniques used by actual attackers.

operations, including the 44 systems that are planned to be used in the 2018 End-to-End Test, and 8 additional systems that were not included in the test.[21] The Bureau expects that the systems used in the 2018 End-to-End Test will need additional development and testing due to, among other things, new functionality to be added, the need to scale system performance for the number of respondents expected during the 2020 Census, or to address system defects identified during the 2018 End-to-End Test.

Following the 2018 End-to-End Test, the Bureau plans to develop, test, and deploy the 52 systems for the 2020 Census in four groups, or operational releases: (1) recruiting and hiring; (2) address canvassing; (3) self-response, non-response follow-up, and fraud detection; and (4) reporting and coverage measurement.[22] The systems are generally grouped by the operation(s) they support in the 2020 Census. For example, the third operational release—which includes the most systems—has 47 systems to be used for self-response (including via the Internet), non-response follow-up, and fraud detection. These systems are expected to be deployed in November 2019 so that they will be ready for the Internet self-response operation, which begins in March 2020. Table 2 identifies the key dates for the operational releases for systems in the 2020 Census.

[21]Several of these systems are for the coverage measurement operation, which was cut from the scope of the 2018 End-to-End Test. As stated previously, coverage measurement evaluates the quality of the census data by estimating the census coverage based on a post-enumeration survey.

[22]Similar to the 2018 End-to-End Test, a system being used in the 2020 Census may be deployed multiple times (with additional or new functionality) if that system is needed for more than one of these operations.

Table 2: The Census Bureau's Planned Operational Releases for the 2020 Census, as of April 2018

Operational release name	Number of systems in the operational release	Expected completion date for system development	Expected completion date for integration and test	Expected deployment date
1. Recruiting and hiring	19	May 2018	July 2018	September 2018
2. Address canvassing	26	November 2018	March 2019	May 2019
3. Self-response, non-response follow-up, and fraud detection	47	February 2019	June 2019	November 2019
4. Reporting and coverage measurement	22	October 2019	February 2020	July 2020

Source: GAO analysis of Census Bureau data. | GAO-18-416T

As planning for the 2020 Census continues, it will be important for the Bureau to provide adequate time for system development and testing activities. This will help ensure that the time available for security assessments is not reduced as it was in the 2017 Test, and as it has been, thus far, during the 2018 End-to-End Test. Without adequate time for completing these security assessments, the Bureau will be challenged in ensuring that risks are at an acceptable level before the systems are deployed for the 2020 Census.

Contract management

Our ongoing work has also determined that the Bureau faces challenges in managing its significant contractor support. The Bureau is relying on contractor support in many areas to prepare for the 2020 Census. For example, it is relying on contractors to develop a number of systems and components of the IT infrastructure. These activities include (1) developing the IT platform (as part of the CEDCaP program) that is intended to be used to collect data from households responding via the Internet and telephone, and for non-response follow-up activities; (2) procuring the mobile devices and cellular service to be used for non-response follow-up;[23] and (3) deploying the IT and telecommunications hardware in the field offices. According to Bureau officials, contractors are also providing support in areas such as fraud detection, cloud computing services, and disaster recovery.

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[23]In non-response follow-up, if a household does not respond to the census by a certain date, the Bureau will send out employees to visit the home. The Bureau's plan is for these enumerators to use a census application, on a mobile device provided by the Bureau, to capture the information given to them by the in-person interviews.

In addition to the development of technology, the Bureau is relying on a technical integration contractor to integrate all of the key systems and infrastructure. The Bureau awarded a contract to integrate the 2020 Census systems and infrastructure in August 2016. The contractor's work was to include evaluating the systems and infrastructure and acquiring the infrastructure (e.g., cloud or data center) to meet the Bureau's scalability and performance needs. It was also to include integrating all of the systems, supporting technical testing activities, and developing plans for ensuring the continuity of operations. Since the contract was awarded, the Bureau has modified the scope to also include assisting with operational testing activities, conducting performance testing for two Internet self-response systems, and providing technical support for the implementation of the paper data capture system.

However, our ongoing work has determined that the Bureau is facing staffing challenges that could impact its ability to manage and oversee the technical integration contractor. Specifically, the Bureau is managing the integration contractor through a government program management office, but this office is still filling vacancies. As of February 2018, the Bureau reported that 34 of the office's 58 federal employee positions were vacant. As a result, this program management office may not be sufficiently staffed to provide adequate oversight of contractor cost, schedule, and performance.

The development and testing schedule delays during the 2017 Test and preparations for the 2018 End-to-End Test raise concerns about the Bureau's ability to effectively perform contractor management. As we reported in November 2016, a greater reliance on contractors for these components of the 2020 Census requires the Bureau to focus on sound management and oversight of the key contracts, projects, and systems.[24]

IT cost growth

The Bureau faces challenges in controlling IT cost growth. Specifically, the Bureau's October 2015 cost estimate included about $3.41 billion in total IT costs for fiscal years 2012 through 2023. These included costs for, among other things, system engineering, test and evaluation, and

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[24]GAO, *Information Technology: Uncertainty Remains about the Bureau's Readiness for a Key Decennial Census Test,* GAO-17-221T (Washington, D.C.: Nov. 16, 2016).

infrastructure, as well as for a portion of the CEDCaP program.[25] However, in October 2017, we reported[26] that IT costs would likely be at least $4.8 billion due to increases in costs associated with the CEDCaP program[27] and certain IT contracts (including those associated with technical integration and mobile devices).

In December 2017, the Bureau reported that its estimated IT costs had grown from $3.41 billion to $4.97 billion—an increase of $1.56 billion. Figure 6 identifies the Bureau estimate of total IT costs associated with the 2020 program as of December 2017.

Figure 6: Total Information Technology Costs Estimated by the Census Bureau, as of December 2017
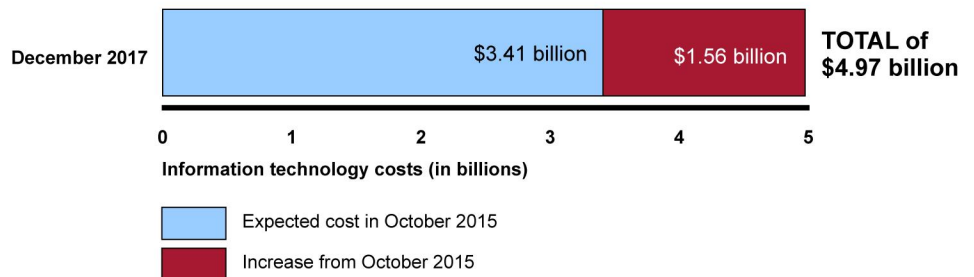
Source: GAO analysis of Census Bureau data. | GAO-18-416T

The cost increases were due, in large part, to the Bureau (1) updating the cost estimate for the CEDCaP program, (2) including an estimate for technical integration services, and (3) updating costs related to other major contracts (such as mobile device as a service).[28] Table 3 describes the IT costs that comprised the Bureau's cost estimate as of December 2017.

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[25]The 2020 program pays for a portion of the costs for the CEDCaP program. According to the October 2015 estimate, the portion of CEDCaP costs associated with the 2020 Census was estimated at $328 million of the $548 million total program estimate.

[26]GAO-18-215T.

[27]In May 2017, the Bureau reported that the CEDCaP program's cost estimate was increasing by about $400 million—from its original estimate of $548 million in 2013 to a revised estimate of $965 million in May 2017.

[28]As part of mobile device as a service, the Bureau plans to provide mobile devices (including mobile phones, tablets, and laptops) and cellular service to field staff to support operations such as address canvassing and non-response follow-up.

Table 3: Total 2020 Census Information Technology (IT) Costs Estimated by the Census Bureau, by Cost Category, as of December 2017

IT cost category	Expected cost (in millions)
Technical integration services	$1,492
Census questionnaire assistance	$817
Other IT services, such as day-to-day IT support	$808
Census Enterprise Data Collection and Processing (CEDCaP) costs related to the 2020 Census	$509[a]
Decennial device as a service	$489
Field IT deployment	$450
Other non-CEDCaP systems, such as recruitment and personnel systems	$401
Total	**$4,966**

Source: GAO analysis of Census Bureau data. | GAO-18-416T

[a]The 2020 program pays for a portion of the costs for the CEDCaP program. As of May 2017, the Census Bureau estimated that the entire cost of the CEDCaP program would be about $965 million.

IT cost information that is accurately reported and clearly communicated is necessary to help ensure that Congress and the public have confidence that taxpayer funds are being spent in an appropriate manner. However, the amount of cost growth since the October 2015 estimate raises questions as to whether the Bureau has a complete understanding of the IT costs associated with the 2020 program. In December 2017, the Bureau provided us with the documentation used to develop the updated cost-estimate, and we are reviewing these materials as part of our continuing body of work on the 2020 Census.

Governance and internal coordination

Effective governance can drive change, provide oversight, and ensure accountability for results. Further, effective IT governance was envisioned in the statutory provisions enacted in 2014 and referred to as the Federal Information Technology Acquisition Reform Act (FITARA),[29] which strengthened and reinforced the role of the departmental CIO. The component CIO (such as the Bureau's CIO) also plays a role in effective IT governance, as the component is subject to the oversight and policies of the parent department implementing FITARA.

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[29]Carl Levin and Howard P. 'Buck' McKeon National Defense Authorization Act for Fiscal Year 2015, Pub. L. No. 113-291, div. A, title VIII, subtitle D, 128 Stat. 3292, 3438-50 (Dec. 19, 2014).

Our ongoing work has determined that officials in Commerce's Office of the Secretary have increased their oversight of the Bureau's preparations for the 2020 Census by holding regular meetings to discuss contracts, expected costs, and risks, among other topics. For example, Bureau officials reported that they have recently begun meeting with the Secretary of Commerce on a monthly basis and with the Under Secretary of Commerce for Economic Affairs on a weekly basis to discuss 2020 Census issues. Moreover, the department's Acting CIO has also been involved in overseeing the Bureau's IT system readiness. The Bureau has also appointed two new assistant directors within the Decennial Directorate. Each of these individuals is responsible for overseeing aspects of the 2020 Census program, to include schedules, contracts, and system development.

In addition, to ensure executive-level oversight of the key systems and technology, the Bureau's CIO (or a designated representative) is to be a member of the governance boards that oversee all of the operations and technology for the 2020 Census. However, in August 2016 we reported on challenges that the Bureau has had with IT governance and internal coordination, including weaknesses in its ability to monitor and control IT project costs, schedules, and performance.[30] We made eight recommendations to the Secretary of Commerce to direct the Bureau to, among other things, better ensure that risks are adequately identified and schedules are aligned. The department agreed with our recommendations. As of April 2018, the Bureau had fully implemented five of the recommendations and had taken initial steps toward implementing the other three recommendations.

Further, given the schedule delays and cost increases previously mentioned, and the vast amount of development, testing, and security assessments left to be completed, we remain concerned about executive-level oversight of systems and security. Moving forward, it will be important that the CIO and other Bureau executives continue to use a collaborative governance approach to effectively manage risks and ensure that the IT solutions meet the needs of the agency within cost and schedule.

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[30]GAO-16-623.

Information security

In November 2016, we described the significant challenges that the Bureau faced in securing systems and data for the 2020 Census, and we noted that tight time frames could exacerbate these challenges.[31] Two such challenges were (1) ensuring that individuals gain only limited and appropriate access to the 2020 Census data, including personally identifiable information (PII), such as name, personal address, and date of birth; and (2) making certain that security assessments were completed in a timely manner and that risks were at an acceptable level.[32] Protecting PII, for example, is especially important because a majority of the 44 systems to be used in the 2018 End-to-End Test contain such information, as reflected in figure 7.[33]

Figure 7: Personally Identifiable Information (PII) in Census Bureau Systems Included in the 2018 End-to-End Test, as of February 2018

System contains PII
39 systems, about 89%

System does not contain PII
5 systems, about 11%
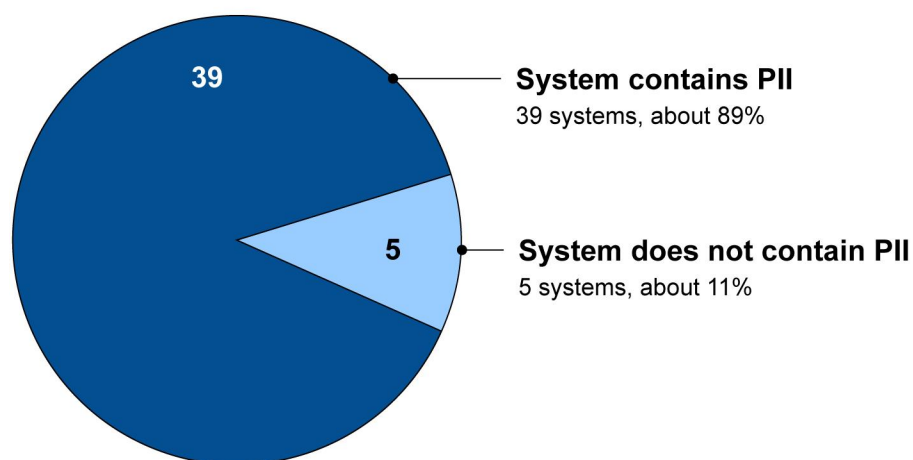
Source: GAO analysis of Census Bureau data. | GAO-18-416T

[31]GAO-17-584T.

[32]GAO-17-221T.

[33]According to officials in the Bureau's Office of Information Security, 26 systems contain data that is protected from disclosure under Title 13 of the U.S. Code. This law protects information provided by the public for the Bureau's censuses and surveys and requires that the Bureau keep it confidential. The Bureau may not disclose or publish any private information that identifies an individual or business, such as names, addresses, Social Security numbers, and telephone numbers. 13 U.S.C. § 9.

To address these and other challenges, federal law specifies requirements for protecting federal information and information systems, such as those systems to be used in the 2020 Census. Specifically, the Federal Information Security Management Act of 2002 and the Federal Information Security Modernization Act of 2014 (FISMA) require executive branch agencies to develop, document, and implement an agency-wide program to provide security for the information and information systems that support operations and assets of the agency.[34]

Accordingly, the National Institute of Standards and Technology (NIST) developed risk management framework guidance for agencies to follow in developing information security programs.[35] In addition, the Office of Management and Budget's (OMB) revised Circular A-130 on managing federal information resources required agencies to implement the NIST risk management framework to integrate information security and risk management activities into the system development life cycle.[36]

In accordance with FISMA, NIST guidance, and OMB guidance, the Bureau's Office of the CIO established a risk management framework. This framework requires system developers to ensure that each of the Bureau's systems undergoes a full security assessment, and that system developers remediate critical deficiencies. In addition, according to the framework, system developers are to ensure that each component of a system has its own system security plan that documents how the Bureau intends to implement security controls. As a result of this requirement, system developers for a single system might develop multiple system security plans which all have to be approved as part of the system's complete security documentation.

According to the Bureau's framework, each of the 44 systems in the 2018 End-to-End Test will need to have complete security documentation (such

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[34]The Federal Information Security Modernization Act of 2014, Pub. L. No. 113-283, 128 Stat. 3073 (Dec. 18, 2014) largely superseded the Federal Information Security Management Act of 2002, enacted as Title III, E-Government Act of 2002, Pub. L. No. 107-347, 116 Stat. 2899, 2946 (Dec. 17, 2002).

[35]NIST, *Guide for Applying the Risk Management Framework to Federal Information Systems: A Security Life Cycle Approach*, SP 800-37, Revision 1 (Gaithersburg, Md.: February 2010).

[36]OMB, *Revision of OMB Circular A-130, Managing Federal Information as a Strategic Resource* (Washington, D.C.: July 28, 2016).

as system security plans) and an approved authorization to operate[37] prior to its use in the 2018 End-to-End Test. However, our ongoing work indicates that, while the Bureau is completing these steps for the 44 systems to be used in the 2018 End-to-End Test, significant work remains. Specifically:

- Six of the 44 systems are fully authorized to operate through the completion of the 2018 End-to-End Test.

- Thirty-two systems have a current authorization to operate, but the Bureau will need to reauthorize these systems before the completion of the 2018 End-to-End Test. Bureau officials in the CIO's Office of Information Security stated that these systems will need to be reauthorized because, among other things, they have additional development work planned that may require the systems to be reauthorized; are being moved to a different infrastructure environment (e.g., from a data center to a cloud-based environment); or have a current authorization that expires before the completion of the 2018 End-to-End Test.

- Six systems have not yet obtained an authorization to operate.

Figure 8 summarizes the authorization to operate status for the systems being used in the 2018 End-to-End Test, as reported by the Bureau.

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[37]According to the Bureau's framework, systems are to obtain security authorization approval from the authorizing official in order to operate. Specifically, the authorizing official evaluates the security authorization package and provides system authorization if the overall risk level is acceptable. In addition, according to the Bureau's IT security program policy, the issuance of an authorization to operate for a system requires support of both the technical authorizing official (i.e., the CIO) and the business authorizing official responsible for funding and managing the system (i.e., the Associate Director for Decennial Census Programs). Further, according to the Bureau's framework, once a system obtains an authorization, it is transitioned to the continuous monitoring process where the authorizing official can provide implicit, continued authorization for system operation as long as the risk level remains acceptable.

Figure 8: Authorization to Operate Status for 44 Systems Being Used in the Census Bureau's 2018 End-to-End Test, as of April 2018

Number of systems

Number of systems
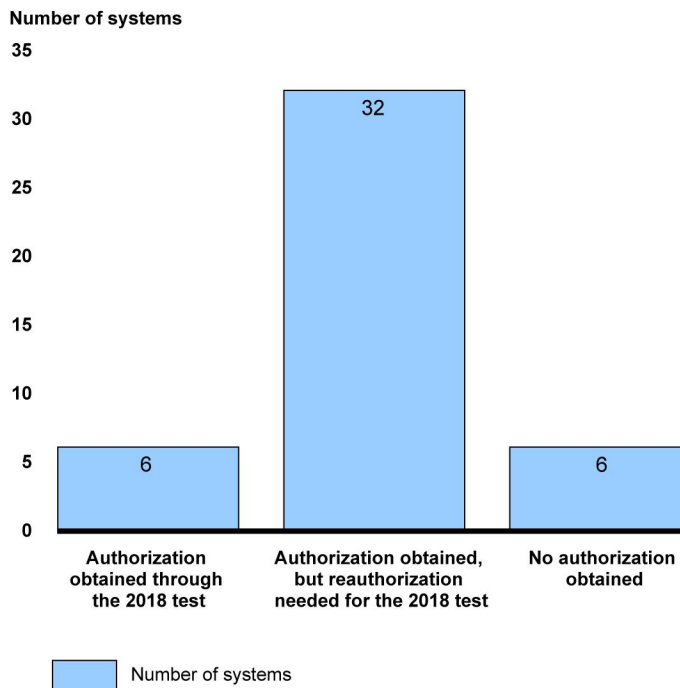
Source: GAO analysis of Census Bureau data. | GAO-18-416T

Because many of the systems that will be a part of the 2018 End-to-End Test are not yet fully developed, the Bureau has not finalized all of the security controls to be implemented; assessed those controls; developed plans to remediate control weaknesses; and determined whether there is time to fully remediate any deficiencies before the systems are needed for the test. In addition, as discussed earlier, the Bureau is facing system development and testing challenges that are delaying the completion of milestones and compressing the time available for security testing activities.

Further, while the large-scale technological changes (such as Internet self-response) increase the likelihood of efficiency and effectiveness gains, they also introduce many information security challenges. The 2018 End-to-End Test also involves collecting PII on hundreds of thousands of households across the country, which further increases the need to properly secure these systems. Thus, it will be important that the Bureau provides adequate time to perform these security assessments,

completes them in a timely manner, and ensures that risks are at an acceptable level before the systems are deployed.

Key Risk #3: The Bureau Will Need to Control Any Further Cost Growth and Develop Cost Estimates That Reflect Best Practices

In October 2017, Commerce announced that it had updated its October 2015 life-cycle cost estimate and now projects the life-cycle cost of the 2020 Census will be $15.6 billion, more than a $3 billion (27 percent) increase over the Bureau's earlier estimate. The higher estimated life-cycle cost is due, in part, as we reported in June 2016, to the Bureau's failure to meet best practices for a quality cost-estimate. Specifically, we reported that, although the Bureau had taken steps to improve its capacity to carry out an effective cost estimate, such as establishing an independent cost estimation office, its October 2015 version of the estimate for the 2020 Census only partially met two characteristics of a reliable cost estimate (comprehensive and accurate) and minimally met the other two (well-documented and credible). We also reported that risks were not properly accounted for in the cost estimate.[38]

We recommended that the Bureau take action to ensure its 2020 Census cost estimate meets all four characteristics of a reliable cost estimate, as well as properly account for risk to ensure there are appropriate levels for budgeted contingencies. The Bureau agreed with our recommendations. In response, Commerce reported that in May, 2017, a multidisciplinary team was created to evaluate the 2020 Census program and to produce an independent cost estimate.

Factors driving the increased cost estimate include changes to assumptions relating to self-response rates, wage levels for temporary census workers, as well as the fact that major contracts and IT scale-up plans and procedures were not effectively planned, managed, and executed. The new estimate also includes a contingency of 10 percent of estimated costs per year as insurance against "unknown-unknowns," such as a major cybersecurity event.

The Bureau has provided us with the documentation used to develop the $15.6 billion cost estimate. We are reviewing these documents to

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[38]GAO-16-628.

determine the reliability of the estimate using our cost guide.[39] In order for the new estimate to be deemed high quality, and, thus, the basis for any 2020 Census annual budgetary figures, the new cost-estimate will need to address the following four characteristics:

- **Comprehensive.** To be comprehensive an estimate should have enough detail to ensure that cost elements are neither omitted nor double-counted, and all cost-influencing assumptions are detailed in the estimate's documentation, among other things, according to best practices.

- **Accurate.** Accurate estimates are unbiased and contain few mathematical mistakes.

- **Well-documented.** Cost estimates are considered valid if they are well-documented to the point they can be easily repeated or updated and can be traced to original sources through auditing, according to best practices.

- **Credible.** Credible cost estimates must clearly identify limitations due to uncertainty or bias surrounding the data or assumptions, according to best practices.

Based on our preliminary analysis, we have found that the Bureau has made improvements in its cost estimation process across the four characteristics. We plan to issue a report in the summer of 2018 on the revised estimate's reliability.

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[39]GAO, *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs (Supersedes* GAO-07-1134SP*),* GAO-09-3SP (Washington, D.C.: Mar. 2, 2009).

Continued Management Attention Needed to Keep Preparations on Track and Help Ensure a Cost-Effective Enumeration

2020 Challenges Are Symptomatic of Deeper Long-Term Organizational Issues

The difficulties facing the Bureau's preparation for the decennial census in such areas as planning and testing; managing and overseeing IT programs, systems, and contractors supporting the enumeration; developing reliable cost estimates; prioritizing decisions; managing schedules; and other challenges, are symptomatic of deeper organizational issues.

Following the 2010 Census, a key lesson learned for 2020 that we identified was ensuring that the Bureau's organizational culture and structure, as well as its approach to strategic planning, human capital management, internal collaboration, knowledge sharing, capital decision-making, risk and change management, and other internal functions are aligned toward delivering more cost-effective outcomes.[40]

The Bureau has made improvements over the last decade, and continued progress will depend in part on sustaining efforts to strengthen risk management activities, enhancing systems testing, bringing in experienced personnel to key positions, implementing our recommendations, and meeting regularly with officials from its parent agency, Commerce. Going forward, we have reported that the key elements needed to make progress in high-risk areas are top-level attention by the administration and agency officials to (1) leadership commitment, (2) ensuring capacity, (3) developing a corrective action plan, (4) regular monitoring, and (5) demonstrated progress. Although important steps have been taken in at least some of these areas, overall, far more work is needed.[41] We discuss three of five areas below.

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[40]GAO, *2010 Census: Preliminary Lesson Learned Highlight the Need for Fundamental Reforms,* GAO-11-496T (Washington, D.C.: Apr. 6, 2011).

[41]GAO-17-317.

The Secretary of Commerce has taken several actions towards demonstrating **leadership commitment**. For example, the previously noted multidisciplinary review team included members with Bureau leadership experience, as well as members with private sector technology management experience. Additional program evaluation and the independent cost estimate was produced by a team from the Commerce Secretary's Office of Acquisition Management that included a member detailed from OMB. We have met with the Under Secretary of Commerce for Economic Affairs at her invitation to discuss oversight priorities, Commerce's commitment to them, as well as the progress on high risk areas. Commerce reports that other senior officials are now also actively involved in the management and oversight of the decennial. Likewise, with respect to **monitoring progress**, the Commerce Secretary reports having weekly 2020 Census oversight reviews with senior Bureau staff and will require metric tracking and program execution status on a real-time basis.

On the other hand, demonstrating the **capacity** to address high risk concerns remains a challenge. For example, as stated earlier, the Bureau is facing staffing challenges that could impact its ability to manage and oversee the technical integration contractor. Specifically, the Bureau is managing the integration contractor through a government program management office, but this office is still filling vacancies. As previously discussed, the Bureau reported that 34 of 58, or almost 60 percent, of the office's federal employee positions were vacant as of February 2018. As a result, this program management office may not be able to provide adequate oversight of contractor cost, schedule, and performance.

In the months ahead, we will continue to monitor the Bureau's progress in addressing in each of the five elements essential for reducing the risk to a cost-effective enumeration.

Strong Bureau Leadership Will Be Critical for Keeping Efforts On-Track

At a time when strong Bureau management is needed, vacancies in the agency's two top positions—Director and Deputy Director—are not helpful for keeping 2020 preparations on-track. These vacancies are due to the previous director's retirement on June 30, 2017, and the previous deputy director's appointment to be the Chief Statistician of the United States within OMB in January 2017. Although interim leadership has since been named, there are upcoming key decisions that would more effectively be

made by permanent leadership. In our prior work we have noted how openings in the Bureau's top position makes it difficult to ensure accountability and continuity, as well as to develop and sustain efforts that foster change, produce results, mitigate risks, and control costs over the long term. For example, in September 2018 the Bureau is scheduled to decide what types of challenges it will allow state, tribal, or local governments to make to their official 2020 Census results.

The director of the Bureau is appointed by the President, by and with the advice and consent of the Senate, without regard to political affiliation. The director's term is a fixed 5-year term of office.[42] An individual may be reappointed but may not serve more than two full terms as director. The director's position was first filled this way beginning on January 1, 2012, and cycles every fifth year thereafter. Because the new term began on January 1, 2017, the time that elapses until a new director is confirmed counts against the 5-year term of office. As a result, the next director's first term will be less than 5 years.

Going forward, filling these top two positions should be an important priority. On the basis of our prior work, key attributes of a census director, in addition to the obvious ones of technical expertise and the ability to lead large, long-term and high risk programs, could include abilities in the following areas:

- **Strategic Vision.** The director needs to build a long-term vision for the Bureau that extends beyond the current decennial census. Strategic planning, human-capital succession planning, and life-cycle cost estimates for the Bureau all span the decade.

- **Sustaining Stakeholder Relationships.** The director needs to continually expand and develop working relationships and partnerships with governmental, political, and other professional officials in both the public and private sectors to obtain their input, support, and participation in the Bureau's activities.

- **Accountability.** The life-cycle cost for a decennial census spans a decade, and decisions made early in the decade about the next decennial census guide the research, investments, and tests carried out throughout the decennial census. Institutionalizing accountability

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[42]13 U.S.C. § 21(a)-(b)(1).

over an extended period may help long-term decennial initiatives provide meaningful and sustainable results.[43]

Further Actions Needed on Our Recommendations

Over the past several years we have issued numerous reports that underscored the fact that, if the Bureau was to successfully meet its cost savings goal for the 2020 Census, the Bureau needed to take significant actions to improve its research, testing, planning, scheduling, cost estimation, system development, and IT security practices. As previously stated, over the past decade, we have made 84 recommendations specific to the 2020 Census to help address these and other issues. The Bureau has generally agreed with those recommendations and has taken action to address them. However, 30 of the recommendations had not been fully implemented as of April 2018, although the Bureau had taken initial steps to implement many of them. We have designated 21 of these 84 recommendations as a priority for Commerce and 6 have been implemented. In August 2017, we sent the Secretary of Commerce a letter that identified our open priority recommendations at the department, 15 of which concern the 2020 Census.[44] We believe that attention to these recommendations is essential for a cost-effective enumeration. The recommendations included implementing reliable cost estimation and scheduling practices in order to establish better control over program costs, as well as taking steps to better position the Bureau to develop an Internet response option for the 2020 Census.

On October 3, 2017, in response to our August 2017 letter, the Commerce Secretary noted that he shared our concerns about the 2020 Census and acknowledged that some of the programs had not worked as planned, and are not delivering the savings that were promised. The Commerce Secretary also stated that he intends to improve the timeliness for implementing our recommendations.

We meet quarterly with Bureau officials to discuss the progress and status of open recommendations related to the 2020 Census, which has

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[43]GAO, *2010 Census: Data Collection Operations Were Generally Completed as Planned, but Long-standing Challenges Suggest Need for Fundamental Reforms,* GAO-11-193 (Washington, D.C.: Dec. 14, 2010).

[44]The 15 priority recommendations for the 2020 Census cover the period from November 2009 to July 2017.

resulted in Bureau actions in recent months leading to closure of some recommendations. We are encouraged by this commitment by Commerce and the Bureau in addressing our recommendations. Implementing our recommendations in a complete and timely manner is important because it could improve the management of the 2020 Census and help to mitigate continued risks.

In conclusion, while the Bureau has made progress in revamping its approach to the census, it faces considerable challenges and uncertainties in (1) implementing key cost-saving innovations and ensuring they function under operational conditions; (2) managing the development and security of IT systems; and (3) developing a quality cost estimate for the 2020 Census and preventing further cost increases. Without timely and appropriate actions, these challenges could adversely affect the cost, accuracy, schedule, and security of the enumeration. For these reasons, the 2020 Census is a GAO high risk area.

Going forward, continued management attention and oversight will be vital for ensuring that risks are managed, preparations stay on-track, and the Bureau is held accountable for implementing the enumeration, as planned. We will continue to assess the Bureau's efforts to conduct a cost-effective and secure enumeration and look forward to keeping Congress informed of the Bureau's progress.

Chairman Culberson, Ranking Member Serrano, and Members of the Subcommittee, this completes our prepared statement. We would be pleased to respond to any questions that you may have.

Appendix I: Status of Development and Testing
for Systems in the 2018 End-to-End Test, as of
April 2018

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As part of its 2018 End-to-End Test, the Census Bureau (Bureau) plans to deploy 44 systems incrementally to support key operations from December 2016 through the end of the test in April 2019. These operations include address canvassing, self-response (i.e., Internet, phone, or paper), field enumeration, and tabulation and dissemination. According to the Bureau, a single system may be deployed multiple times throughout the test (with additional or new functionality) if that system is needed for more than one of these operations.

Table 1 describes the status of development and testing, and describes if a portion of functionality has been deployed for each system in the 2018 End-to-End Test. The table also describes key system deployment dates and the delay in these dates since August 2017.

Table 1: Development, Testing, and Deployment Status for the 44 Systems in the Census Bureau's 2018 End-to-End Test, as of April 2018

System name and description	Status of development	Status of testing	Expected/ actual first deployment date[a] (delay since August 2017)	Expected/ actual final deployment date[a] (delay since August 2017)	Has at least a portion of the system's functionality been deployed?
1. **Block Assessment, Review and Classification Application** Interactive review tool that is designed to assist an analyst in assessing a set of geographic work units.	Complete	Complete	December 2016	n/a	Yes
2. **OneForm Designer Plus** Tool that creates paper forms including decennial questionnaires, letters, envelopes, notices of visit, language guides, and other Decennial field and public materials.	Complete	Complete	March 2017	n/a	Yes
3. **Census Document System** Web-based system for requesting forms design services, publications and graphics services, and printing services.	Complete	Complete	March 2017	September 2017	Yes

Appendix I: Status of Development and Testing
for Systems in the 2018 End-to-End Test, as of
April 2018

System name and description	Status of development	Status of testing	Expected/ actual first deployment date[a] (delay since August 2017)	Expected/ actual final deployment date[a] (delay since August 2017)	Has at least a portion of the system's functionality been deployed?
4. MOJO Recruiting Dashboard System that provides a dashboard to show recruiting metrics.	Complete	Complete	March 2017	June 2018	Yes
5. Matching and Coding Software System that allows for clerical matching and geocoding during Non-ID Processing.	Complete	Complete	February 2018	n/a	Yes
6. Real Time Non-ID Processing System that matches addresses in real-time, geocodes addresses in real-time, and geo-locates housing units using web map services.	Complete	Complete	February 2018	n/a	Yes
7. Enterprise Censuses and Surveys Enabling (ECaSE) – Internet Self Response (ISR) Tool that supports self-response data collection by the Internet for respondents and by call center agents on behalf of respondents.	Complete	Complete	March 2018 (1-month delay)	n/a	Yes
8. 2020 Website Website for the 2018 End-to-End Test, the scope encompasses the Test's internet presence needs.	Complete	Complete	June 2018	January 2019	Yes
9. Master Address File/Topologically Integrated Geographic Encoding and Referencing System Database that contains, manages, and controls a repository of spatial and non-spatial data used to provide extracts to define census operations, provide maps, and support Web applications.	Complete	In progress[b]	December 2016	October 2018	Yes
10. Census Hiring and Employment Check Administrative system that automates the clearance processing of all personnel at Census Bureau Headquarters, the Bureau of Economic Analysis, The Regional Offices, the National Processing Center, and two Computer Assisted Telephone Interview sites.	Complete	In progress[b]	March 2017	June 2018 (4-month delay)[c]	Yes
11. Census Human Resources Information System Web-based personal information tool providing personnel and payroll information on desktops.	Complete	In progress[b]	March 2017	July 2018	Yes
12. Commerce Business System System that collects and reports labor hours and costs for the activities that the National Processing Center performs.	Complete	In progress[b]	March 2017	July 2018	Yes

**Appendix I: Status of Development and Testing
for Systems in the 2018 End-to-End Test, as of
April 2018**

System name and description	Status of development	Status of testing	Expected/ actual first deployment date[a] (delay since August 2017)	Expected/ actual final deployment date[a] (delay since August 2017)	Has at least a portion of the system's functionality been deployed?
13. Decennial Applicant, Personnel and Payroll Systems System that supports personnel and payroll administration for temporary, intermittent Census Bureau employees participating in the 2018 End-to-End test.	Complete	In progress	March 2017	July 2018 (11-month delay)[c]	Yes
14. Decennial Service Center Suite of systems to handle all IT service requests initiated by field staff.	Complete	In progress	March 2017	July 2018	Yes
15. Desktop Services Suite of systems that includes chat.	Complete	In progress	March 2017	July 2018	Yes
16. Recruiting and Assessment Tool that provides capabilities for applicant recruiting and the applicant pre-selection assessment process.	Complete	In progress	March 2017	July 2018 (5-month delay)[c]	Yes
17. Identity Management System System used to ensure that the right individuals have access to the right resources at the right times for the right reasons.	Complete	In progress[b]	March 2017	January 2019	Yes
18. Listing and Mapping Application Single instrument that enables field users to capture and provide accurate listing and mapping updates to the Master Address File/Topologically Integrated Geographic Encoding and Referencing Database.	Complete	In progress	July 2017	April 2018 (1-month delay)	Yes
19. Mobile Case Management Tool that provides mobile device-level survey case management and dashboards, and manages data transmissions and other applications on the mobile device.	Complete	In progress	July 2017	April 2018 (1-month delay)	Yes
20. Geospatial Services Tool that provides vintage imagery service, internal current imagery service, public current imagery service, mapping services.	Complete	In progress[b]	July 2017	July 2018	Yes
21. Service Oriented Architecture Enterprise software architecture model used for designing and implementing communication between mutually interacting software applications in a service-oriented architecture.	Complete	In progress	July 2017	July 2018	Yes
22. MOJO Optimizer/Modeling Service to optimize the field workers' routes.	Complete	In progress	August 2017	April 2018 (1-month delay)	Yes

System name and description	Status of development	Status of testing	Expected/ actual first deployment date[a] (delay since August 2017)	Expected/ actual final deployment date[a] (delay since August 2017)	Has at least a portion of the system's functionality been deployed?
23. Integrated Logistics Management System System to manage logistics and resource planning.	Complete	In progress	August 2017	July 2018	Yes
24. National Processing Center Printing Service that provides printing services for low-volume forms and merges static form and variable data, such as printing a standard form with unique addresses.	Complete	In progress[b]	August 2017	July 2018	Yes
25. Automated Tracking and Control Tool that provides customer, employee, and workflow management by automating business and support activities. It provides outbound call tracking for Geographic Partnership Programs and material tracking and check-in.	Complete	In progress	February 2018	July 2018	Yes
26. Concurrent Analysis and Estimation System System that stores data and uses it to execute statistical models in support of survey flow processing, analysis, and control.	Complete	In progress[d]	March 2018	n/a	Yes
27. Census Questionnaire Assistance Provides call center capability for self-response and assists respondents with responding to and completing census questionnaires.	Complete	In progress	March 2018 (1-month delay)	April 2018 (1-month delay)	Yes
28. Decennial Physical Access System System that maintains the photo and other information relating to providing physical access control to facilities. It also is used to generate badges for certain employees, including enumerators, listers, and Census Field Supervisors.	Complete	In progress[b]	March 2018	June 2018	Yes
29. Census Image Retrieval Application Application that provides secure access to census data and digital images of the questionnaires from which the data were captured.	Complete	In progress[b]	March 2018 (1-month delay)	July 2018 (5-month delay)[c]	Yes
30. Integrated Computer Assisted Data Entry Tool that captures paper responses from questionnaires.	Complete	In progress	March 2018 (1-month delay)	July 2018	Yes

Appendix I: Status of Development and Testing
for Systems in the 2018 End-to-End Test, as of
April 2018

System name and description	Status of development	Status of testing	Expected/ actual first deployment date[a] (delay since August 2017)	Expected/ actual final deployment date[a] (delay since August 2017)	Has at least a portion of the system's functionality been deployed?
31. Unified Tracking System Data warehouse that combines data from a variety of Census systems, bringing the data to one place where the users can run or create reports to analyze survey and resource performance.	In progress	In progress	December 2016	October 2018 (7-month delay)[c]	Yes
32. ECaSE – Field Operational Control System System that manages field assignments with routing optimizer, reviews and approves field worker's time and expense, and tracks field worker's performance.	In progress	In progress	July 2017	July 2018 (4-month delay)[c]	Yes
33. ECaSE Operational Control System System that manages the data collection universe for all enumeration operations, maintains operational workloads, and provides alerts to management.	In progress	In progress	August 2017	July 2018 (4-month delay)[c]	Yes
34. Sampling, Matching, Reviewing, and Coding System System that supports quality control for field operations.	In progress	In progress	August 2017	October 2018 (7-month delay)[c]	Yes
35. Intelligent Postal Tracking Service Mail tracking system developed by the Census Bureau and the U.S. Postal Service system to trace individual mail pieces during transit.	In progress	In progress	February 2018	July 2018	Yes
36. Control and Response Data System System that provides a sample design and universe determination for the Decennial Census	In progress	In progress	February 2018	October 2018	Yes
37. Census Data Lake Repository for response data, supports data ingest, and storage, and provides data access to reporting and analytics applications.	In progress	In progress	February 2018	January 2019	Yes
38. Decennial Response Processing System System that performs data processing on the raw response data and stores the final processed response data for long term storage.	In progress	In progress	March 2018 (1-month delay)	January 2019	Yes
39. Production Environment for Administrative Records Staging, Integration and Storage Tool that manages Administrative Records and provide services associated with those records.	In progress	In progress	March 2018 (1-month delay)	January 2019 (10-month delay)[c]	Yes

Appendix I: Status of Development and Testing
for Systems in the 2018 End-to-End Test, as of
April 2018

System name and description	Status of development	Status of testing	Expected/ actual first deployment date[a] (delay since August 2017)	Expected/ actual final deployment date[a] (delay since August 2017)	Has at least a portion of the system's functionality been deployed?
40. ECaSE – Enumeration Tool that captures survey responses collected by door-to-door enumeration, records contact attempts, and collects employee availability and time and expenses.	In progress	In progress	March 2018 (1-month delay)	July 2018 (4-month delay)[c]	Yes
41. Centurion Tool that provides an external interface for the upload of group quarters electronic response data.	In progress	In progress	July 2018 (4-month delay)	n/a	No
42. Fraud Detection System System that identifies fraudulent responses either in real-time or post data collection.	In progress	In progress	October 2018 (8-month delay)	n/a	No
43. Center for Enterprise Dissemination Services and Consumer Innovation Tool that will provide search and access to tabulated Census data.	In progress	In progress	January 2019	n/a	No
44. Tabulation Tool that receives post-processed response data and produces tabulated statistical data.	In progress	In progress	January 2019	n/a	No

Legend:

n/a = not applicable. These systems are only being deployed one time, so the first deployment date also represents the final deployment date.

Source: GAO analysis of Census Bureau data. | GAO-18-416T

[a]The dates listed for March 2018 or earlier should be considered actual dates.

[b]Bureau officials stated that testing for this system is complete; however, the Bureau has not yet provided documentation to support this assertion.

[c]According to officials within the Bureau's 2020 Census Systems Engineering and Integration office, the delay in the final deployment date for this system is due to a change in the timing of the operations it is supporting for the 2018 End-to-End Test.

[d]Although this system has deployed, one of its interfaces was still undergoing testing as of the end of March 2018

GAO Contact and Staff Acknowledgments

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