Report of the Independent Review of New Zealand's 2018 Census

Contents

Foreword

The census is a key part of New Zealand's data ecosystem. It provides data to support the drawing of electoral boundaries, underpins the development of government policy, informs decisions of firms and local and central government agencies, and is a resource for a range of research and academic purposes. Census data are also used as a frame from which samples are selected to conduct important social surveys. Usually undertaken every five years, the census is a large and complex operation and Statistics NZ is the government department responsible for its planning and delivery.

As has been widely reported, the 2018 Census struggled with response rates and has yet to deliver its first outputs. These are scheduled for 23 September 2019, 11 months later than planned. The delays have affected some key users of census data, and many have concerns about its quality.

As this report highlights, the 2018 Census represented a significant change from its predecessor in 2013. This change was consistent with international developments and the public-sector focus on digital services, and aligned with Statistics NZ's long-term census transformation strategy. We note that the Census was delivered at a time of broader change within Statistics NZ and that over that period the agency faced material disruption from the North Canterbury (Kaikōura) earthquake.

Many aspects of this Census went well. However, it is also clear that there were key components that were not successful, and unanticipated challenges resulted in a less than optimal outcome.

Once the seriousness of the lower-than-expected response rates became clear, Statistics NZ devoted significant energies to innovative remediation efforts. This work continues. As stated in its April 2019 media release, Statistics NZ has now confirmed that statutory requirements should be met and some key variables may exceed desired quality targets. However, there will be a number of variables for which results will fall below the quality threshold for publication as official statistics.

We also note the increased effort by Statistics NZ in working with Māori, through engagement both with Māori organisations on the ground and key iwi groups. Given the importance of the census to Māori in their position as Treaty partners, we note the need to deepen and strengthen these relationships.

It is our view that weaknesses in overall governance and strategic leadership at the programme level led to a series of decisions, some influenced by the North Canterbury earthquake, that when taken together ultimately compromised the achievement of the investment objectives and several important key performance indicators. It is also our view that some elements of the programme design introduced unnecessary complexity that made it difficult to execute and for citizens to respond.

In making these comments we do recognise the immense effort that many people have made to plan, design, and deliver the 2018 Census over a period of years. The magnitude of change introduced during one census cycle was extraordinary. Our report includes a number of recommendations and lessons learned. These cover the full census life-cycle and governance, and are designed to inform future censuses.

The issues with the 2018 Census have increased its visibility amongst users and the public. This presents an ideal opportunity for Statistics NZ to engage more broadly with New Zealanders on the importance of the census and on Statistics NZ's role in the broader data ecosystem.

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Executive summary

Following minimal-change censuses in 2006 and 2013, Statistics New Zealand embarked on a significant change journey with the 2018 Census. The design principles for the 2018 Census were feasible and were influenced by a successful methodology adopted internationally, particularly in Australia and Canada, beginning in the mid-2000s. The changes in approach were necessary to combat the increased costs of conducting a traditional census, and in response to pressure to remain relevant as well as improve the quality and timeliness of census outputs. The growing reluctance of citizens to participate was evident in declining response rates over time, while the availability and sharing of administrative data across government were ever-increasing.

For the 2018 Census, Statistics NZ's key investment objectives were:

1. To undertake a Census of Population and Dwellings in 2018 that meets statutory requirements;

2. To at least maintain the quality of census information compared with the 2013 Census;

3. To improve, by 20%, the timeliness of census information products released to users following a 2018 Census compared to that released following the 2013 Census; and

4. To reduce, over two full census cycles, the average cost of the census by 5.0%, starting in 2014 and using the 2013 Census adjusted for annual inflation at 2.0%.

To achieve these objectives, the 2018 programme introduced a new suite of interdependent IT systems. These systems were designed to support a redesigned process aimed at improving quality and efficiency using administrative data to support collection and processing operations. Supported by a much smaller field workforce, the new model relied on respondents understanding their role in completing the census questionnaires (both dwelling and individual), preferably online and without the assistance of a census worker. To ensure these changes were understood by citizens, Statistics NZ deployed a modern communications and marketing campaign with special engagement strategies developed to support the parts of the population who are traditionally low census responders. To improve the quality of the census, it was understood that increased participation and better response rates for these special populations were important, with particular focus on Māori, Pasifika, homeless, and youth populations.

Two of the four investment objectives listed above were not met and a third is likely to be very challenging. As such, it would be easy to conclude that the 2018 Census was not successful. However, there are important aspects of the programme that surpassed expectations and can be used as building blocks for the future.

What worked well?

The decision to partner with external vendors was a success as it allowed Statistics NZ to focus on the critical elements that can only be delivered by a statistical agency. NZ Post was able to deliver invitation letters to almost 80% of households (up from the original target of 70%). In particular, the Internet Collection System was secure, stable, and easy to use with over 80% of forms (dwelling and individual) completed online. Other examples and details are highlighted in the report.

Although challenges and delays occurred in the development of the IT systems, these systems along with an address register are now built and with changes from lessons learned in 2018, the systems and registers can be improved and fully integrated for future censuses.

The communications and marketing campaign exceeded all of its key performance indicators. Messages ensured the population, including targeted groups, was aware of the census and successfully encouraged online participation of the majority of the population.

Finally, remediation efforts and the innovative use of administrative data will likely result in Statistics NZ achieving one of its investment objectives. The knowledge and experience that Statistics NZ gained through its Census Transformation Project (started in 2012) became a critical factor in the organisation's ability to elevate the quality of the census dataset by combining census responses with administrative data information to create a census dataset that should meet statutory requirements and in some instances exceed desired quality targets.

What were the challenges?

The Census Programme Plan identified governance and alignment between projects, including interdependencies, as a programme risk. It is our view that the programme governance was overly complex and ultimately ineffective in guiding the programme to a successful outcome. The leadership at the programme level lacked strategic direction and effective programme management. The programme was managed using milestones rather than a critical path, which inhibited the ability of those in governance roles to see the critical

dependencies and associated risks that needed to be managed to ensure a successful outcome.

Although we believe the census programme had sufficient budget to carry out its stated plan, in hindsight we question whether additional funding would have been advisable to cover the inherent risks associated with the uncertainty of how the model would work in New Zealand and the magnitude of change. With little flexibility or contingencies built into the budget or the planning schedule, the risks began to mount as the programme encountered challenges with IT system delivery, tackled the implications of the North Canterbury earthquake, and implemented deviations from the planned collection model.

The development of the critical IT systems was already behind schedule when the significant earthquake struck North Canterbury in November 2016. With all Wellington-based staff displaced due to the damage of Statistics House, it took several weeks to re-establish essential services and months to stabilise systems that were rendered inoperable. At the time, discussions were held to consider whether or not to defer the 2018 Census. Ultimately the decision was made to proceed as planned and additional funding to support direct costs was partially provided. However, the disruptions related to the earthquake led to a postponement of the planned dress rehearsal in March 2017. The test was delayed by a month and its scope significantly decreased. No end-to-end test of the systems was conducted and there was no full test of critical changes to field operations such as list-leave and non-response follow-up. As a result, the test did not provide sufficient insights into how the new model would perform. The unknown risks associated with business processes and systems interdependencies were carried into production.

In 2016, the Australian Bureau of Statistics experienced a significant online incident on their census day. Statistics NZ's awareness of the Australian experience, combined with the delay in the delivery of IT systems and the inability to test as planned, drove a heightened focus on technology risks. This focus heavily influenced some other programme decisions and distracted attention from risks in other areas of design and process.

Although the decision regarding the census content was delivered on time, it was 10 months later in the census cycle than in 2011 and just eight months before census day. Concerns were raised about this timeline but no changes to the planning schedule were proposed. The timing left little time to finalise the questionnaire for both paper and online versions; the most significant impact was the downstream effect on the volume of paper that needed to be printed and its lack of availability for distribution for essential field operations.

Due to the lack of testing, Statistics NZ did not appear to fully understand how the various components of the model needed to work together to achieve success. The model is designed to encourage respondents to participate without the assistance of a census

worker (self-response). To do so, respondents must be provided with the tools they need to participate. In cases where mail service is not available, a census worker visits the household and leaves the material that allows respondents to participate in the census (list-leave). As such, paper is an important component; however, its value was underestimated. There was too much focus placed on the digital-first approach due to factors described above. This is evidenced by the decisions to remove paper and then contact from list-leave operations. This made it difficult for a significant portion of the targeted sub-population groups and special dwellings to complete the census. The aggressive reduction in the field workforce also meant Statistics NZ had a reduced capacity to respond when the response rate began to fall below acceptable tolerance levels.

A strong operational focus combined with a lack of knowledge and expertise in how to use data from the management information systems meant a less than effective response to mitigate issues as they arose during field operations. That led us to consider the role and responsibilities of the Chief Methodologist and statistical methodology, which in our view were unclear. Despite concerns being raised during the planning phase and particularly during collection operations, statistical methodology did not appear to have a significant influence on the decision-making process until remediation efforts began.

The efforts Statistics NZ deployed to improve engagement with special populations, particularly Māori and Pasifika, have been noted earlier. While these efforts raised awareness of the census, the strategies did not result in improved participation for many of the reasons mentioned above. It is our view that investments in ongoing partnerships with these key groups should focus on a co-design of collection strategies, education, and timing to meet the needs of these communities. A return to the traditional census approach (using census workers to collect the information) in some parts of the country should be considered.

Due to the lower-than-desired response rates, challenges naturally arose in data processing and evaluation. As a result, Statistics NZ was forced to delay the initial outputs of the census data to allow sufficient time to determine the best mitigation strategies to lift the quality of census data to meet statutory and user requirements. An external Data Quality Panel of experts was established in July 2018 to provide advice to the Government Statistician. This was a very important initiative that we endorse. The panel was initially due to report by the end of April 2019. Due to the length of time it has taken to fully develop the approach to augment the quality of the data, the panel continues to work with Statistics NZ and now expects to report at the time of the first release at the end of September 2019.

The 2018 Census was a large, complex operation that introduced unprecedented change and experienced significant challenges. Despite the fact that not all investment objectives were met, the programme did deliver important elements that can and should be used as building blocks for future censuses. We conclude that the project has not met all of its expectations and the delay in producing results and limited communication with users has led to stakeholder frustration and an erosion of trust, as evidenced by numerous public comments.

To reduce the frustration and rebuild this trust, the organisation should communicate clearly the measures it has taken to ensure quality in census data as well as its limitations, and share improvements it will adopt in future to restore the quality and timeliness of census outputs.

Our recommendations, key findings, and important lessons learned are summarised on the following pages. Details on the review of the programme are contained in the subsequent chapters.

Recommendations

Future censuses

1. Proceed with the next census as currently planned in 2023. We note there have been some calls for an earlier date of 2021. It is our view that a census before 2023 is unsafe – maintaining too much risk with insufficient time to properly redesign, test, and implement a plan for success.

2. Building on the innovative approaches adopted for the 2018 Census Statistics NZ should continue its longer-term strategy for the increased use of administrative data and plan the design of the next census accordingly. We note that it will be important to continue to build public acceptance for such an approach.

3. Ensure that funding provides sufficient contingency for risks inherent in a multi-mode self-response model and is at appropriate levels for meaningful engagement with special populations, particularly iwi and Pasifika.

4. Long-term planning for continuous improvements through incremental change over multiple census cycles should be considered.

Organisational governance

5. Establish an independent body responsible for advising the Government Statistician on matters relating to ethics, privacy, and security in relation to the use of alternative data sources in statistical programmes, including the census. This could comprise four to five members including, if appropriate, international experts. It should report formally each year to the Government Statistician with reports published.

6. Establish within Statistics NZ a Design Authority with responsibility for decisions on the design and stewardship of statistical surveys, including the census. For the census this would include approval of the model design. Any subsequent changes should be referred to the Design Authority for approval as part of a formal change request process. Any potential conflicts between the Design Authority and the census programme should be escalated to the Executive Leadership Team (ELT) for resolution.

7.   Revise the role and responsibilities of the Chief Methodologist position to report to the Government Statistician and be a member of the Executive Leadership Team (ELT). The Chief Methodologist should chair the Design Authority.

Programme governance

8.   Establish a single Census Programme Board with responsibility to govern all aspects of the census programme. Chaired by the Senior Responsible Officer (SRO), it should include external advisors as well as other representatives of the ELT. The General Manager, Census should report to the Census Programme Board and attend meetings but not be a member. The focus of the Board should be oversight of the census strategy and planning, key risks and issues, programme performance, contingency planning, and funding. Although the SRO is the decision-maker, the Board should be consulted on all significant decisions. Significant issues should be escalated to the Board from the General Manager, Census and SRO, and upwards to the Government Statistician and the ELT as appropriate. To prevent confusion no other groups within the census programme should be Boards – these can be teams, groups, or committees.

9.   Maintain a Census Programme Team with responsibility for the day-to-day leadership and execution of census operations. Led by the General Manager, Census, members of the team should be senior leaders from all key programme partners including IT, Statistical Methodology, Geography, Procurement, Finance, and the census projects. The Census Programme Team should report to the Census Programme Board through the General Manager.

Programme leadership

10. Strengthen the leadership of the census programme. Experience in managing large statistical programmes, strategic leadership, and the ability to foster an open and collaborative culture within the programme are critical capabilities. Each census should be resourced with succession for key roles in mind.

11. Ensure the programme plan identifies a critical path that enables effective management of dependencies and risks and provides for appropriate contingency planning.

Engagement and communications

12. Invest in capability, governance, and operational arrangements that facilitate greater collaboration with Māori as Treaty partners, both throughout the census life-cycle and in Statistics NZ's broader survey programmes.

13. The census programme should form partnerships with key community groups with a particular focus on iwi and Pasifika. This will enable implementation of a co-design approach to develop effective, targeted collection strategies for these groups. Strategies should consider full enumeration in some areas, for example South Auckland, Northland, and the East Coast, and appropriate timing for completion.

14. Engagement with key community groups should begin early and be continuous up to and after census day. The census programme should plan for ways to maintain the relationships between censuses.

15. The strategic communications plan for the census should include frequent updates, including collection response rates, up to scheduled publication dates, as required.

Design considerations

16. For the 2023 Census maintain the model planned for 2018 with appropriate changes taken from lessons learned in 2018. The following are ideas to be explored:

    • Consolidate collection instruments into a single form.

    • Determine the way in which response rates are calculated prior to collection activities.

    • Continue to work with the international statistical community to share lessons and test new approaches. Of particular interest is the work being done to include sexual orientation and gender questions in the census. Engagement with the rainbow community will ensure the wording of the questions and response categories will adequately capture the information required.

    • Explore the expanded use of administrative data to improve the collection strategy for large institutions and other non-private dwellings.

    • Review the size of the field force to ensure sufficient contingency for operational response when challenges occur in collection operations.

- Adjust programme timelines to allow sufficient time for testing and a full dress rehearsal.

- Procure third-party services earlier.

- Review the use of single secure access codes for households and pre-assembled paper packs to reduce complexity for the field force and respondents.

- Ensure sufficient paper forms (including bilingual forms) are produced and deployed in the field to fully enable list-leave operations, non-response follow-up, and where appropriate full enumeration. Provide sufficient buffer for a planned level of contingency.

- Review the systems and processes used in the Contact Centre to ensure that, if the service is retained, requests for paper and service to the public are processed in the most efficient and effective manner possible.

- Enhance the management reporting on collection progress and use it to strategically target follow-up efforts.

- Introduce daily progress/tolerance reports to the ELT during collection operations. These reports could move to weekly during processing and evaluation of data.

Key findings

1. The design principles for the modernised census were feasible and supported by international best practices. The modernised 2018 Census aligned with Statistics NZ's longer-term vision for its census programme and was consistent with the then Government's 'digital by default' approach and its vision for digital service delivery.

2. Two of the four investment objectives as outlined in the Focussed Business Case were not met and a third is likely to be very challenging.

3. Other important quality objectives and key performance indicators such as national, sub-population and small geography response rates were not met, and nor have the output measures been fully achieved.

4. The 2018 Census programme had sufficient budget to carry out its programme plan. Statistics NZ was diligent in the preparation of cost estimates, and the funding to address the impact of the North Canterbury earthquake was sought and partially provided. In hindsight, more funding for contingency to cover risks inherent in the new model as well as appropriate funding to deploy meaningful engagement strategies with special populations would have been advisable.

5. Leadership at the programme level lacked strategic direction and effective programme management. The programme struggled with project integration throughout the census life-cycle. There was a strong operational focus with optimism bias in reporting to external reviews and within the census governance. We could not find evidence of escalation of key decisions beyond the programme team to the relevant governance boards, including the ELT.

6. The scale of change and decisions on timing of key project deliverables meant that the schedule was always challenging with little time contingency. This was compounded by the North Canterbury earthquake and the significant disruption that resulted. Ultimately these factors combined to influence decisions made by the programme team that impaired the effectiveness of field operations and of initial responses to the lower-than-expected response rates.

7. The programme governance was overly complex and ultimately ineffective in guiding the programme to a successful outcome. Although there was clarity in its design as evidenced by the terms of reference for the various boards, there was confusion in the execution and decision-making process.

8. The roles and responsibilities of the Chief Methodologist and statistical methodology were unclear. Despite concerns being raised during the planning phase and particularly during collection, statistical methodology did not appear to have a significant influence in the decision-making process until remediation efforts began.

9. Despite the solid design, due to lack of testing, Statistics NZ did not appear to fully understand how the various components of the model needed to work together to achieve success. The model is designed to stimulate self-response by providing citizens with the tools they need to participate – in essence a multi-mode, not a digital-only, approach. In the case of the 2018 Census, there was too much focus on the online solution both in terms of communications and risk management.

10. Some decisions were made throughout the programme that aggravated an already high-risk operation. When issues arose, options were not always fully explored and adequate mitigation strategies were not developed.

11. The size of the field workforce was insufficient. Given the uncertainty of how the model would work in New Zealand, the initial targets were too aggressive and further reductions affected field operations.

12. Forced by the impacts of the North Canterbury earthquake and the late delivery of IT systems, the reduced scope of the 2017 Census Test provided limited insights into how the new model would perform, how online and paper approaches would work together, and the associated risks. The performance of new systems and the interdependencies were not able to be fully tested.

13. The apparent lack of understanding of how the model would perform led to deviations from the planned approach. The importance of paper in this model was underestimated. Inability to fully test the list-leave and non-response follow-up operations in the 2017 Census Test led to decisions during field operations that affected the results of the census. In addition, a lack of understanding and trust in the management information system led to a less-than-effective mitigation strategy to deal with the low response rates.

14. Due to a lack of field resources combined with the decisions to remove paper and contact from list-leave operations, targeted populations and dwellings were not properly equipped to fully participate. The strategies developed to increase participation, particularly for Māori, were not effective and in some cases not well executed.

15. Communications subsequent to census day have not been transparent about response rates and plans for treating gaps, and have left many stakeholders frustrated.

16. Despite introducing a tremendous amount of change and facing significant challenges, the 2018 Census programme achieved success on several key objectives that can be used to influence and guide changes to future census design.

   16.1 The decision to partner with external vendors who had the tools, skills and expertise to deliver specific components of the programme allowed Statistics NZ to focus on critical elements that can only be delivered by a statistical agency. These partnerships became even more important with the impact of the North Canterbury earthquake on Statistics NZ's operations in Wellington and its IT systems.

   16.2 The design and build of a new set of IT systems and processes was a significant achievement which will be of great benefit to future censuses.

   16.3 The Internet Collection System (ICS) was a success. It was secure, stable, and easy to use with over 80% of forms (dwelling and individual) completed online by the end of census collection operations. This well exceeded the expected target of 70%.

   16.4 The development of an address register and dwelling frame is an investment that should be maintained as a corporate tool, including the use of a structured change process to manage all updates.

   16.5 The communications campaign and marketing strategy exceeded all of its key performance indicators. Messages ensured the general population was aware of the census and successfully encouraged online participation. Awareness of the census reached targeted populations but unfortunately the awareness did not translate into action for all groups.

17. The innovative use of administrative data should lead to the achievement of the sole 2018 Census investment objective to be met. In 2012, Statistics NZ committed to exploring the use of administrative data for the census. The knowledge and experience gained through this research became a critical factor in the organisation's ability to elevate the quality of the census dataset by combining census responses with administrative information to create a census dataset that should meet statutory requirements.

18. Although the extensive use of administrative data in the 2018 Census was not planned, Statistics NZ has gained invaluable insight into how administrative data can be used, and its strengths and limitations. It undoubtedly advanced the research related to the long-term feasibility of delivering a census using administrative data.

Lessons learned

The following are some lessons learned that we hope add value as Statistics NZ embarks on the development of its business case for the 2023 Census. Some of these lessons can easily apply to other programmes across the organisation.

- When dealing with external stakeholders and partners, take an outside/in approach by involving them in a meaningful way through the planning, design, testing, implementation, and evaluation of the programme. We heard many good ideas during our interviews with stakeholders and an enthusiasm for involvement that can be beneficial.

- Keep things simple. Complexity adds risk and introduces confusion within the team, and to external partners and the public.

- Ensure that management accountabilities and the roles and responsibilities for all members within the governance structure are well defined, understood, and implemented.

- Develop a critical path with critical success factors to ensure programme coordination and effectively manage interdependencies at the programme level.

- Testing is critical. A comprehensive testing strategy including end-to-end integration testing of all systems and processes is necessary. Plan for sufficient time to conduct the tests and make necessary adjustments before going into production.

- Build management information systems that produce reliable, meaningful results that can be trusted and used effectively.

- Nurture an environment that is open to innovation and receptive to ideas, concerns, issues, and criticism. Many risks can be mitigated through this open challenge culture.

- Large complex programmes inherently carry a level of risk. Problems will occur so plan for the worst and execute for success. Ensure the risks are well documented and monitored with agile mitigation strategies in place (tested) and ready to be deployed. Develop executable contingency plans for the key risks relating to IT and field operations failure.

- With the increased use of administrative data and Statistics NZ's evolving role in the country's data ecosystem, the importance of statistical methodology cannot be underestimated.

- Statistical methodology needs to take ownership of the design and monitoring of the census model.

- Structured and formal peer review ensures that programme design is sound and implementation strategies are feasible.

- The use of external vendors is an effective way to bring in the necessary expertise, skills, and knowledge to mitigate risk in large projects. The development of an organisational Contract Management Policy, procedures and templates as well as a Contract Management Plan will help strengthen the management control environment. All contracts with the vendors need to have clearly defined outputs and established timelines and must be carefully managed.

- Continual investment in innovation, research and development directly benefit the census. Incremental change in each census can avoid the necessity for more significant change in any one census, thereby reducing design and execution risk.

Introduction

1. Background

Statistics New Zealand, branded as Statistics NZ or Stats NZ, is New Zealand's official data agency. Its activities are guided legislatively by the Statistics Act 1975. Statistics NZ plays a crucial role in New Zealand's data ecosystem. In recent years it has embarked on a transformational journey to increase the value of data to decision-makers, including responding to the needs of governments to support evidence-based policy making.

As the national statistics office, Statistics NZ is also entrusted by governments and the people of New Zealand to lead the Official Statistics System. In this role it is responsible for providing official statistics that are the result of a careful statistical production process that delivers reliable, impartial results.

A key element of the statistical production process is the conduct of a population and dwelling census every five years. This is not a trivial operation. In most developed countries, the census programme is the largest single programme in the statistical system and for some, the largest peace-time operation undertaken by government. In any one census cycle the cost of a census will absorb around 9% of Statistics NZ's annual budget, rising to around 33% in the year in which census collection operations occur.

The 2018 Census, built on international trends and lessons learned from a small trial in the 2013 Census, planned to use technology, supplemented by traditional collection methods – a 'digital first' census. In the days following the census date of 6 March it became clear that response rates were not as high as expected. In Statistics NZ's 2018 Annual Report it was noted that full or partial responses had been collected for 90% of the estimated population (compared with 94.5% in 2013).

The low response rate created concerns about the time it would take to finalise the census and the potential reliability of the outputs relative to users' expectations.

2. Purpose and scope of the review

The Government Statistician initiated this independent review in October 2018 to focus on the factors that contributed to the lower-than-expected response rate in order to understand the lessons that can be learned to inform future censuses and surveys.

The scope of the review covers the census life-cycle, including planning, design, governance, funding, implementation, risk management, stakeholder responsiveness, communications, and engagement. We were asked to consider the responsiveness of the census to te ao Māori and the Crown–Māori relationship under the Treaty of Waitangi in relation to census design and implementation. We were also asked to consider the impact of the design and implementation approach on participation with a particular focus on Māori, Pasifika, disabled people, the LGBTQ+ communities, people living in lower socio-economic areas, remote communities, young people, and senior citizens.

The final report on the outcomes of the review is due in July 2019.

The terms of reference were issued on 15 October 2018 and are included in Appendix 1 to this report.

3. Approach and report structure

Our approach was to define a baseline for a typical census based on international best practices, which then provided the basis for reviewing the phases, tasks, and deliverables of the 2018 Census programme.

We phased our approach. We began with the review of several documents from which we developed a number of lines of inquiry. This was followed with structured interviews of key people within Statistics NZ, external stakeholders, community groups, census data users, central agencies, and Ministers. We also met with representatives of the Iwi Data Leaders Group and twice with the external Data Quality Panel. Additional information was sought as needed.

We have included a list of the information sources in Appendix 2.

After reviewing the context for the 2018 Census in Chapter 1 we have structured this report in four parts. The first part follows the census life-cycle, from determining needs, through design and methodology, development and testing, collection, processing and analysis, dissemination, and evaluation. The second part focuses on the cross-programme activities that support effective execution – such as governance, leadership, management and culture,

stakeholder engagement and communications, use of third parties, risk management and assurance, costs and benefits management, and central agencies and Ministers. The third part documents key decisions that we believe had a significant impact on the outcome of the programme. Lastly we review the remediation phase.

Our findings in each section are outlined as we go, and our key findings are summarised in the executive summary.

We have included a short glossary of technical terms in Appendix 4.

4. Acknowledgements

We would like to thank all those who have made time to provide input into this review. In particular we acknowledge the many managers and staff at Statistics NZ, the external stakeholders, suppliers, field staff, agency officials, international statistical organisations, the Iwi Data Leaders Group, and members of the Data Quality Panel who have contributed their time. We also thank the Ministers of Statistics, past and present, who made themselves available to us.

We were supported throughout the review by a small secretariat provided by Statistics NZ. They have been vital to the conduct of the review and we thank them for their efforts.

We received full cooperation from Statistics NZ and were provided with access to information and people as requested.

Chapter 1: Context

1.1 What is a census?

The Organization for Economic Cooperation and Economic Development (OECD) defines a census as 'the total process of collecting, compiling, evaluating, analysing and disseminating demographic, economic and social data pertaining, at a specified time, to all persons in a country or in a well delimited part of a country'. (Nations, 1998).

The New Zealand Census of Population and Dwellings is defined as the official count of how many people and dwellings there are in the country at a set point in time. It provides an official count of people, along with detailed demographic and socio-economic characteristics produced at community levels and for small populations.

Section 24 (1) of the Statistics Act 1975 requires Statistics NZ to obtain the name, age, sex, and ethnicity of every occupant of a dwelling as well as the address, location, number of rooms, ownership, and number of occupants of a dwelling on census night. Everyone who is in New Zealand on that night, including visitors, must complete a census form.

1.2 Who are the users?

The reasons for taking a census vary with the needs of each country. For example, much information is needed for planning, policy, and programme development to improve health, literacy, education, income, and housing. Census data are also used to determine the representativeness of legislative bodies, the number of persons eligible to vote, and the areas or groups that have a claim to benefits deriving from the state. Comparisons of successive censuses show changes in the size, characteristics, and location of the population.[1]

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1   'Census', International Encyclopedia of the Social Sciences, https://www.encyclopedia.com

In New Zealand, the census is used to determine the number of general and Māori electorates, as well as redrawing the electorate boundaries after each census to ensure the number of people in each electorate reflect changes in population and that electorate names remain relevant.

In a study commissioned by Statistics NZ (Bakker, *Valuing the census*, c.2014), the author describes the uses of the census as diverse, with many applications that are indirect or embedded in other products and tools. He suggests that for information at the level of overall population counts with demographic characteristics, the census data underpin long-term forecasting such as New Zealand's long-term fiscal position and the requirements for growth-related infrastructure and housing. More detailed levels of information, for example at the level of geographic meshblocks, allow firms and government agencies to better understand patterns and relationships such as achievements and earnings of young Māori people.

In August 2017, New Zealand's Disability Issues Minister welcomed Statistics NZ's decision to include questions on disability in the 2018 Census. 'Having up to date and meaningful data is critical for understanding the experiences of disabled people as well as informing policy development and service planning. Along with information gathered from talking to disabled people about their experiences, census data will be used to develop outcome measures for the New Zealand Disability Strategy 2016–2026.'

A wide range of people, from varying levels of government to private sector companies, from community groups and academic researchers to the general public, use census data. Census data help governments plan for the future at all levels. For example, an understanding of trends associated with population growth and changing demographic characteristics help determine where facilities (such as hospitals and schools) are located and services are provided. For example, to support local health-care services throughout the country, the Ministry of Health uses census data to allocate funds to the 20 District Health Boards.

1.3   Recent history

Section 23 (1) of the Statistics Act 1975 (amended in 2011) requires that a census of population and dwellings be conducted in the year 2013 and every five years thereafter.

The first census was held in 1851 and since 1877 has been conducted every five years with three exceptions: during the Great Depression and the Second World War, and in 2011 as a result of the Christchurch earthquake.

At the time of the Christchurch earthquake all of the preparation for the 2011 Census had been completed. Even though 25% of forms had been delivered, Statistics NZ called off the census 11 days prior to census day, due to the national state of emergency. It should be noted that Statistics NZ has much of its census operations based in Christchurch. Although it was directly impacted by the earthquake, Statistics NZ was well positioned to deliver a census that was ultimately deferred until 2013. The decision to defer the census was not taken lightly, as changing the census timing does have impacts on the comparability of data that are used for time series analysis.

Traditionally the census was undertaken by distributing paper forms to all households and collecting them using an extensive field workforce. Individuals completed dwelling and individual forms manually.

A digital process using online collection was first explored in 2006, with a 7% usage rate. In 2013, in addition to the option for online collection, a self-response process with mail-out was trialled in Ōamaru and this yielded reasonable results. Aside from the residents of Ōamaru, all households received paper forms and an online code, which were distributed and the paper forms collected using the traditional field operations workforce. The total online take-up rate for 2013 was 34%. The online forms that were available in 2006 and 2011/13 had little online functionality.

Planning for the next census starts prior to the dissemination of the current census outputs. This was the case for the 2018 Census. Given the positive experience with the online trial in Ōamaru and following similar international trends, the overall intent was to transition to a self-response model supported by targeted non-response follow-up and a strong public communications campaign. This became known as a 'digital first' census.

1.4   International trends

Internationally, Statistics NZ is a member of the OECD, the United Nations Statistical Commission, and the Conference of European Statisticians (CES). The CES produces standards, guidelines, and recommendations aimed at improving statistical work in the United Nations Economic Commission for Europe (UNECE) and worldwide. The work of the CES is guided by the vision and direction of the CES Bureau. New Zealand's Government Statistician is one of eight members of the Bureau, elected from within the 60 countries participating in the CES.

Traditionally, the definition of a census has been based on the principles of individual enumeration, simultaneity, universality, and defined periodicity. Increasingly over the past 20 years, different methods have emerged across the world responding to societal changes and the growing cost pressures. With the proliferation of different census methodologies, it is the census information output that has become the international focus for comparison rather than the way in which the information has been collected.

Several factors have contributed to the introduction of these new methodologies. The first common factor is the continued and increased cost of conducting the traditional method of field enumeration of all individuals as the population grows. The second factor is the speed at which technology is changing, the rapid adoption of social media, and the growing demand for current information to be produced quickly and efficiently. The third factor is the increased burden the census has placed on citizens at a time when the availability and sharing of administrative data across government is increasing. The growing reluctance of respondents to participate has resulted in overall declining response rates, nationally as well as for vulnerable segments of the population and small geographies.

Figures 1 and 2 below provide comparative international census response rate trends for Australia, Canada, New Zealand, and the United Kingdom (UK). Figure 1 shows response rate comparisons for dwellings and Figure 2 shows population response rates. Please note that the rates provided for New Zealand in 2011 are for the 2013 Census, and for 2016 they are preliminary rates as of July 2019 for the 2018 Census. In addition, the UK conducts a census every 10 years. As a result, comparative rates for the UK are only available for 2001 and 2011.

Figures 1 and 2: International Census Response Rates

Figure 1: Census Dwelling Response Rates

Figure 2: Census Population Response Rates
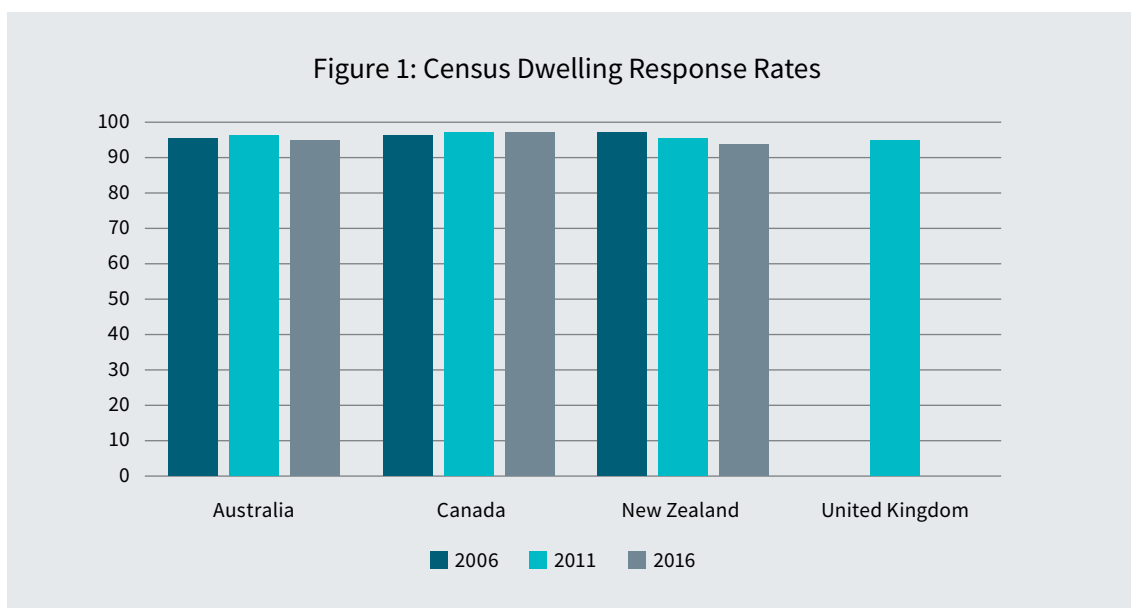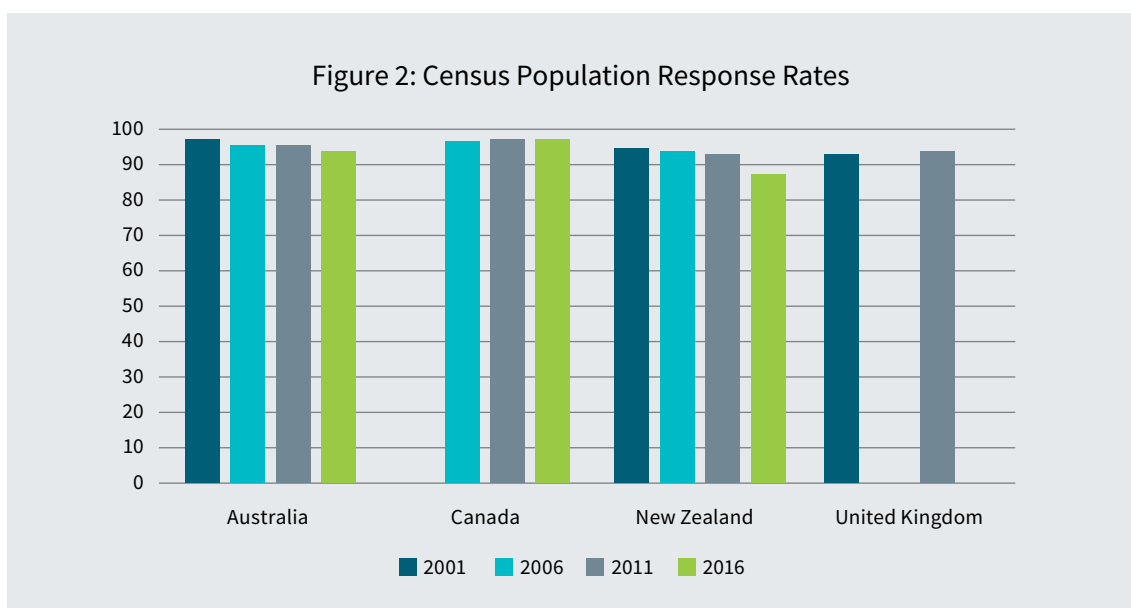
A variety of census methodologies are now recognised and supported by the United Nations. In some countries, such as Denmark, Finland, Sweden, and the Netherlands, the traditional census has been replaced by the use of up-to-date population registers. In these countries, it is the responsibility of each citizen to report life changes such as births, deaths, and movement within or between countries. Since the mid-2000s, countries such as Canada and Australia have replaced the traditional census method with a hybrid methodology that offers citizens a variety of response channels (based on user preferences) aimed at maximising self-response through a wave of customised communication stimulants. Methodological models are used to determine sufficient responses at all levels of geography and alternative (administrative) data sources are used to replace information collected directly from respondents.

Until recently, the census in most countries was managed as an independent programme within the statistical office, building and maintaining its own systems and processes and hiring its own workforce. It was financed separately, taking into account the cyclical nature of its operations. With many national statistical offices looking to modernise their operations, reduce costs and respondent burden, improve the quality and timeliness of outputs, and effectively use information collected by government, it makes good business sense to maximise the investments in the census programme to enhance corporate capability of the entire statistical system and vice versa. Internationally, an initiative sponsored by the UN entitled High-level Group on the Modernization of Official Statistics has been formed to share best approaches and examine ways to achieve these common objectives.

1.5   Census 2018: a new approach

Following minimal-change censuses in 2006 and 2013, Statistics NZ recognised the need to modernise its census approach to remain relevant and to be sustainable over time. The content of the census questionnaire had not been updated since 2001 although minor changes to the wording of questions were introduced to improve data quality.

In June 2014, Cabinet approved funding for a modernised 2018 Census based on Statistics NZ's Focussed Detailed Business Case (14 June 2014). The drivers for change reflected the challenges in New Zealand and aligned with international trends articulated in the previous section.

In September 2016, Statistics NZ published its 2018 Census Strategy paper. The paper documented the intention to introduce mail-out to engage the population and make the internet the primary response channel. It also documented the need to expand communication strategies to inform New Zealand's citizens of the change in the collection process. Given the magnitude of change to be introduced and the risk associated with maintaining the quality of census counts, it recognised the need to adopt a thorough development and testing programme.

The 2018 programme introduced significant change to the census processes, methodologies, systems, and tools with seven strategic goals:

1. Improve data quality while modernising – maintain high coverage and response rates and address sub-national variation in response rates

2. Reduce the cost of collection operations

3. Contribute to corporate capability – collaborate in and contribute to modernisation across a range of Statistics NZ projects

4. Increase the use of administrative data

5. Make digital engagement easy

6. Adopt test-driven development

7. Deliver customer-driven products and services.

1.6 Key objectives and key performance indicators

At the planning stage of each census the key objectives and key performance indicators (KPIs) are agreed and laid out in the business case. For the 2018 Census the key investment objectives were:

1. To undertake a Census of Population and Dwellings in 2018 that meets statutory requirements;

2. To at least maintain the quality of census information compared with the 2013 Census;

3. To improve, by 20%, the timeliness of census information products released to users following a 2018 Census compared to that released following the 2013 Census; and

4. To reduce, over two full census cycles, the average cost of the census by 5.0%, starting in 2014 and using the 2013 Census adjusted for annual inflation at 2.0%.

These were not unreasonable objectives and they were subject to much analysis in the aforementioned Focussed Detailed Business Case. In particular there was considerable discussion of the level of funding and whether the cost constraint embedded in the fourth objective was achievable. At that time the total funding level in the business case was $118.9m ($111m being operating expenditure and $2.5m for census transformation). A revised Quantitative Risk Analysis (QRA) undertaken for Statistics NZ by Broadleaf in May 2014 revealed a potential further $6.4m cost to deliver the 2018 Census, bringing the total estimated cost to $125.3m. The main cause of the cost increase was an additional $3.0m for personnel. A further $0.7m capital cost was also identified. Statistics NZ then reduced some project costs and identified options to absorb some cost pressures with their baseline operations, resulting in a $3.0m reduction in overhead costs. Importantly the business case concluded that 'whilst recognising the risks identified by the QRA, Statistics NZ remains confident it can successfully deliver the modernised 2018 Census within the Budget 2014 appropriation of $118.9M and is not seeking additional funding'.

At the programme level there is a detailed set of approximately 50 KPIs encompassing targets for accuracy (coverage, response, communications), relevance, coherence, accessibility, timeliness, interoperability, and efficiency. A summary of the more important KPIs and actual results are set out in the three tables below.

Table 1 depicts the coverage and response rate targets for 2006, 2013, and 2018. There were no targets established in 2006. For the purpose of this comparison the 2013 targets were used to assess the rates achieved for both 2006 and 2013, which are final. For 2018, the rates

achieved are interim, as of July 2019. These rates will be finalised with the results of the Post Enumeration Survey, expected in March 2020.

Table 1: Coverage and quality KPIs

	2006 Target	Achieved	2013 Target	Achieved	2018 Target	Interim
National population net coverage rate	98.0%	98.0%	98.0%	97.6%	98.0%	98.6%
Sub-group coverage rates						
– Māori	97.0%	96.9%	97.0%	93.9%	96.0%	96.0%
– Asian	97.0%	94.8%	97.0%	97.0%	96.0%	97.3%
– Pasifika	97.0%	97.7%	97.0%	95.2%	96.0%	96.1%
– 15–29-year-olds	97.0%	95.9%	97.0%	95.2%	96.0%	96.3%
National population response rates	95.0%	94.5% (95.1%)	95.0%	92.2% (93.2%)	94.0%	83.3% (87.5%)
Sub-group response rates						
– Māori	94.0%	93.1% (93.7%)	94.0%	88.5% (89.7%)	92.0%	68.2% (74.3%)
– Asian	94.0%	91.0% (92.1%)	94.0%	91.7% (93.3%)	92.0%	81.7% (87.8%)
– Pasifika	94.0%	92.4% (93.9%)	94.0%	88.3% (90.8%)	92.0%	65.1% (73.5%)
– 15–29-year-olds	94.0%	91.9% (92.8%)	94.0%	88.5% (90.3%)	92.0%	75.0% (81.1%)
Household collection rate threshold* at SA1** level	100%	96.3%	100%	89.2%	100%	75.7% (80.2%)
Population collection rate threshold at SA1 level	Not a KPI		Not a KPI		100%	36.4% (59.9%)
Item non-response for priority 1 variables	<1.0%	<1.0%	<1.0%	Target achieved for 2 of 3 variables	<1.0%	Target achieved for 5 of 6 variables
Item non-response for priority 2 variables	<5.0%	Did not achieve target for 4 variables	<5.0%	Target achieved for 6 of 7 variables	<5.0%	Target achieved for 21 of 26 variables

* % of subdistricts that reached the 90% threshold

** SA1 is an output geography that is created by joining meshblocks

Coverage and quality

The coverage rates indicated above are post-imputation, including the addition of information from administrative data sources. The interim results achieved show an improvement over the 2013 Census for national and sub-group coverage rates. In most cases targets were met or exceeded.

Response rates

The response rates include all responses received directly from respondents during census collection activities, online and paper. This is internationally referred to as 'collection response rates'. The figures in brackets represent an alternative measure that includes partial responses and is more aligned with international reporting standards. A partial response is when either a) a dwelling form was received but all the expected individual forms were not; or b) an individual form (or forms) was received but not a dwelling form.

The response rates show a different story from the interim coverage rates. National and sub-population rates show a significant decline from previous censuses with no targets met and the number of partial responses significantly increased. The percentage of subdistricts that met the 90% household collection threshold also dropped dramatically in 2018 following a decline in 2013.

In addition to the information contained in Table 1 above, analysis of response patterns by mode (online and paper), geographic region, age, and sex as well as complete and partial responses was conducted during the review. It is expected that detailed information will be made available to the public when census data is released by Statistics NZ.

Priority variables

According to the 2018 Census Data Quality Management Strategy, information collected in the census is divided into three priority levels. A list of quality priority variables can be found in Appendix 3.

Priority One variables are given the highest priority in terms of quality (accuracy, relevance, timeliness, consistency, interpretability, and accessibility), time, and resources across all phases of the census. These core census output variables are required to produce population and dwelling counts and required for electoral needs. The target was met for five of the six priority variables. This is a similar outcome to the 2013 Census.

Priority Two variables are given the second-highest quality priority across all phases of the census. These variables include information about population groups of high public interest; data that are important for policy development, evaluation, and monitoring; and data that are closely linked to and frequently used with priority one variables (i.e., in cross tabulation). The target was achieved for 21 of 26 priority two variables, which is also similar to previous census outcomes.

Priority Three variables include data that are important to certain groups and data that can be used to create frames for high-quality sample surveys.

It should be noted that minimum quality standards have to be met to ensure the output data in all three priority levels is fit for purpose. Detailed information about the quality of data will be released by Statistics NZ at the time of census releases. We also expect the external Data Quality Panel to comment on the quality of the three priority variables.

Table 2: Self-response, online, mail-out, and output KPIs

	Target	Achieved
Self-response of full households by end of reminder phase	70%	73.48%
Forms (dwelling and individual) completed online by end of census collection operations	70%	88.0%*
Mail-out of internet access codes to NZ dwellings	70%	79.7%
Undeliverable mail	3%	2.27%
Clean unit record file delivered	CD** + 5 mths	Not met
Output datasets and tools ready for use with Stats NZ	CD** + 6 mths	Not met
First release of census data within Stats NZ published	CD** + 7 mths	Not met

* This includes all forms received for those in private dwellings. 71% of the population completed an individual form online.

** CD is census day (6 March 2018).

Table 3: Communications KPIs

	Target	Achieved
General population aware the census is coming	95%	97%
General population aware that they can complete the census online	85%	96%
General population reach of communications	95%	99%
Māori aware the census is coming	80%	95%
Young working-age people aware the census is coming	80%	91%
Cultural/language barrier populations aware the census is coming	80%	89%
Target response groups reach of communications	95%	95.3%

The overall results tell a story of a successful awareness-communication campaign and better-than-expected self-response rates (online and full households by end of the reminder phase) that did not result in achievement of the desired response rates at the national or sub-population levels. The output-related KPIs, including geographical output, were also not met.

The three graphics in Figure 3 below show the trends for dwelling (household), individual, and online response rates throughout the collection period. The rates shown include complete and partial responses (as defined above). Tolerance is defined as an expected level of response at a given point in time that will lead to the achievement of the response rate target by the end of the collection period.

Figure 3: Response rate trends from the Management Information System (MIS)

Cumulative On-line Response Rate
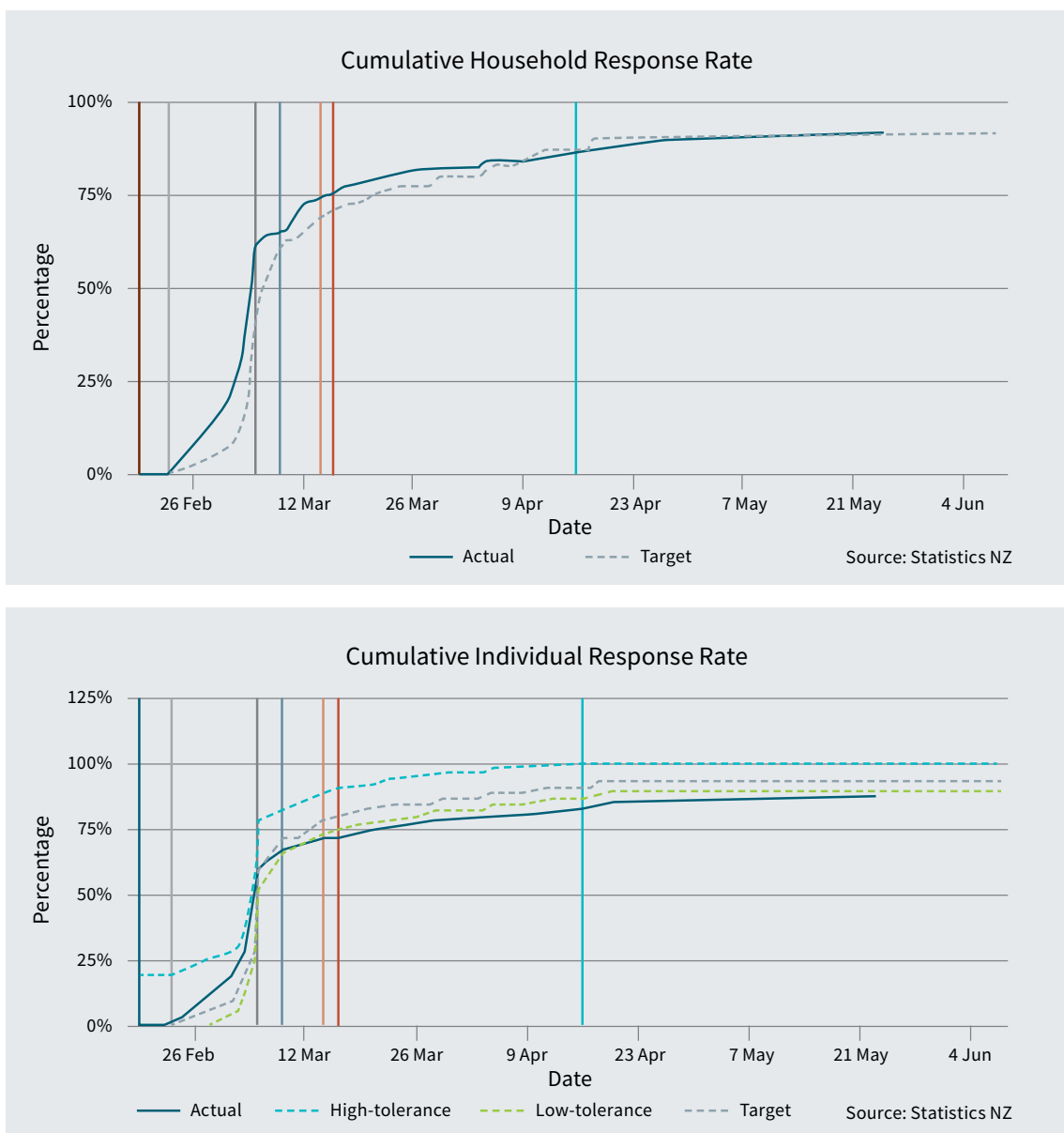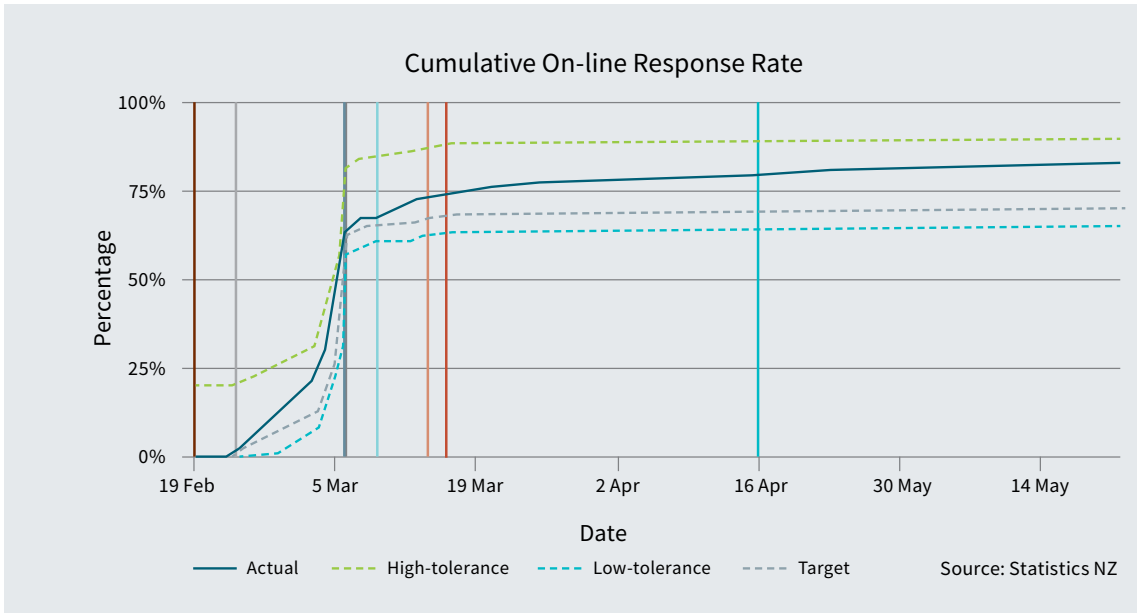
The graphics show response rates for dwellings generally trending above or at target throughout the entire collection period. Similarly, the response rates for online show responses above the low tolerance level before, on, and following census day exceeding target expectations. The individual response rates graphic tells a different story. It shows this response rate on track at the beginning of the collection period and then slipping below the target level just before census day and tolerance levels in the subsequent days. This response rate never fully recovered to tolerance level and as a result, the response rate target for individual responses was not met.

Chapter 2:
The census life-cycle

In this chapter we review and comment on the census life-cycle. We identify a number of key decisions that resulted in a deviation from the model design and in our view impacted collection operations and census outcomes. Each of these decisions is explored in more detail in Chapter 4: Key decisions.

The 2018 Census business process followed the internationally adopted Generic Statistical Business Process Model.[2] The census business process features seven phases: needs; design and methodology; develop and test; collect; data processing and analysis; dissemination; and evaluation.

Five general principles and seven high-level assumptions guided the design and development of the 2018 Census programme.

General principles
1. Digital first by design
2. Marketing and communications strategies will be implemented to maximise self-response
3. Partner with external vendors to provision and support operations
4. Use and integrate with enterprise statistical architecture
5. Data is managed as an asset
6. English and bilingual respondent materials will be provided

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2   UNECE, The Generic Statistical Business Process Model GSBPM (Version 5.0, December 2013), http://www1.unece.org/stat/platform/display/GSBPM/GSBPM+v5.0

High-level assumptions
• Field staff numbers will be reduced to 3,000 and the field structure will be revised.
• 70% will be in mail-out areas, receiving their census material via the post.
• 17% will be in list-leave areas where field staff list addresses and leave census material at households without contact.
• 13% will be specially enumerated where contact will be made to deliver census material using the traditional method.
• There will be a 70% online take-up.
• There will be 100% canvassing of mail-out areas.
• The first release of the census data will be August 2018.

2.1 Identify needs

As mentioned earlier, the census is used to determine the number of general and Māori electorates and redrawing the electorate boundaries. To do so, some information collected in the census is required by law. However, to ensure it continues to provide high-quality information to a broad range of users, content of the census can and should change as the societal and economic landscape evolves. Identifying what changes should be considered for the 2018 Census began with a multi-phased plan to engage with external stakeholders.

Content consultation

With minimal change to census questions since 2001, extensive consultation was required to ensure the census was gathering information that was relevant for its users. Through a series of face-to-face meetings, workshops, and an online submission process, Statistics NZ gathered input and feedback from key stakeholders and the general public on a proposed set of questions that was developed using the results of 2006 and 2011 consultation processes as well as international trends. Stakeholder engagement began in November 2014 with online public consultation occurring in May–June 2015.

In addition to this process, Statistics NZ also considered the following in determining the final census content:

• whether information needs could be met from other data sources;

- research and testing including cognitive testing of questions, mass completion tests, and two large-scale tests in 2016 and 2017; and

- questionnaire constraints, real-world change, respondent burden, classification reviews, and international trends.

The *2018 Census Report on Final Content* (Statistics NZ, July 2017) outlined the changes to the census content aimed at improving relevance and quality.

The changes appear to have met user expectations, with the exception of the rainbow community. New topics to be considered in the 2018 questionnaire were tested, including questions regarding sexual orientation and gender identity. Following both cognitive and public testing in 2016 and 2017, Statistics NZ determined it would be unable to guarantee the quality of the information collected through the census and as a result decided not to retain them for inclusion in the 2018 questionnaire. We note that this challenge is not unique to New Zealand. Internationally, the Conference of European Statisticians continues to explore the best ways to collect this information, particularly through the census programme.

2.2 Census design and methodology

The design of the new census model began with a suite of census design questions that were developed in 2015. The four key areas of design change identified were: develop and implement an address list and frame; optimise self-response; re-engineer field processes; and re-engineer processing.

These changes were supported by the development of enterprise-wide systems and, where possible, the use of administrative data. A test-driven approach was adopted to test and refine the thinking required to guide the development of the census methodology. The design questions were further developed into design principles in 2017.

As foundational building blocks, the design questions and principles are essential for the development and testing of all census processes. However, it is our view that the development of these pieces was too late in the census cycle to effectively drive decision-making across the programme.

Three detailed programme plans were developed and approved by the General Manager, Census (as Programme Manager) and the Senior Responsible Owner (SRO) in April 2015, June 2016, and June 2017 with detailed change requests to overall programme plans documented and approved by the SRO. It was noted during our interviews that the plans were slow to be developed and not used effectively to manage the programme interdependencies.

Address list and dwelling frame

A critical component of the new census approach was the use of an address register that allowed households to be enabled, reminded, and visited during collection operations. Statistics NZ used the newly created Statistical Location Register, a Statistics NZ enterprise project, to help build its complete list of addresses. An address canvassing operation was completed by field staff in 2017 to update the address list by identifying and confirming the validity of all residential addresses. The address list was used to mail out census materials, identify dwellings to be included in list-leave operations, and support targeted field operations.

Following the address canvassing operation, the improved address list was a determining factor in the decision to augment the mail-out of census invitations to 80% of dwellings rather than the original target of 70%. As a result, the decision was also taken to reduce the field workforce target from 3,000 to 2,300, which influenced the area design and mode of assignment for the field workforce.

From the address list, a Census Dwelling Frame was created. The Census Dwelling Frame contains the dwelling type and dwelling status of all dwellings in New Zealand on census night (including non-private dwellings).

The development of the address list was on time but, as stated in the project closure report, was ultimately delivered too late. Due to the lack of time to clean various input sources, the number of duplicate addresses caused challenges during field operations. Duplicates were caused by different groups providing updates to addresses and occupancy status using multiple sources. There was no change control process to manage the changes consistently and as a result, different versions of the address list were produced.

Another operational challenge was the quality of information to support the enumeration of non-private dwellings (NPDs). As noted during our interviews, pre-enumeration of NPDs did not result in a complete or accurate NPD address list. As a result, the quality of the frame used to support this collection activity was inadequate. A lack of resources (both workforce and insufficient paper packs) led to several NPDs not enabled by census night. In some NPDs that meant the opportunity to collect information was missed as their residents can be a transient population.

Despite the challenges in field operations, the construction of an address register and dwelling frame was an accomplishment. Now that the register and frame have been constructed, it will be important to actively maintain them. A change control process should be introduced to ensure updates are captured in a consistent manner to one corporately managed frame.

Optimise self-response

To optimise self-response, citizens must be provided with the tools and instructions they need to respond without a census worker knocking at their door. Statistics NZ adopted a 'digital first' strategy encouraging respondents to complete their census questionnaires online, although paper questionnaires were available (generally upon request) to those who chose not to or could not complete their census online. To support this approach, Statistics NZ developed a communications campaign to promote the census and inform citizens what needed to be done. Community engagement plans were developed to support hard-to-reach populations. All online and print forms were available in a bilingual format (English and te reo Māori).

Statistics NZ secured Telnet to provide support to the public through the 2018 Census Contact Centre. The Centre was open from 19 February to 22 May 2018 with printed instructional material and services provided in multiple languages including English, te reo Māori, Cantonese, Mandarin, Samoan, Korean, Tongan, and Hindi. During this period, the Centre recorded approximately 400,000 interactions with the public. Of the total contacts, 47.8% were taken by agents over the phone. 49% of the operator-assisted calls were general census enquiries with 41% requesting access codes or paper forms.

A review of the call logs confirms there were two issues that affected public access to the contact centre. The first was on 26 February when over 10,000 people contacted the centre in the first hour of operation. Wait times averaged over 1:15 minutes with some callers waiting up to 2 minutes. By 11 a.m., Telnet added more staff and ports to handle the unexpected volume, and wait times reduced to below 45 seconds.

The second incident occurred the day before census day. From 9 to 10:30 a.m. the wait times increased and then the server went down. According to Statistics NZ's files, the service provider acted quickly to restore the service with operation returning to normal by mid-morning. On census day, average wait times peaked at 50 seconds from 3 to 4 p.m.

The public could also request paper forms through an automated telephony system using the number pad on their phone. The system was used just under 104,000 times (26.1% of total contacts to the centre). This is less than half of what was expected, which could indicate that some people had trouble using this approach.

The final service offered to the public was email/web requests (eQueries). This service received just over 104,000 (26.1%) requests, a much higher number than expected (30,000), which may have contributed to a backlog in processing this type of request. There was also a lag between receiving and actioning the eQuery requests during peak times.

All requested paper forms were sent by post, which delayed the delivery and potentially added to the frustration of those wanting to complete their census on paper. In total, the Contact Centre fulfilled approximately 213,000 requests for paper forms, of which 205,000 were identified as private occupied dwellings and therefore were required to complete census forms. 86.4% completed all the necessary forms and 96.9% completed some of the forms.

Unique secure access codes provided to households enabled responses to be linked to the addresses contained in the Census Dwelling Frame. This enabled Statistics NZ to know when a response had been received. The use of a single access code was troublesome for some dwellings where multiple individual forms were required. The access code had to be retained and reused by all individuals in the household. Due to a problem with codes not being matched to the proper address (identified during collection operations) the access codes were locked once the initial forms had been submitted. This action was taken to proactively prevent a major privacy incident from occurring. However, as a consequence, if the code was misplaced before all individuals responded, a new one had to be issued. This forced the respondent to repeat the process of completing the dwelling form along with the individual form. Linking of multiple forms was completed during processing.

Re-engineer field processes

Changes introduced in the field processes were intended to increase automation and centrally direct the work of the reduced field workforce. Processes were designed and tools developed to help prioritise work assignments and create workloads aimed at maximising response rates while realising significant cost savings.

To support the new field processes, Statistics NZ partnered with external service providers to develop these key systems and tools. They included a centralised field management system (Salesforce), a dynamic Workload Creation and Allocation Tool (WCAT), and introduction of mobile technology to support field operations. Also introduced in 2018 was the development of a targeted response framework to guide the enumeration of hard-to-reach populations.

For the first time, Statistics NZ contracted out the recruitment and remuneration of field staff. In our view, this was a good decision as the tools and systems to support this critical activity were decommissioned after the 2013 Census. Madison Recruitment had the expertise and networks to hire a large volume of staff across the country for the short-term duration of census operations. During our review we heard that several issues contributed to the recruitment challenges, including the late delivery of the area design to Madison along with unnecessary hiring constraints imposed by Statistics NZ. We note that some of the

restrictions were lifted when additional recruitment was required, for example in Auckland. The short-term nature of the contracts, a cumbersome onboarding process, and a lengthy delay in provisioning staff with equipment resulted in significant workforce attrition.

The new field systems introduced for 2018 worked as well as can be expected given the limited testing and no end-to-end (integrated) testing for non-response follow-up operations due to the reduced scope of the 2017 Census Test (see details below). As noted during our review, of particular importance was the WCAT tool, developed to assist in automatically allocating follow-up work to a reduced field workforce. However, with lower-than-expected response rates, the tool did not perform as intended, requiring significant manual interventions. It was also noted that the tool was at times too dynamic, creating insufficient workloads, particularly in rural areas. In addition, the WCAT tool was unable to manage apartment buildings, which introduced inefficiency and frustration for both field staff and respondents. Work-arounds were required to facilitate the work of field staff (i.e., turning off the dynamic functionality for apartment buildings in Auckland).

Although challenges occurred during production, it is our view that these processes and tools can and should be enhanced with the lessons learned in 2018. With the appropriate adjustments and rigorous testing, we believe they will result in future efficiencies that were envisioned in 2018.

Re-engineer processing

The goal for processing in 2018 was to increase automation while retaining quality standards consistent with 2013. The increased use of information and administrative data was planned to improve efficiency and data quality.

A significant change from past censuses was the plan to use data gathered during collection to inform and direct field operations, more specifically non-response follow-up. Beginning with the receipt of census responses, incoming data would be analysed and measured against key performance indicators, such as response rates by geography. The results would then be used to direct the work of field operations to maximise responses using the suite of interdependent tools described above.

Despite the fact that information made available during collection operations showed concerning overall response patterns for individuals (although online was tracking well), management was slow to react. Several groups raised this issue during our interviews. It is our view that the focus on online responses and the overly optimistic view of 'Stay the course. The paper will come,' led to insufficient action being taken at the appropriate time, resulting in a failure to meet response rate targets.

Also new in 2018 was the approach to editing and imputation. Through the use of more efficient corporate tools, item imputation was planned to improve data quality for most variables, whereby unit imputation was planned to help correct for non-response. However, lower-than-expected response rates changed the intended path for imputation and the use of administrative data sources took on a greater-than-expected role.

The work in the Census Transformation Programme offered strengthened capability and understanding to support the increased use of administrative data. The knowledge Statistics NZ gained through this research programme became a critical factor in the organisation's ability to elevate the quality of the census dataset by combining census responses with administrative information to create a census dataset, set to be released in September 2019, that should meet statutory requirements.

2.3 Develop and test

The forms

The 2018 Census consisted of a dwelling form and an individual form. New in 2018 was the introduction of a household summary that was deployed in the online version only. The summary form confirmed the address of the dwelling for which the forms would be completed and identified the number of individual forms to be completed.

One dwelling form was to be completed for each household with a completed individual form required for each person staying at the dwelling on census night.

The dwelling form captured information about the dwelling and the name, age, and sex of individuals staying at the dwelling on census night including their relationship to the person completing the dwelling form (i.e., husband, wife, partner, mother, father, daughter, son, flatmate, etc).

The individual form contained questions related to ethnic group, country of birth, Māori descent, iwi affiliation, health, education, and employment. For the online version, the same access code was required for each individual within the household to complete their respective form.

Up to and including 2018, New Zealand has maintained two forms for its census enumeration. According to census management, two separate forms have been used in New Zealand since the 1950s, and were introduced for privacy reasons and at a time when census workers facilitated the collection of information. Although the use of a household form was

considered in 2018, it is our view that Statistics NZ missed an opportunity to test and explore simplified form options that might have worked more effectively in a self-response model. In some areas of the country and with some populations, we heard that completing multiple forms without the assistance of a field worker inhibited full participation.

Despite the pre-census-day concerns, the ICS performed well and was a success. It was safe, secure, and easy to use. During our interviews we noted a positive reaction to the platform and several people offered ideas for improvement. One such idea was the desire to have the capability to save information and return to the form later. Without a save option, members of the household were forced to complete their full questionnaire and submit. If the form was not completed in a session the respondent had to start over again.

Testing

Based on international best practices, the plan for the 2018 Census was to integrate the testing programme with the develop–test–learn–revise cycle, emphasising reduction of risk associated with the various elements of programme change. However, the organisation was unable to follow this strategy, mainly due to the late delivery of the IT systems, further compounded by the disruption related to natural disasters described below.

At the programme level, three census tests were planned and conducted, although not as envisioned. The outcome of each test was designed to inform the iterative development of the programme objectives. The first census test, conducted in March 2016, tested some of the new processes designed to stimulate self-response, including call-to-action letters, reminders, and follow-up visits from field officers. This test also had an experimental design that permitted the comparison of old and new collection methods. The second test, conducted in July 2016, tested the set of proposed questions to be asked in the census. The third and final test, planned for March 2017, was intended to be end-to-end testing of the systems and processes as well as the proposed marketing campaign. This test was intended to replicate, to the extent possible, the 2018 model.

The third test was delayed by one month to April 2017 and reduced in scope following the North Canterbury earthquake, which significantly affected all Statistics NZ systems. Removed from the test were the list-leave and non-response follow-up operations and the integrated end-to-end testing of all processes and systems.

The 2017 Census Test focused on targeted, not mainstream, operations. Essentially what was tested was the online capability of respondents (the ICS), the communications and marketing campaigns, and the field workforce's ability to carry out these operations. The early visit operation, a small set of non-private dwellings, list-leave with contact, and full

enumeration were tested. However, any planned follow-up on these activities was cancelled due to a Civil Defence Emergency that was declared in Whanganui during the test. Most of the main systems used in operations were not ready to be tested due to delays compounded by the North Canterbury earthquake, so work-around solutions were deployed. We have been told that the systems used for address canvassing and list-leave operations in the test were not the systems used in the 2018 field operations.

2.4 Collect

Arguably, the collection operation has the most impact on the outcome of the census programme due to the reliance on respondent cooperation. As the most expensive single component of the entire programme, it is also the phase where most efficiencies can be achieved if successfully designed and implemented.

The following describes the collection phases as presented by Statistics NZ in the *2018 Census Design Principles*, April 2017.

Prepare

The preparation phase was the first live phase of the census. This phase ran from June 2017 until two weeks prior to the census. During this time, the mode of delivery for all areas of the country was determined, the recruitment and training of the field management occurred, engagement work began, and the canvassing operation to confirm addresses was completed.

Enable

During this phase, 19 February–6 March 2018, it was planned that all dwellings in New Zealand would receive either a 'call to action' letter (which contained an internet access code to encourage online responses) or a census pack which included a call-to-action letter and paper forms.

As explained earlier, the majority of households (80%) received a call-to-action letter only. It was planned that the remaining households (20%), which were in areas that were identified as low mailability (list-leave) and/or targeted operations areas (see below for explanation) would receive census packs.

It was also planned that ICS would be live at the start of the enable phase so that citizens could complete their form online as soon as their census materials were received.

Remind

The remind phase was planned from 7 March (the day after census day) to 16 March. During this phase, two waves of reminder letters were mailed to households who had not yet responded.

Respondents in list-leave areas were not intended to receive reminder letters as they would have been provided with both internet access codes and paper packs during the enable phase.

Visit (non-response follow-up – NRFU)

This phase of collection operations was planned to begin 10 days after census day with the focus shifting from self-response to obtaining a response from non-responding households. All non-responding households would receive a visit, at which time paper packs would be delivered and contact would be made by a census field worker to convince people of the importance of participating in the census. As described above, real-time information from the field would be used to determine priorities and workload assignments.

Targeted operations

In the planning phase, Statistics NZ recognised the need to develop a range of strategies, different from those used with the general population, to improve participation and increase both coverage and response rates among the parts of the population that are traditionally low responders.

Targeted response groups are population sub-groups (Māori, Pasifika, culturally and linguistically diverse, and homeless) from which it is crucial to obtain a high response to improve the overall quality of census data. Challenges with enumeration are usually due to issues with access (i.e., affordability or connectivity), potential language or literacy barriers, and general distrust of government.

Targeted dwellings, such as non-private, remote and rural dwellings, remote islands, and secure-access buildings require special attention to address geographic complexity, access (internet, mail, or building), and population on census night.

The optimal approaches to address the challenges of enumerating these sub-populations and dwellings were: list-leave with contact; early visit; full enumeration; and field-assisted response. However, not all the planned collection strategies were successful and others were not implemented as planned.

We also heard that the strategy to engage special populations, particularly Māori, was not as effective as it could have been. The field workforce was understaffed and didn't have the tools required to be productive or engage in a meaningful way. This included insufficient bilingual paper packs as well as a lack of coordination between the targeted field operations and the community liaison engagement teams.

The strategies for collection in non-private dwellings and secure-access dwellings was also an issue. Problems began with the quality of the address frame that supported these operations. Incorrect identification of the dwellings resulted in insufficient workforce and materials to adequately support the operations.

Response to low response rates

Once it became clear that individual response rates were below tolerance levels the programme team initiated a number of actions to address the problem. These included targeted social-media advertising, deploying additional waves of reminder letters, engaging with local councils, issuing single-use access codes to support community events, and where possible doorstep completion. In addition, collection activities were extended by two weeks and focused efforts included the redeployment of field staff and the use of fly-in squads to support key low-responding areas. Ultimately these efforts were not sufficient to raise the response rates to expected levels.

2.5   Data processing and analysis

The plan was to begin processing data once the ICS was operational. Unit and item imputation would begin as soon as census responses were received. The plan also included the use of administrative and historical data to impute data where appropriate.

Due to the low individual response rates, Statistics NZ was forced to change the way in which it addressed missing information. As described earlier, complex work to combine census responses with administrative data obtained from other government sources was carried out by Statistics NZ staff to augment the quality of the census dataset.

Several dependent activities caused delays in the processing and evaluation of data. The extension of field operations inherently delayed both automated and manual processing operations. Significant clean-up of the Census Dwelling Frame delayed the input into processing systems by at least six weeks. In addition, delays were experienced in the build, test, and operationalisation of the processing system, as well as the introduction of new elements that were required due to the lower-than-expected response rates.

At the time of writing this report, the processing and evaluation of the quality of census data are still under way. We expect this will be addressed in the report of the external Data Quality Panel.

2.6   Dissemination

The plan was to begin dissemination of census outputs with the release of provisional counts in October 2018. Data would then be released progressively and disseminated via enterprise products and services.

Given the challenges during collection operations the date for the release of the first census outputs was delayed. It was first delayed to March 2019 and then further delayed to September 2019.

2.7   Evaluation

Statistics NZ has deployed several mechanisms to evaluate the 2018 programme.

First was a self-evaluation process at both the project and programme levels. Each project within the programme was required to prepare a closure report, a review of how the project performed against its baselines or approved changes to the objectives. In addition, each project was asked to provide lessons learned, details of ongoing or potential risks, and high-level recommendations for future census operations.

The Programme Review Report, which at the time of writing this report has yet to be finalised, focuses on a self-review of the modernised census design, how the programme performed in key areas and phases of the census cycle, and key operational decisions. The report also documents lessons learned and high-level recommendations for future consideration as well as a summary of areas that require further investigation.

In July 2018, the Government Statistician announced the creation of an external Data Quality Panel. The panel's role is to provide independent advice to the Government Statistician about whether the methodologies used to produce information from the 2018 Census of Population and Dwellings are based upon sound research and a strong evidence base. It was due to meet regularly until April 2019 (since revised to October 2019) and produce an independent report to the Government Statistician. At the time of the writing of this report, the external Data Quality Panel had not yet produced its report. The report is now scheduled to be completed with the release of the first census results in September 2019.

In August 2018, the Australian Bureau of Statistics was requested by the Census Programme Team to undertake an evaluation of field operations.

Lastly, the findings of this report provide an independent review of the 2018 Census programme and offer lessons learned and recommendations for consideration in design and development of future censuses.

Summary view of the model

Although response rate targets were not met, the design of the new census model appears to have been accepted by the general public in New Zealand. The creation of an address list resulted in an increase in the mail-out of internet access codes to almost 80% of New Zealand dwellings, with undeliverable mail at 2.27%, below the 3% target volume. The digital-first strategy resulted in approximately 70% of the population completing their census online by the end of the visit phase. Confirmed by market research, awareness of the census and the new approach was achieved both with the general population and sub-populations.

Much attention and focus was dedicated to the security and performance of the ICS. This was, no doubt, heavily influenced by the Distributed Denial of Service attacks experienced on census night in Australia in 2016. Ultimately, no security issues were experienced with the ICS during collection operations. It was fully available to the public on census night and was generally easy to use.

The introduction of a contact centre appears to have worked relatively well in supporting public enquiries. There was no significant or extended downtime for the public in accessing the centre. Although there was some negative media coverage related to respondent ability to obtain online access codes, the two incidents affecting public access were identified quickly and addressed effectively. However, we noted some respondent frustration with the process to obtain paper packs and believe this is related to the lack of paper in the field during early stages of collection rather than the performance of the contact centre.

Throughout the review process, we heard that challenges related to the size and recruitment of field staff and deviations from the plans during the enable phase of collection contributed to lower-than-expected response rates, nationally as well as in particular sub-populations and smaller geographies. The lower-than-expected response rates had a profound effect on data processing, analysis, and ultimately the late delivery of outputs. We are unable to comment on the quality or quantity of census outputs as none have been released at this time.

Despite the less than optimal result, it is our view that this model should be retained for the next census and, with proper adjustments, should deliver the benefits it was initially planned to achieve. However, attention must be paid to the multi-modal approach and the importance of paper. The model is designed to promote and encourage 'self-response', with digital-first as a default, but not at the expense of achieving response rates. As such, all the population must be enabled early and provided with the support they need to respond using the tools that best suit their environment. Significant consideration must also be given to the design of collection strategies for special populations, particularly Māori and Pasifika, as well as targeted dwellings such as non-private and secure access.

As Statistics NZ learns from this census experience and moves forward with the development of its approach to 2023 and future operations, structured international peer review is encouraged throughout the design and development phases.

Chapter 3: Execution

3.1 Governance, leadership, management, and culture

3.1.1 Background

Previous reviews of large-scale programmes in the public sector have highlighted the importance of governance, leadership, management, and culture to successful outcomes, and as potential root causes of major failures. (*Report of the Ministerial Inquiry into the Novopay Project*, June 2013, and Immigration New Zealand's *Vision 2015 Programme*, June 2016).

Census programmes typically span six years from initial planning through to release of key outputs. They consume a material proportion of Statistics NZ's annual budget. As such the census is organised as a separate team within the business-as-usual organisation structure, with a programme manager who reports to the SRO, who is at the Deputy Government Statistician level.

We note that Statistics NZ has been maturing its governance arrangements over the past few years and that this has continued post the 2018 Census. There is not currently an Audit and Risk Committee in place. We understand the intention is to re-establish a Committee as part of a broader Independent Challenge Board for the organisation. Although we recognise that Statistics NZ is a relatively small agency, given the nature of its transformation we support these steps and encourage senior leadership to advance their implementation.

3.1.2 Governance

The governance arrangements for Census 2018 changed over the course of the programme, some of the changes in response to assurance reviews. Table 4, below, shows the evolution of the governance structure from 2014 to the present.

Table 4: Census governance structure, 2014 to present

2014/15	2016	2017/18	2018 on
Investment Board	Investment Board	Investment Board	Investment Board
Census Programme Board	Data Processes and Infrastructure Programme Board	Census Assurance Board	Census and Future Census Board
Census Projects Board	Census Projects Board		

The Investment Board is the enterprise-level governance body with responsibility for oversight over the Statistics NZ enterprise portfolio. As part of this role it ensured strategic alignment and prioritisation of initiatives. This was particularly important for the 2018 Census given its dependence on the delivery of key components (particularly IT) which sat outside the census programme and within the corporate functions. There were clear challenges in balancing priorities and resources which were not fully resolved until after the North Canterbury earthquake. The Investment Board membership comprised the ELT and nominated members and was chaired by the Government Statistician. It included an independent advisor. It remained in place throughout the period of the census programme although its terms of reference (ToR) and composition were refined in July 2018.

The Census Programme Board (June 2014–January 2016) had primary responsibility for supporting and advising the SRO, and overseeing the effective management and delivery of the 2018 Census, escalating risks or issues to the SRO as appropriate. The Board was chaired by the SRO and membership comprised six Statistics NZ leaders representing users, suppliers, assurance, and operations. The General Manager, Census was a member. The ToR make it clear that the Board is advisory. Decision-making rests with the SRO, who is required under the ToR to consult formally with the Board before any decisions on scope, timetable, and funding are made.

The Data Processes and Infrastructure Programme (DPIP) Board (January–November 2016) was responsible for ensuring appropriate sequencing of initiatives, dependency management and oversight, and effective and efficient processes for collection and processing of census data. The DPIP Board also governed projects that were outside the 2018 Census but critical to its delivery (for example the Enterprise Collection Platform and Property Data Frame projects). The Board was chaired by the SRO, with members comprising Statistics NZ leaders representing impacted business groups as well as an independent advisor.

The Census Projects Board (November 2014–July 2017) was responsible for overall direction and management of the census projects, within the constraints provided by the programme boards. The Board provided advice to the 2018 Census Programme Manager (the General Manager, Census) and was not a decision-making body. The ToR required the Programme Manager to formally consult with the Board before taking decisions relating to programme scope, timetable, and funding. This Board was chaired by the General Manager, Census and included 13 Statistics NZ managers in their roles as project executives and suppliers. The chair reported on the work of the Board to the Census Programme Board and its successor, the DPIP Board.

The 2018 Census Assurance Board (April 2017–July 2018) replaced the DPIP Board. Its role was to oversee effective management and delivery of the 2018 Census programme and all associated projects, provide direction to the programme, facilitate communication between the programme and business units, and support the SRO in decision-making. The Board was chaired by the SRO and comprised senior Statistics NZ managers.

We note that over the two- to three-month period after the North Canterbury earthquake (and just over one year out from the 2018 census day), the governance bodies at the time did not formally meet, as senior managers and staff were fully engaged in recovery activity.

In July 2018 the governance structure for the census was restructured as a consequence of the issues being faced in closing out the 2018 Census. The Census and Future Census Board replaced the 2018 Census Assurance Board at this time. Its role was to maintain a strategic focus on the 2018 Census and create a cohesive strategy, including lessons learned, into the next census. The Board was initially chaired by the Government Statistician, but from November 2018 these roles reverted to the Deputy Government Statistician – Census, Communications and Enterprise Portfolio Office. The Board has five members, including an external independent advisor.

The monthly programme dashboard reports identify the status of the programme from November 2014 through to November 2018. Status varied throughout this period; initially 'red', then varying between 'green' and 'amber' up until the North Canterbury earthquake in November 2016. At that point the status became 'red' and remained largely 'amber/red' until December 2017 through April 2018, after which it was rated 'amber/green'. Once the issues with response rates became clearer in May 2018 the programme was rated 'amber/red' or 'red'. It is not unusual for programmes of this scale and complexity to have a 'red' status.

Documentation of the ToRs of the governance groups is primarily sound. It appears many of the important decisions made within the programme team are not referenced in the minutes of the governance bodies.

From the minutes and interviews it is noted the Census Programme Board focused primarily on the progress of individual projects. There was little evidence of discussion on programme-level risks and issues, or integration across the projects, including dependency management, performance, and benefits realisation. The DPIP Board had a greater focus on these areas. The DPIP Board minutes confirm the extent to which issues with the IT projects impacted on the 2018 Census programme.

As referenced earlier, we heard there was some frustration at the governance boards regarding the time it took to produce a programme plan and the quality of the support from the census programme, particularly in the early years.

We also heard that most issues and decisions were resolved within the census programme team and that few were escalated to the governance boards. For example, the issues with progress on the IT systems were not escalated to the Investment Board. There was a sense that the census programme felt it could manage the programme and did not formally engage with the governance boards in a structured way.

We noted that the tone of reporting had an optimism bias at times. Examples included some status ratings that did not reflect the seriousness of the issues the programme was confronting, and the overly positive conclusions on the value of the 2017 Census Test.

The governance structure was more complex than required, with Boards at multiple layers. This created confusion about the roles of the different bodies and an opportunity for focus on key responsibilities to be diffused.

The Census Programme Board and the Census Projects Board governance bodies comprised internal Statistics NZ staff. No use was made of independent participation (either locally or from the international statistics community), which is common in other complex large-scale programmes in the public sector.

3.1.3 Leadership

The Government Statistician is accountable for the conduct of the census and delegated the responsibility for the programme of work required to deliver it to the General Manager, Census, reporting to an SRO.

The SRO role carried the ultimate decision-making for the 2018 Census, and throughout the life cycle of the programme this was a member of the ELT. The role was held by the following executives:

February 2014–March 2017	Deputy Government Statistician – Operations
March 2017–March 2018	Deputy Government Statistician – Insights & Statistics
April 2018	Acting Deputy Government Statistician
May 2018–November 2018	Deputy Government Statistician – Insights & Statistics
November 2018–present	Deputy Government Statistician – Census, Enterprise Portfolio Office and Strategic Communications

We note that over the course of the census programme the SRO role was held by three different executives, with some of those changes occurring at crucial times. Whilst we acknowledge the circumstances that gave rise to the changes it is preferable to have consistency of leadership and direction over the course of a programme of this type.

A review of the ELT minutes indicates that updates were provided by the census programme on four occasions between September 2016 and July 2018. Some of these were verbal updates and covered, for example, the approach to targeted populations and testing. There were no records of key decisions being referred or reported to the ELT over that period.

Statistics New Zealand also had a Core Leadership Team (CLT). This included all the General Managers, including the General Manager, Census, the 'Chief Advisors' (Chief Methodologist, Chief Architect, Chief Digital Officer, Chief People Officer, and Chief Financial Officer), and the respective Directors of the Office of the CE, Organisational Strategy and Performance, Enterprise Programme Office, and Strategic Communications. The CLT meets weekly and the ELT and CLT meet together once a month as the Core Leadership Group (CLG). The key focus of each meeting is the monthly or quarterly report which is collated by Organisational Strategy and Performance. Census was generally a feature of each monthly report and quarterly report.

The responsibility for day-to-day leadership and management of the census was delegated by the SRO to the General Manager, Census.

Although the delivery of the census falls to the programme team, we note the important role methodologists must play in the design and stewardship of the census model adopted. This was particularly important in the 2018 Census as the modernised approach focusing on self-response marked a substantial change. We note that the Chief Methodologist was a member of the Core Leadership Team but not a member of the ELT. We acknowledge however that Statistical Methods was represented at all levels of the operational groups.

3.1.4 Management

The General Manager, Census created a programme office along with a number of project teams focused on delivery of the key components of the programme. Over the course of the programme there were up to 10 individual projects. It is noted that a number of census-related projects were treated as external dependencies; these included some of the IT platforms necessary to deliver the census. These projects had their own management and governance arrangements, with overall oversight at the Investment Board level. Each of the projects teams had senior leaders assigned as Project Executives. Planning identified the scale of the programme, with around 300 deliverables broken down into around 700 work packages. The planning process itself took around nine months. The programme office drove the development of strategies and plans for quality and assurance management, risk and issues management, testing, procurement, stakeholder engagement and communication, and benefits realisation. The standards adopted for project management were aligned to PRINCE2, MSP and Statistics NZ standards. The programme was largely managed by monitoring milestones of individual projects. Where required 'go to green' plans to address project progress issues were prepared. We could not identify documentation of the critical path for the programme or evidence of its use in managing dependencies and programme status, although we understand a high-level critical path was developed later in the programme and well after the collection phase was completed.

As the programme progressed operational-level forums were used to manage project and programme progress. These included at various times the Census Project Team, Technical Advisory Group, Census Quality Integration Advisory (Group), and the General Manager Operations Meeting and the Managers Operations Meeting. Some of these had formal ToRs and others were more informal.

The Census Projects Team was the principal operating forum with responsibility to advise the General Manager, Census on day-to-day management of the programme, including risks and issues. It was chaired by the General Manager, Census.

It was apparent from discussions, and from the minutes of governance boards, that the programme struggled with the IT components of the overall programme. Some of these sat outside the programme itself and were managed as external dependencies. By the time of the North Canterbury earthquake the programme was behind schedule due to issues with the IT components. This improved with the stronger focus on the census programme after the earthquake when the General Manager, Census and the Chief Information Officer established a dedicated development operations team and identified a census IT Programme Manager and a census project owner to manage a detailed prioritised work plan. Despite these efforts, the IT components were not fully ready for the 2017 Census Test, and some elements were still in development at census day. We understand that the IT function was itself undertaking a significant transformation and restructure in the earlier years of the census programme, and was materially disrupted by the earthquake. Given this situation it was an extraordinary effort to deliver the state of readiness achieved at the time of the census.

The overall impression from the documentation and comments from those interviewed is that individual projects were predominantly well managed but that integration at the programme level was a continual challenge. It was difficult to have sight of all dependencies and it was not always clear that risks and issues were fully dealt with.

3.1.5 Culture

The culture within programme and project teams is always an important factor in success. Open cultures that are collaborative, receptive to advice and outside views, and that encourage and act on escalation of issues are essential in large and complex programmes that invariably operate in a stressful environment.

A number of those interviewed have commented on a strong focus on problem resolution and delivery to meet schedule deadlines. Whilst we see evidence of frequent interaction with international statistics organisations, much of this was informal. Although the Australian Bureau of Statistics carried out two formal reviews, one of the IT systems readiness and a second on the field collection operations, we did not see formal peer review of the model design or programme plans.

We are aware of a number of issues that were raised with programme leadership by some within the project teams or with past experience of census operations, including Statistical Methods. These included concerns over the reliance on online

collection for targeted populations, the abandonment of list-leave with contact, and lack of paper for enablement. These concerns did not appear to influence decisions.

We have noted earlier the lack of escalation of key decisions to the governance boards and an optimism bias in reporting. The focus on managing by milestone and on project performance made it more challenging to manage dependencies and integration across projects and to foster a collaborative environment.

The overall impression is of a programme very focused on delivery but not as open to advice as was desirable. There was a sense of 'don't worry, this is hard, but everything is going well and we will deliver the census as planned'.

More broadly, feedback from a number of external stakeholders describes a culture in Statistics NZ that is earnest and committed, but one that needs to take a more user-centric perspective, listen more, and be more transparent. This underscores the importance of the broader Statistics NZ transformation programme resulting in a shift in culture.

3.2 Stakeholder engagement and communication

To meet key programme objectives, the new census model relied heavily on respondents completing their census questionnaires without the encouragement or assistance of a census field worker. The success of this model was dependent on the public understanding what was required of them and by when. A comprehensive community-engagement and communications campaign was developed and launched with the goals of educating the public about the new approach to census taking and encouraging participation, particularly focused on online participation.

Stakeholder relationships were developed and managed throughout the census cycle with multiple groups including central and local government agencies, customers (data users, national organisations), academia, the public, media, and community stakeholders.

A review of the 2018 Census Media Monitoring Report, compiled by Statistics NZ, shows there were 3,355 stories related to the census aired and published in New Zealand mainstream media channels from 1 January to 29 March 2018, the core period of the census campaign and operations. The highest audience reach was on census day, with a reach of just over 4 million people. It is important to note that these stories include instances of the same story being played through multiple channels.

The report classifies the stories into three categories:

- Good – favourable census story – 41%

- Neutral – neutral story or only mentions the word 'census' – 32%

- Negative – negative tone and unfavourable story towards census operation – 27%

The majority of the coverage was favourable or neutral (73%), primarily focusing on the success of the online system. The negative stories (27%) were predominantly letters to the editor or reporting about individuals who had experienced difficulty in obtaining online access codes or taking part in the census online.

Research conducted prior to the census collection operation and after census day showed that there was a significant increased awareness of the census and the 'digital-first' option. This was evident across all audience groups, as documented by the results achieved against the KPIs for awareness and reach of the campaign (see section on KPIs).

However, for certain parts of the country, general communication and/or approaches were not sufficient to trigger public cooperation.

The challenge experienced by some special populations was highlighted in an article published on census day in the mainstream media. The article quotes the National Party's disabilities spokeswoman as stating it was 'extremely disappointing' that people with disabilities were struggling to participate in the census. 'Not only does it exclude them from the opportunity to take part, but it's likely the results will be skewed because so many people from this sector of society won't be represented.' During our review, it was noted that earlier outreach to community sectors (such as rainbow, seniors, and youth) or advocacy groups (such as the Office of Disability Issues, Blind Citizens NZ, Deaf Aotearoa, and Disabled Persons Assembly NZ) could have resulted in better participation rates using well-established communication mechanisms available within their respective networks.

Several interviews recognised the effort of Statistics NZ in engaging with communities, particularly Māori. Those interviewed were very supportive of the Community Liaison Manager and team but indicated they were not sufficiently resourced to make a significant difference. Several of the community leaders expressed the need for earlier engagement and for it to be coordinated and maintained throughout the census cycle and between censuses. They described how trust must be earned and maintained to ensure cooperation that will lead to participation. Several ideas were proposed on ways to improve and strengthen community engagement for future censuses. These ideas include involvement in the collection design for 2023 and the potential of improved timing to facilitate community participation.

As successful as the awareness campaign was, and despite the higher-than-expected self-response from the general population, attention for future censuses should focus on translating awareness into a call to action, particularly for special population groups. It was noted in several interviews that the communications campaign was heavily focused on the 'digital-first' strategy. This may have resulted in people opting not to participate because they couldn't or wouldn't complete the census online and possibly did not understand the importance of their participation. As noted in the Programme Review Report, the story of data, and its impact and relevance to New Zealanders, needs to become an ongoing message and not just one that is shared during census operations.

3.3   Responsiveness to Māori

Te Rautaki Māori, the 2018 Census Māori Strategy, was developed to help guide the 2018 Census programme with goals to improve Māori response rates, improve census information for and about Māori, and increase understanding and use of census information by Māori.

The Electoral Act 1993 requires population data from the census to be used in the calculation of electoral populations and electoral boundaries, including Māori electoral boundaries. The Census Transformation Programme work related to iwi and Māori data needs supported the importance of collecting Māori ethnicity, iwi affiliation, and te reo Māori data in the 2018 Census.

The Census Māori Advisor was responsible for identifying issues and monitoring implementation of Te Rautaki Māori across the 2018 Census. Special collection strategies and engagement plans were developed to help achieve the objectives, but were not well executed, and improved response rate targets were not achieved. Through our interviews we heard that many communities did not have the capacity to be able to participate (lack of forms, lack of support, lack of understanding). Inadequate field staff, restrictive hiring policies, and the paper and list-leave decisions mentioned in Chapter 4 exacerbated an already difficult situation.

It is our view that the strategy was not used effectively to guide decision-making with Māori. The primary focus of the discussions was on the changes to the census content and informing iwi how the census would be conducted rather than engaging in meaningful dialogue on how best to work with the community leaders to ensure participation.

It is our view that to improve participation in these communities, Statistics NZ needs to re-think its collection and communication approaches going forward and be appropriately funded to implement any required changes. Strategic engagement with the communities

must begin now to better understand what approaches will be most effective. Co-design (with and not for Māori) from planning through implementation is required. The census collection approach needs to include the design of collection instruments and timing of enumeration along with tailored (meaningful) communication and education that resonates with communities, important components that need careful thought and consideration.

3.4   Use of third parties

Following the 2013 Census, many of the systems used to support the census were at the end of their life cycle and were decommissioned. In addition, new systems, processes, and tools were required to support the new model. As a result, Statistics NZ decided early in the planning process to partner with external vendors who had the skills, tools, and expertise required to develop specialised components or to deliver a more efficient operation.

Important partners included NZ Post for printing and postal services, Madison Recruitment for the recruitment, employment, and remuneration of field staff, Clemenger BBDO for advertising and communications, Fronde for Salesforce support, Auckland University for the development of WCAT, SilverStripe for the development and hosting of the ICS and hosting services for the census information website, TIMG for scanning, True North for logistics and the staff information portal, Telnet for the public contact centre, and Deloitte for IT security assurance.

Managing several external contracts of this magnitude is challenging and complex. For the first time in 2018, the census programme employed an experienced Commercial Manager who joined the team in 2016. The role of this manager was to oversee the full suite of census contracts.

It is our view that the partnership with external vendors was an important decision given all the changes introduced in 2018. In addition, with the North Canterbury earthquake, Statistics NZ's data service centre and all its systems were left inoperable for three or so months. With many of the key systems and tools contracted to external firms, the delivery timelines were less affected. We believe the use of third-party vendors reduced the level of risk and helped Statistics NZ deliver key components of the census programme.

The Programme Review Report noted that the Commercial Manager should have been appointed earlier to provide expert advice and guidance in the development of the procurement strategy. It was also noted during our interviews that several of the vendors should have been brought on earlier in the process to facilitate more rigorous testing and integration of the various components. It was particularly noted that recruitment efforts should have commenced earlier.

We also note the contract management review of two large contracts within the 2018 Census programme that was conducted by McHale Group Ltd in June 2017. The report highlights specific areas that could be improved to strengthen Statistics NZ's management control environment for all major contracts. Two important areas include the need for a Contract Management Plan and the development of an organisational Contract Management Policy, procedures and templates.

3.5   Risk management and assurance

3.5.1   Risk management approach

The census programme had a risk management framework in place as set out in the Risk & Issue Management Strategy April 2016. This followed a standard framework requiring risks to be identified, assessed, treated, and monitored, and setting out procedures for issue identification and escalation. A standard heat-map matrix to present identified risks was adopted. In addition the programme identified 12 catastrophic risks that if they became issues would pose a material threat to the achievement of the census objectives. There were specific risk registers at the project level.

Although the board ToRs identified risk management responsibilities, it was not clear where ownership for risk management lay in practice and whether there were sufficient resources allocated to risk-mitigation identification and management, and issue management and resolution. The Programme Review Report noted that programme risk meetings were ad hoc.

There were also disconnects between the risks identified and decisions on census operations. For example, one of the 12 catastrophic risks (number 6) related to 'list-leave processes failure result in respondents not enabled'. Yet, during census collection a decision was made not to provide paper forms as part of the list-leave process, despite advice from field operations that paper was required. This decision may have impacted the effectiveness of the list-leave process in lifting response rates.

It is our view that the Australian Bureau of Statistics experience with a significant online incident on their 2016 census day drove a heightened focus on technology risk for the 2018 Census, which heavily influenced some decisions (such as paper) and distracted attention from risks in other areas of design and process.

3.5.2   Assurance approach

The programme planned a comprehensive assurance approach. There were four Gateway reviews, six Independent Quality Assurance reviews, two independent cost reviews, two specific security reviews and cyber simulations, and a number of additional independent reviews of aspects of the programme.

In addition an Enterprise Design Authority to review design decisions was used in the early stages of the programme. A Technical Advisory Group was also used in 2014/15 and again in 2018 to provide advice, technical review, and quality assurance on statistical and technical design and methodological issues.

In the remediation phase an external Data Quality Panel has also been established to review the approach Statistics NZ is taking to ensure a quality 2018 Census outcome.

The approach ensured that all relevant aspects of the programme were subject to assurance.

3.5.2.1 Gateway reviews

There were four Gateway reviews with the first two combined into a single report:

- Gateway 0.0   Strategic Assessment   16 May 2014
- Gateway 2.0   Delivery Strategy   16 May 2014
- Gateway 3.0   Investment Decision   27 November 2015
- Gateway 4.0   Readiness for Service   12 April 2017
- Gateway 4.0   Readiness for Service   22 June 2018

The Strategic Assessment and Delivery Strategy reviews were rated 'amber' with eight critical recommendations. The Investment Decision was also rated 'amber' and contained 11 critical recommendations. This report also identified that two of the critical recommendations relating to governance and risk reporting were only partially completed.

The April 2017 Readiness for Service review was rated 'amber' and identified that four of the recommendations from the previous Gateway review had not been addressed. The Readiness for Service review pointed specifically to the need to improve risk, issue and dependency management and to develop contingency plans, and recommended a further Readiness for Service review prior to census day.

The final Readiness for Service review was delivered in June 2018, three months after census day. At this time collection operations had been completed and the issues with non-response and potential implications were well known. This Gateway report noted two critical recommendations: the need for communications to present a factual and balanced view of achievements and challenges, and the need to implement a flexible governance structure to oversee the implementation phase. The report notes the lower-than-expected response rates and the projected delays, and that 'the RT (Review Team) is not in a position to assess the organisation's readiness for market as the census product set for the initial market offering has not been specifically determined and most of the candidate census products are still under development'. This led to a limitation in the scope of the review.

Later in the report, after noting differences between KPI and critical success factor (CSF) targets and actual response outcomes, it was noted that 'notwithstanding the "miss" in the return rate CSF, the 2018 Census exceeded performance expectations in all areas whereby Stats NZ had direct control. This should be "shouted from the rooftops" as an outstanding achievement in the delivery of New Zealand's first predominantly digital Census.'

We were surprised by this comment, given that in May 2018 it was well known that the response rate was less than 90%. At that time Statistical Methods was already working with the census programme on potential solutions to fill the gaps. We understand the limited depth of the Gateway process, and that these are not assurance reviews, yet this statement reflects a level of optimism that was not supported by facts.

3.5.2.2 Independent Quality Assurance

The programme used Statistics NZ's preferred assurance provider, IQANZ, to conduct five Independent Quality Assurance (IQA) reviews:

- Baseline Health Check Review   March 2015
- Follow-up Health Check Review   July 2015
- Procurement Probity Review   February 2016
- Follow-up Health Check Review   October 2016
- Programme Health Check Review   November 2017

The Baseline Review rated delivery as 'feasible', noting that the programme planning was late, although at a similar stage as the 2011 census. A number of recommendations to strengthen governance were made.

The October 2016 review, immediately before the North Canterbury earthquake, again rated delivery as 'feasible', noting the maturing of governance arrangements. However, this review also highlighted the need to move beyond a project focus to a programme focus, and the importance of establishing and utilising the programme critical path to ensure dependencies are managed appropriately.

The final review in November 2017 again rated delivery as 'feasible'. The review noted that issues with the IT elements of the programme had resulted in significant delays and forced re-planning and a need for additional resources. Nine recommendations were made, including to develop a 'go-live' checklist, appoint release and environment managers, and ensure a more forward look at risks.

It appears that most of the IQA recommendations were implemented. However, it appears that the programme continued to manage progress and status using milestones rather than develop a critical path, as recommended. This approach likely contributed to the focus of the Census Programme Board on project status rather than the overall programme and the dependencies inherent in its planned approach and structure.

We also reviewed the Census Technical Review (April 2016) conducted by Fujitsu. The recommendations are aligned to many of those already highlighted, including the need for stronger programme planning, critical path, and dependency management.

3.5.2.3 Contingency planning

The programme developed a detailed Incident Management Plan laying out what might constitute a serious incident and procedures for managing such incidents. As examples, serious incidents could include issues that affect privacy, safety, or security, the reputation of Statistics NZ, and the ability of the 2018 Census to achieve its objectives or KPIs.

The plan provided for the establishment of the Serious Incident Management Team and protocols for escalation of issues with the Director, Enterprise Programme Office identified as the serious incident manager. All incidents were to be managed within the 2018 Census programme, unless determined by the programme to be 'emergency' matters that were beyond the programme team's capability or capacity to resolve.

Whilst the Serious Incident Management Plan sets out well the proposed roles, processes, and procedures to be applied, it does not set out any detailed contingency plans. The 2018 Census Programme Plan and some of the various project-level operational plans do set out pertinent risks and mitigations but these are not contingency plans.

Two incidents were escalated to the Serious Incident Management Team.

The first incident was related to packages delivered to the wrong address introducing privacy concerns. Access codes for online participation were linked to a specific address. Therefore, a letter delivered to the wrong address meant the access code was linked to the wrong address. The privacy issue arose when individuals within the household called the contact centre to retrieve a lost code. When the code was provided, the individual could see the summary data for the household. Once the issue was identified, access codes were locked and new access codes provided.

The second issue was system-related. The system appeared to 'drop' the unique identifier that is used to link online individual forms to dwelling forms. The linking process enables Statistics NZ to establish relationships between people in the household to derive household and family information. The issue was identified on 16 March and a dedicated incident manager was appointed to resolve the problem. Working with the vendor, a solution was identified and tested and the issue resolved as of 3 April 2018. No data was lost during the incident and the issue had no impact on non-response follow-up operations. However, it did cause a delay to the general processing of data.

When the issues with response rates emerged, the Serious Incident Management Team was not convened. The response was managed by the census programme leadership and team.

3.6 Costs and benefits

3.6.1 Costs

The Focussed Business Case in June 2014 set out a funding level of $118.9m for the 2018 census (including $2.5m for census transformation), and this was appropriated in the 2014 Budget. The programme developed a detailed budget comprising the core census programme and other census projects, and split between capital and operating expenditure. The level of operating funding was $111.1m.

The census budget was subjected to quantitative risk analysis, which initially projected a base estimate of $118.6m (excluding depreciation) in May 2014, rising to $120.7m in April 2016. Statistics NZ did not make any additional requests for funding until after the North Canterbury earthquake, with the programme team believing there was sufficient funding to deliver the plan.

After the North Canterbury earthquake a review of the fiscal impact was undertaken. Statistics NZ sought an additional $5m in funding, $2m to cover the direct cost impacts and $3m contingency to cover potential additional costs should systems not be ready or fully tested and a more manual model be required. On 5 July 2017 Cabinet approved the additional $2m and invited the Minister of Statistics to report back to Cabinet by 31 October 2017 on any need for the $3m contingency should it be required. Ultimately no additional funding requests were made in 2017. We note that there were fiscally neutral swaps between capital and operating expenditure but these do not impact the total costs.

Further funding was approved in 2018 as part of the 2023 Census budget bid to cover the final year of the 2018 Census programme. This took the total approved funding for the 2018 Census programme to $126.756m. Statistics NZ are forecasting to deliver the 2018 Census outputs within this appropriation.

Table 5 below shows the budgeted costs of the last four census programmes.

Table 5: Census programme budgets

2001	2006	2011/13	2018
$38.4m	$74.2m	$90.4m (2011 Budget))	$118.9m (initial, excluding earthquake impacts)

The 2013 Census had a budget of $74.1m. However, $66m had also been spent on the deferred 2011 Census. Some of this cost was duplicated in the 2013 Census. Over the years there have been occasions when actual costs exceeded the appropriation. In these cases the overspend was absorbed by Statistics NZ within their operational budget.

3.6.2 Benefits

Turning to benefits, it is noted that most literature on this topic concludes that the benefits of a census significantly outweigh the costs. This conclusion rests on the value derived by users from access to the quality of the data provided by the census.

The aforementioned report, *Valuing the Census* by Taylor Duignan Barry, calculated the estimated value of the census over 25 years at between $960m and $1,420m (medium case).

The Focussed Detailed Business Case identified the present value of monetary benefits of the planned modernised 2018 census at $391.8m, yielding a cost-to-present-value ratio of 1:3.9. A number of non-monetary benefits are added to this.

The analysis assumes that the objectives of the census are achieved. In particular there are assumptions with regard to health funding allocation and increased precision of data for policy-making for iwi and vulnerable groups that will have been affected by the challenges with the census. While it is clear that not all the objectives will be achieved, it is in our view unlikely that the degree of non-achievement will materially alter the cost–benefit profile of the census. Nonetheless Statistics NZ should recalculate the expected benefits arising from the 2018 Census once the quality and quantity of the final outputs is known.

3.6.3   Adequacy of funding

There have been a number of comments about the adequacy or otherwise of the funding provided for the 2018 Census. Our review indicates that Statistics NZ was diligent in the preparation of estimated costs and that funding to address the impact of the North Canterbury earthquake was sought and provided. We note however that the cost implications of that event were likely understated. Cabinet invited the Minister of Statistics to confirm the need for the additional contingency but this was ultimately not asked for by Statistics NZ. We note the objective in the business case of savings of 5% of the average census costs using an inflation-adjusted 2013 Census as the base, and that this was to be achieved over two census cycles.

As we have described, the 2018 Census had a number of change elements and a design that was more complex than previously adopted. The additional costs of developing the necessary IT systems were largely offset by a reduced field workforce.

We also note that the planned engagement and collection strategies did not result in achieving the required response rates for targeted populations, particularly for Māori and Pasifika. With the benefit of hindsight we question whether appropriate funding was requested for this component of the new model and the significant effort required to obtain responses from historically low-responding populations.

It is our view that given the scale of change, the business case required almost flawless execution if the investment objectives were to be met. Although the level of contingency was similar to prior censuses it could be argued that, given the scale of change, a greater level of contingency would have provided the programme with flexibility to respond to issues encountered in execution.

Ultimately the 2018 Census received the funding it asked for and the programme felt confident it could deliver the census as outlined in the business case.

Noting that the forecast final cost of the 2018 Census of $126.756m reflects the total appropriation and that those costs include the remediation effort, we do not believe an argument the census was significantly underfunded can be sustained.

3.7 Ministers and central agencies

3.7.1 Ministers of Statistics during the 2018 Census programme

There were six Ministers of Statistics over the life of the 2018 Census programme, four of whom were interviewed as part of this review. We note that the Government Statistician is a statutory position and has the sole responsibility for deciding the procedures and methods employed in the provision of statistics including the extent, the content, form, and timing of their release. Statistics NZ officials regularly updated Ministers of the progress and status of the census programme and it formed part of the Briefings for Incoming Ministers.

Ministers were aware of the overall approach for the modernised census and in particular the focus on the online response. Ministers were also aware of the broader transformation taking place within Statistics NZ as it took on its greater leadership role in increasing the value of data across the public sector and the broader data ecosystem. Table 6 below sets out the relevant Ministers and decisions taken and announcements made during their tenure.

Table 6: Ministers of Statistics, 2008–present

Minister	Period of tenure	Significant census decisions taken during this time
Hon Maurice Williamson	November 2008–May 2014	February 2014: Cabinet agreement (in principle) for a modernised 2018 Census, based on a single-stage business case, depending on the submission of a detailed business case later in the year and approval of funding (subject to Budget decisions)
Hon Nicky Wagner	May–October 2014	May 2014 (Budget 2014): Budget for first year in the census cycle (2014/15) approved, remainder kept as tagged contingency until completion of detailed business case
		June 2014: Detailed business case presented to Cabinet resulted in approval of 2018 Census and release of remaining requested funding
Hon Craig Foss	October 2014–December 2016	June 2016: Cabinet agreement for the Proclamation of Census Day – 6 March 2018 – through the Governor-General
		November 2016: North Canterbury earthquake
		Reduce the scope of and delay the 2017 Census Test from March to April 2017
Hon Mark Mitchell	December 2016–May 2017	April 2017: Final Census Test
Hon Scott Simpson	May–October 2017	July 2017: Final content decision
Hon James Shaw	October 2017–present	6 March 2018: census day
		1 June 2018: media release announcing lower-than-expected response rate
		10 July 2018: first release of census data postponed from October 2018 to March 2019
		July 2018: Government Statistician announces the creation of an external Data Quality Panel
		October 2018: Government Statistician launches the Independent Review of the 2018 Census
		27 November 2018: Further delay of first release of census data announced
		29 April 2019: Statistics NZ confirms the date for the first release of census outputs – 23 September 2019

Ministers were informed of significant decisions, including the final content and the de-scoping/postponement of the 2017 Census Test. Ministers were consulted on the impacts of the earthquake and ultimately Cabinet approved an additional $2m of funding in July 2017.

Subsequent to census day, Ministers were regularly briefed on the progress of the programme.

In briefings that led up to census day, the focus on risks was largely confined to those relating to technology, and in particular the online collection platform. It was not apparent that there was reporting of risks related to non-response or field operations. It is not clear that Ministers had a full appreciation of the risk landscape.

We find a level of optimism in the reporting to Ministers that was not always consistent with the level of issues being managed by the programme.

3.7.2 Central agencies

The 2018 Census programme was included in Treasury's major projects monitoring programme and as such there were regular programme monitoring meetings. Throughout the period of monitoring, the programme was rated amber and amber/red after the North Canterbury earthquake. Statistics NZ rated the status as green on some occasions. The monitoring reports pointed to challenges with integration across the programme and with the impact of the earthquake.

The Government Chief Information Office (GCIO) was also providing some oversight and participated in the programme monitoring meetings.

The observations of these agencies reflect a number of those already made: for example, the focus on IT relative to paper, complexity of governance arrangements, and challenges with managing an integrated view across the programme.

Chapter 4: Key decisions

This chapter describes a series of key decisions taken by programme management before and during collection operations that we believe had a significant impact on the ultimate outcome of the 2018 programme.

4.1 Programme critical path

The Census Programme Plan V3.0 (June 2017) identified governance and alignment between projects, including interdependencies, as a programme risk. The absence of a critical path was also highlighted in the IQA reports (section 3.5.2.2).

The decision to manage the programme by milestone rather than a critical path inhibited the ability of the decision-makers to see the critical dependencies and associated risks that needed to be managed to ensure a successful outcome.

4.2 Risk management

As described in Chapter 3, section 3.4: Risk management and assurance, the census programme developed a risk management framework and identified 12 catastrophic risks. However, the primary and almost exclusive focus was placed on the risk associated with potential failure of the online collection system. Other catastrophic risks that were identified, such as lower-than-expected response rates and difficulties in recruitment of field staff, did not appear to have appropriate risk mitigation measures in place to adapt quickly when/if they materialised.

4.3   North Canterbury earthquake response

In November 2016, a time when preparations for the 2018 Census were intensifying, a significant earthquake struck North Canterbury with extensive damage to parts of the Wellington central business district. Statistics NZ's building, Statistics House, was severely damaged and all Wellington-based Statistics NZ staff (approximately 500) were forced to evacuate the building permanently, relocating to several buildings across Wellington. With the implications of the earthquake, staff in the census programme essentially operated in crisis mode beginning in November 2016. It took several weeks to re-establish essential support services, set up new office facilities, and establish ways of working that could be effective given the now dispersed organisation. The Data Centre was devastated, rendering IT systems inoperable for an extended period. It took several months for all systems to be stabilised. The recovery must be recognised as a massive task and a considerable achievement by Statistics NZ management and staff.

At this time discussions were held to consider whether or not to defer the 2018 Census. We note the decision to postpone the 2011 Census due to the earthquake in Christchurch weighed heavily in the discussion. Given the progress on re-establishing operations, the current state of census preparations and the assessment of effort to complete readiness for the 6 March 2018 census day, it was the judgement of the programme team and the Government Statistician that the 2018 Census could be delivered as planned. There is no reference to the decision to continue in the minutes of the Investment Board at the time.

The decision to proceed ultimately had the effect of focusing effort on the census programme and in particular the IT system elements. However, it also raised risk levels, most notably relating to testing.

Additional funding of $5m was sought to cover earthquake direct cost impacts and contingencies and $2m was approved by Ministers, with an invitation to consider the need for the contingency sum of $3m by 31 October 2017. Given the magnitude of disruption, it is our view that the cost implications were likely understated. In particular, the impact on the programme schedule almost certainly required more resources to mitigate the risks.

4.4   Timing of content decision

The final content for the 2018 Census was approved by the Government Statistician on 30 June 2017, as planned. This was 10 months later in the census cycle than the content decision in 2011. Concerns were raised about this later timeline but no changes to the planning schedule were proposed. The timing of this decision left little time to finalise the census questionnaires for both paper and online versions. The impact was most significant for the paper version as it

had a downstream effect on the volume of paper that needed to be printed and ultimately the availability and distribution of paper for essential field operations.

4.5   Testing

As mentioned earlier, the planned end-to-end testing in March 2017 was delayed by a month and the scope significantly reduced due to the impact of the North Canterbury earthquake. The scope of the test did not provide sufficient insights into how the new model would perform and the risks associated with business process and systems interdependency. As a result, the programme assumed significant risks going into field operations.

4.6   Field workforce

In the Focussed Detailed Business Case, Statistics NZ planned to hire approximately 3,000 staff to carry out its field operations. This was approximately 40% of the total field workforce that was used to conduct the 2013 Census. It is our view that the planned reduction to the size of the field workforce was too aggressive given the amount of change that was introduced to collection operations and, despite international experiences, the uncertainty of how the new model would work in New Zealand.

Compounding an already aggressive reduction in the field workforce, the workforce target was further reduced to 2,300 following the address canvassing operation and the increase in the mail-out. The decision appears to have been driven by a mathematical model without careful consideration of respondent behaviour. We could not find any evidence that this issue was raised within the governance structure and that options or risks were considered.

Ultimately, even the reduced recruitment target was not reached and field operations were severely hampered by insufficient staff. For example, approximately 1,500 field workers were required for non-response follow-up (NRFU) operations yet actual numbers show a peak of just over 900 were deployed. As mentioned earlier, we do not believe the use of an external vendor was the root cause.

4.7   Paper

The decisions regarding paper are interconnected and directly influenced several other critical decisions and outcomes in the 2018 programme.

The first decision relates to the complexity of the printing of the paper packs. There were two types of packs that were ultimately printed. The first was an 'enable' pack, which included a 'Census is coming' letter that would be used in the enable phase of list-leave areas and non-private dwellings (NPDs). The second was a 'visit' pack, which included an 'It's not too late to do your census' letter that would be distributed to all non-responding dwellings during the visit phase. The packs contained the code required to link the questionnaires (household and individual) to the Dwelling Register. The decision to customise the packages by including the instruction letter was driven by the goal of increasing automation and efficiency. However, the decision introduced unnecessary complexity and restricted the ability of the programme to effectively deploy packs when and where they were required.

The second decision relates to the volume of paper printed. Printing of the paper packs was outsourced and when the Request for Proposal was issued in May 2016, the content of the questionnaires and the area design for collection were not yet known. In the Programme Review Report, the underestimation of the paper requirements during the initial procurement process was noted. In August 2017, the requirement for paper forms – 1.8 million English packs and 250,000 bilingual packs – was identified by field operations. At this point, the vendor did not have sufficient capacity to print the required volumes. The maximum they could produce within the required time frame was much lower. The option of contracting another printer was explored. However, the requirement for additional development work required to integrate products produced by another vendor and the short timeline meant this was not considered a viable option. Ultimately 1.3 million English packs, 53,000 bilingual packs and 409,000 non-private dwelling packs (primarily individual forms) were printed.

At this point, a third decision was made regarding the type of pack to be printed and how the packs would be distributed. Influenced by the Australian experience, concern over the risk of the online option going down or public concern with the security of the online census drove the decision to heavily weight the print volume to visit packs, with only 94,000 enable packs printed.

The distribution of the 94,000 printed enable paper packs was prioritised in remote rural areas, remote islands, areas identified for full enumeration, Kaikōura, and homeless and freedom camping areas, and was removed from list-leave areas. The limited number of bilingual packs (only 4,800 printed) diminished the capacity for field staff to effectively engage with Māori respondents. Statistics NZ's records show that of the total enable packs (English and bilingual) that were printed, only 47% were actually distributed.

Finally, for those households and respondents who chose not to or could not respond online, the process by which they could obtain a paper questionnaire was cumbersome. They had to call the census contact centre to request a paper pack and then wait for it to be delivered. The limited availability of paper packs during the enable phase and the decision to remove paper from list-leave operations meant there were targeted areas, including those who had limited or

no accessible internet and no mail service, who were forced to follow this process. If an address was identified as a non-responding household, paper packs were delivered during the visit phase. However, we learned during the review that of the approximately 1.3 million printed visit packs (English and bilingual), only 530,000 packs were actually delivered. Of the packs delivered during NRFU, approximately 71% of households responded.

We heard during our interviews that some respondents and sometimes entire communities waited a long time to receive paper, some indicating they never did. For those who ultimately did receive paper, many thought it was then too late to respond.

We note that several concerns were raised when the change request for the decision to remove paper from list-leave operations was presented. Many of these concerns do not appear to have been addressed at the time and most of the issues raised became apparent during collection.

4.8   List-leave operations

List-leave operations are designed for areas of the country where mail service is not available as well as areas where response rates are generally low and special approaches are required to increase participation.

The original plan was for field workers to attempt to make contact with the dwelling (in targeted areas), and once done, enable the respondents with the information needed to participate in the census. When contact was not made, the plan was to leave a call-to-action letter and in targeted areas, a paper pack.

There were two key decisions that may have had a detrimental impact on response rates for these areas. The first decision was the removal of paper from the enable phase of list-leave operations as described above. It should be noted that all list-leave operations had been tested with the delivery of paper packs, consistent with international practices.

The second decision was made when management realised they were trending below expected response rates during collection operations. The plan was to run list-leave operations with contact seven days a week from 19 February to 4 March. However, to speed up the process and ensure all households were enabled by census day, the decision was made to remove contact from list-leave operations. At this point, no attempt was made to communicate with anyone in the household and a letter was just dropped off at the doorstep or in the mailbox.

It is our view that the removal of paper combined with no contact directly impacted the response rates in targeted areas. As many of these areas are also highly populated with

sub-population groups such as Māori and Pasifika, it also impacted the response rates for these targeted sub-populations.

4.9   Non-response follow-up (NRFU)

It is our understanding that the planning decision to begin non-response follow-up activities 10 days after census day was driven by the 'digital-first' strategy, whereby the majority of communications and marketing activities were nudging respondents to complete their census online.

As management information reporting showed, while the dwelling and online responses were tracking at or above the expected rates, the overall individual responses were tracking below expected levels of return from census day onwards. While efforts were deployed to address this issue, we believe management was slow to react. Indeed some of the decisions that were taken, such as removing contact and paper from list-leave operations, ultimately increased the burden on NRFU operations, which were already understaffed.

Extra reminder letters had little to no effect, as online responses had likely reached their peak.

The programme also decided not to follow up on partial responses during NRFU. The decision was taken in mid-April that priority be given to fully non-responding households. With limited resources available, extending the follow-up to include partial responses was not feasible. This resulted in an increase in partial responses for both online and paper compared to earlier censuses. Ultimately, with the use of administrative data, we don't believe this materially impacted the priority one variables – those required to meet statutory requirements. However, with evaluation and processing still ongoing, it is too early to confirm the impact this decision had on remaining census outputs.

4.10 Management Information System (MIS)

Data produced by the MIS during collection were signalling early indications of individual response rates tracking below acceptable tolerance level. As noted during our interviews, the process of using MIS to identify emerging issues, agree on solutions, and monitor their impact did not work well. The lack of testing and knowledge of how to use the information resulted in a lack of confidence in the information. When issues of concern were raised by those who were monitoring the MIS, appropriate action was not taken.

Chapter 5: Remediation

We describe as remediation the activities and initiatives that have been initiated by Statistics NZ to compensate for the weaker-than-expected response rates, in order to produce the best possible 2018 Census outputs. For the purposes of the review we have assumed the remediation began once the visit phase concluded. Initially planned for mid-April 2018, this was extended to 29 April. Once the visit phase ended, field operations ceased and efforts to identify, understand, and treat gaps began.

5.1   Governance and leadership

Once the magnitude of the problems in collection operations became clear to the Government Statistician and the ELT, measures were put in place to address the challenges. This included a change to the governance arrangements. In July 2018 the Census and Future Census Board replaced the Census Assurance Board. This was chaired by the Government Statistician until November 2018, when the SRO role was shifted to the Deputy Government Statistician, Census, Communications and Enterprise Portfolio Office. The board has an external independent advisor. A Census and Next Census Programme Manager, with responsibility for managing the completion of the 2018 Census and planning the next census, was appointed at the same time.

The governance changes were appropriate and appear to be focused at the programme level. We have heard that the new arrangements are working more effectively.

We note that the extent of the work to complete the 2018 Census is much greater than would typically be the case had the census gone as planned. As a result combining responsibilities at the programme level for both completing the 2018 Census and planning for the 2023 Census is onerous and could place planning for the 2023 Census at risk.

5.2 Stakeholder engagement

Statistics NZ has put considerable effort into stakeholder engagement following the identification of the issues, much of this undertaken by the Government Statistician and members of the senior leadership and census programme teams.

We heard from a number of stakeholders significant levels of frustration at the lack of information shared about the problems encountered and plans for mitigation. In some instances stakeholders were aware there were issues before any official comment from Statistics NZ.

We note that the Minister of Statistics has been regularly briefed on progress.

While key users, such as the Electoral Commission, government agencies, and iwi, were contacted we believe a more structured programme of regular updates to the public could have been valuable. Much of the feedback has indicated that the visibility of plans for remediation and timing could have been improved.

5.3 Strategic communications

We have reviewed communications over the period since mid-2018. We acknowledge Statistics NZ was in a difficult position. Early work indicated that in order to treat the gaps arising from the lower-than-planned response, the use of administrative data would need to be considerably more extensive than planned. Further, detailed research would be needed to determine the methods to be used in using administrative data and these would need to be tested to ensure that the outputs would meet quality thresholds. As a result it was difficult for Statistics NZ to communicate with certainty the likely outcome for the census and in particular the timing of outputs.

We noted an optimistic tone in communications, particularly as it related to timing expectations and the potential comprehensiveness of outputs.

We also noted that there were lengthy periods between announcements. This created a void of information which was filled by others with significantly less knowledge of the issues.

We understand that Statistics NZ is by nature conservative and careful about what it discloses. However, this needs to be balanced against the need for openness and transparency. We do not see impediments to continuous disclosure of status in terms of response rates, suitably qualified, and planned actions to treat emerging gaps.

5.4   Data quality

In recognition of the requirement for changes in the use of administrative data and the challenges in treating gaps in coverage, Statistics NZ established an external Data Quality Panel of experts in July 2018 to provide advice to the Government Statistician. This was a very important initiative that we endorse.

The panel was initially due to report by the end of April 2019. Due to the length of time it has taken to fully develop the approach to augment the quality of the data, the panel now expects to report at the time of the first release of 2018 Census outputs at the end of September 2019. In the meantime the panel continues to interact with Statistics NZ staff and provide feedback and advice on the approaches as they develop.

In addition to the panel, Statistics NZ also has a detailed quality system in place to assure that the approaches are robust and that the outputs meet the quality thresholds set. In some areas the quality will likely be higher than in previous censuses.

We also understand the detailed research underpinning the approach to the use of administrative data will also be subject to peer review by international experts.

Overall we are satisfied that Statistics NZ has in place a robust set of processes to assure the quality of 2018 Census outputs.

5.5   Census outputs

We have not seen any outputs for the 2018 Census. As we have discussed Statistics NZ is making extensive use of administrative data to treat gaps in response rates and coverage.

From our interviews we understand that it is likely that the counts required for Statistics NZ to satisfy its statutory requirements will be met. In some cases these results could be of a better quality than those of prior censuses. We also understand that there will be variables where the Census output will not meet the quality threshold for publication as official statistics. This does not mean that the outputs will not have any value, but that there will be some qualifications. We understand Statistics NZ plans to issue detailed guidance on their use.

Appendices

Appendix 1

Independent review – terms of reference

Stats NZ
Tatauranga Aotearoa

Terms of reference for an independent review of the 2018 Census

Background

Stats NZ conducts the census every five years (as required by the Statistics Act 1975). The census aims to collect data from all New Zealanders at a given point in time. Its purpose is to provide a complete enumeration of the population at the national level, and to describe the composition and distribution of the population, demographically, geographically, and socially.

Census data informs a range of important national (including statutory) decisions, public policy, and decisions made at local government, business, and community levels.

The 2018 Census was held on 6 March 2018. While parts of the 2018 Census operations worked well, some aspects presented challenges. There has been a high level of public interest in the 2018 Census, including in the lower-than-expected level of participation.

The Government Statistician is seeking robust independent advice on the 2018 Census, with a focus on understanding what factors contributed to the lower-than-expected participation rate, so that future censuses and other household surveys can be as effective as possible. Stats NZ is a learning organisation. It holds itself and the way it delivers official statistics to a high standard. Given the importance of the census and the role it plays in informing decisions that affect the lives of New Zealanders, it is critical that trust and confidence in future censuses are maintained and enhanced.

Purpose and objective

The objective of the Review is to consider the design, implementation, and operation of the 2018 Census; with a focus on participation in and the coverage of the census.

The Review will look at how the 2018 Census performed against Stats NZ's own expectations, the stated objectives and key performance indicators (KPIs), and against international best practice standards. This should include an assessment of the suitability of the KPIs and other measures used for the 2018 Census.

The intent of the Review is to provide advice and make recommendations, so that future censuses and other household surveys can be as effective as possible.

Topics for consideration by the reviewers will include:

- the suitability, effectiveness, and impact of census design, funding decisions, and implementation

- the effectiveness of governance and management decision-making, including contingency and risk management

- responsiveness to te ao Māori and the Crown/Māori relationship under the Treaty of Waitangi in census design and implementation

- the impact of census design and implementation, including mode and format, on census participation, with a particular focus on Māori, Pasifika, disabled people, the LGBTQ+ communities, people living in lower socio-economic areas, remote communities, young people, and senior citizens

- the effectiveness of communication, awareness raising, and engagement activities, including the engagement specific to the groups listed in the bullet point above

- and, any other topics the reviewers decide are of value to support the objective of the Review.

The reviewers and their role

The reviewers are Mr. Murray Jack and Ms. Connie Graziadei.

The reviewers will exercise independent judgement regarding the process they follow as part of the Review, the nature and depth of their investigation, and the communication of their findings and advice.

The reviewers will have access to all Stats NZ documentation, personnel, and internal and external communications that they deem to be relevant. They will engage with Stats NZ staff, third party providers, and key stakeholders, and are expected to seek a wide range of perspectives and views on the 2018 Census, including from Māori and iwi. The reviewers will also have access to the External Data Quality Panel established to provide independent advice to the Government Statistician on the quality of the 2018 Census dataset.

The reviewers will arrange with the Government Statistician for suitable mechanisms to keep her up to date on the progress of the Review. Given that the census cycle means Stats NZ will need to begin planning for the next census during the Review and that non-census survey activity is ongoing, it is expected that the reviewers may wish to share interim findings or advice as they proceed.

A secretariat will be established to support the Review. Stats NZ will host the secretariat.

Phases and time frames

The Review will be conducted in two parts, recognising that data processing and analysis of 2018 Census is still ongoing. This approach will enable the Review to commence without compromising the work still underway to deliver census results.

1. The first part will focus on assessing the design, planning and collection phases of the census (as these phases are already completed). This will include information gathering and analysis, making use of the census business case, planning documentation, operational management information, project closure reports, and interviews with staff. It will also include gathering information from key stakeholders and interest groups on their experience of the 2018 Census. At the completion of this phase the Terms of Reference may be reviewed, and if amended, made public.

2.   The second part will focus on providing any further findings arising from consideration of the data processing and analysis phase of the census and providing overall conclusions from the Review.

A final report of the Review will be delivered no later than July 2019.

The Review will report back to the Government Statistician. A copy of the report will be provided to the Minister of Statistics and the State Services Commissioner at the same time. The final report will be publicly released on the Stats NZ website as soon as practicable.

Appendix 2

Information sources

Published documents

Carl Bakker (2013), *Valuing the Census*, April 2013

Census Independent Assurance Panel to the Australian Statistician (2017), *Report on the Quality of 2016 Census Data*, June 2017

Conference of European Statisticians (2015), *Recommendations for the 2020 Censuses of Population and Housing*, New York and Geneva, 2015

International Encyclopedia of the Social Sciences, https://www.encyclopedia.com

Statistics New Zealand (2016), 2018 Census Strategy

Statistics Act 1975

United Nations Economic Commission for Europe (2013), *The Generic Statistical Business Process Model V 5.0*, December 2013

Statistics NZ documents

Programme artefacts including:

2018 Census contract management review (conducted by McHale Group Ltd., June 2017)

2018 Census content consultation and engagement plan

2018 Census Data Quality Management Strategy

2018 Census Focussed Detail Business Case (17 June 2014)

2018 Census operational review (conducted by the Australian Bureau of Statistics, August 2018)

Census governance boards and project teams – Terms of reference and minutes

Census presentations and technical seminars

Programme and project closure reports for the 2018 Census

Programme and project plans for the 2018 Census

Quality assurance reviews

Organisations and individuals consulted/interviewed during the review

NZ Ministers of Statistics

Statistics NZ

Government Statistician

Executive Leadership Team

Census management and staff (current and past)

2018 Census External Data Quality Panel

Iwi Data Leaders Group

Te Mana Raraunga (Māori Data Sovereignty Network)

Government agencies/departments

Department of Internal Affairs

Department of the Prime Minister and Cabinet

Electoral Commission

Human Rights Commission

Land Information NZ

Ministry of Education

Ministry of Health

Ministry of Social Development

State Services Commission

Te Puni Kōkiri

Treasury

International statistical organisations

Australian Bureau of Statistics

United Kingdom Office of National Statistics

Statistics Canada

Local government organisations

Far North District Council

Porirua City Council

Westland District Council

Whangarei District Council

District Health Boards

Auckland

Canterbury

Counties Manukau

Northland

Waitemata

Community Groups

Census Far North Hub Administrator

English Language Partners

Ngati Hine Forestry Trust

Ngāti Hine Health Trust

Safer Aotearoa Family Violence Prevention Network

Te Kaha o Te Rangatahi, Manurewa

Disability sector

Brain Injury Association Wellington

Blind Citizens New Zealand

Cerebral Palsy Society

Deaf Aotearoa

Disabled Persons Assembly NZ

Mental Health Foundation NZ

Office of Disability Issues

Rainbow sector

InsideOUT

Intersex Awareness NZ

Rainbow Youth

Rainbow Wellington

Seniors sector

Age Concern NZ

Office for Seniors

SeniorNet Federation of NZ

Senior Net Wellington

Youth sector

Wellington City Council Youth Council

Vendors

Auckland University

Madison

SilverStripe

True North

Appendix 3

2018 Census Quality Priority Variables

All information gathered is determined to be 'on census night'. For more details, please refer to the 2018 Census Data Quality Management Strategy.

Priority one

Count of the population

Count of dwellings

Meshblock location of each dwelling

Age of all respondents

Sex of all respondents

Location of all respondents

Usual residence

Ethnicity of all respondents

Number of occupants

Māori descent

Unoccupied dwelling

Priority two

Families and households	Family type
	Child dependency status
	Household composition
	Extended family type
Usual residence one year ago	
Occupied dwelling type	
Tenure of household	Ownership of dwelling
	Mortgage payments
	Weekly rent paid by household
Iwi affiliation	
Work and labour force status	Job indicator
	Hours worked in employment per week
	Job search methods
	Available for work
	Seeking work
Birthplace	
Status in employment	
Legally registered relationship status	

Partnership status in current relationship	
Total personal income	
Sources of personal income	
Sector of landlord	
Highest qualification	Highest secondary school qualification Level of post-school qualification
Field of study	
Overseas qualification indicator	
Study participation	
Main means of travel to work	
Main means of travel to education	
Educational institution address	
Workplace address	

Priority three

Occupation

Industry

Sector of ownership

Languages spoken

Number of rooms/bedrooms

Number of children born

Years since arrival in New Zealand

Years at usual residence

Main type of heating

Dwelling mould indicator

Dwelling dampness indicator

Access to basic amenities

Access to telecommunications systems

Number of motor vehicles

Unpaid activities

Individual home ownership

Religious affiliation

Cigarette smoking behaviour

Disability/activity limitations

Appendix 4

Glossary of technical terms

Area design – the way in which New Zealand is divided geographically to ensure census collection activities are monitored and managed effectively.

Assisted completion events – events supported by census field staff to assist communities in completing their census forms.

Early visit – field staff visited targeted areas to provide households with paper packs to encourage self-response. This operation was planned for seven days before mainstream non-response follow-up operations began.

Enable – a phase of the census process whereby the public is provided with the tools needed to be able to participate in the census. In 2018, respondents had the option of responding online or on paper.

Full enumeration – field staff were based in a community to assist residents with the completion of census questionnaires (either online or paper).

Imputation – the process of replacing missing data with substituted values. Unit imputation is the substitution for non-response; item imputation improves quality and is the substitution for a missing variable.

Internet Collection System (ICS) – the online channel developed to provide citizens with the portal to complete their census forms.

Key performance indicators (KPIs) – indicators of progress toward an intended result. KPIs provide a focus for strategic and operational improvement, create an analytical basis for decision-making, and help focus attention on what matters.

List-leave with contact – a collection strategy whereby field officers visit households, list the address of the dwelling, promote the census, and leave the tools required to enable them to participate.

Meshblock – the smallest geographic unit for which statistical data is collected and processed by Statistics New Zealand.

Mode assignment – determines the way in which census material is delivered, in order to facilitate respondent participation and maximise coverage in the census in the most cost-effective and appropriate way.

Non-response follow-up (NRFU) – the 'visit' phase of the census process whereby non-responding households receive a visit from a census worker to remind and encourage members of the household to respond.

Statistical Area 1 (SA1) – an output geography that is created by joining meshblocks. The main purpose is to release more low-level data than is available at the meshblock level. SA1s have an ideal size range of 100–200 residents and a maximum population of about 500. In 2018 there were almost 30,000 SA1s.