UK Statistics Authority

Assessment of compliance with the Code of Practice for Official Statistics

Special Assessment of the 2011 Censuses in the UK: Phase 3

(produced by the Office for National Statistics, National Records of Scotland and the Northern Ireland Statistics and Research Agency)

Assessment Report 318   November 2015

About the UK Statistics Authority
The UK Statistics Authority is an independent body operating at arm's length from government as a non-ministerial department, directly accountable to Parliament. It was established on 1 April 2008 by the *Statistics and Registration Service Act 2007*.

The Authority's overall objective is to promote and safeguard the production and publication of official statistics that serve the public good. It is also required to promote and safeguard the quality and comprehensiveness of official statistics, and good practice in relation to official statistics.

The Statistics Authority has two main functions:
1. oversight of the Office for National Statistics (ONS) – the executive office of the Authority;
2. independent scrutiny (monitoring and assessment) of all official statistics produced in the UK.

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NATIONAL STATISTICS STATUS

National Statistics status means that official statistics meet the highest standards of trustworthiness, quality and public value.

All official statistics should comply with all aspects of the *Code of Practice for Official Statistics.* They are awarded National Statistics status following an assessment by the Authority's regulatory arm. The Authority considers whether the statistics meet the highest standards of Code compliance, including the value they add to public decisions and debate.

It is a producer's responsibility to maintain compliance with the standards expected of National Statistics, and to improve its statistics on a continuous basis. If a producer becomes concerned about whether its statistics are still meeting the appropriate standards, it should discuss its concerns with the Authority promptly. National Statistics status can be removed at any point when the highest standards are not maintained, and reinstated when standards are restored.

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The UK's decennial population census is central to decisions in all areas of society – whether by businesses, councils, the health service or charities. It is the basis of population estimates; it underpins funding formulae; it provides insight into the well-being and needs of communities throughout UK society. It is also the most expensive single statistical undertaking – getting it right matters, both in terms of providing value for this spending of public money, as well as in ensuring that users base these important decisions on trusted and high quality data.

The positive user feedback highlighted in this Assessment reveals areas of success and strength – the responsiveness of the statistical teams, the willingness to understand the nature of use and seeking better ways of communicating the statistical messages. Behind the innovative dissemination is a vast operational challenge. Each of the census offices showed admirable insight into the areas of learning that they gained across their census operations; not least including a greater use of administrative data to quality assure census data. To recognise the areas of success and to repeat them is important and understanding and appreciating the areas of improvement and learning from them is vital. I encourage each of the producer bodies to reflect on these lessons and to ensure that their value is realised across their statistical teams, beyond the census. But the extent of replicating areas of successful good practice and learning lessons is not limited to census offices. I encourage all statistical producers to reflect on the findings of this report, and for the census offices to play a leading role in sharing these experiences with other official statistics producers.

The 2021 Census planning is underway; these censuses are required to draw more heavily on administrative data. There is a need to create the pathways for sharing from census to non-census areas now, so that the administrative data lessons are learned quickly. But that pathway is not one-way: there is great knowledge about using administrative data across the Government Statistical Service for non-Census purposes. We are seeing that understanding grow as teams apply the Authority's Quality Assurance for Administrative Data (QAAD) tool kit[1]. Census teams should also learn from this experience, as well as from QAAD itself.

There is much to be proud of in the achievements of the census offices and even more to be gained by sharing the understanding and experience. I am encouraged by the collaborative approach between the producer teams, as well as with users. Addressing the actions in this report will enhance the trustworthiness, quality and value of the 2021 Census statistics and help realise the greater benefit across the statistical system.

Ed Humpherson
Director General for Regulation, UK Statistics Authority

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[1] http://www.statisticsauthority.gov.uk/assessment/monitoring/administrative-data-and-official-statistics/index.html

Section 1: Executive Summary

Introduction

1.1   The population census is one of the most important sources of official statistics, informing decisions about almost every aspect of life within the UK and its communities. These include: policy decisions informed for example by understanding the pressures on transport networks and housing stock; guiding support to particular communities by evaluating the extent and nature of disadvantage in the UK, and investment decisions, such as where to place new schools or supermarkets. It is of fundamental importance in allocating billions of pounds to local areas by the UK government and devolved administrations, as well as grants to voluntary sector organisations. And the census helps every person in the UK get a better understanding of the places in which they live and work. This report brings to a close the Assessment of the official statistics from the three censuses conducted in 2011 in England and Wales, in Scotland, and in Northern Ireland.

1.2   This is one of a series of reports[2] prepared under the provisions of the *Statistics and Registration Service Act 2007*[3]. The Act gives the Statistics Authority power to re-assess whether the *Code of Practice for Official Statistics*[4] continues to be complied with in relation to official statistics already designated as National Statistics. The report covers the sets of statistics produced by the Office for National Statistics (ONS), National Records of Scotland (NRS), and Northern Ireland Statistics and Research Agency (NISRA), and reported in:

- 2011 Census for England and Wales statistics[5]
- 2011 Census for Scotland statistics[6]
- 2011 Census for Northern Ireland statistics[7]

1.3   The Authority conducted the Assessment in three phases. The first two phases concentrated on the planning and consultation activities undertaken by the census offices, and the production and output plans (see Annex 1 for more information on the Assessment process). The statistics received their designation as National Statistics after phase 2, on the completion of a range of activities (detailed in Annex 2) to achieve compliance with the *Code of Practice for Official Statistics*. This third phase reviews the delivery of the statistics and users' experiences, to determine the continuing compliance with the *Code of Practice.*

1.4   This report was prepared by the Authority's Assessment team, and approved by the Regulation Committee on behalf of the Board of the Statistics Authority, based on the advice of the Director General for Regulation. The Authority confirms that the 2011 Census statistics are produced in compliance with the *Code of Practice for Official Statistics*, meaning that these official statistics meet the highest standards of trustworthiness, quality and public value. As part of the

[2] http://www.statisticsauthority.gov.uk/assessment/assessment-reports/index.html
[3] http://www.opsi.gov.uk/Acts/acts2007/pdf/ukpga_20070018_en.pdf
[4] http://www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html
[5] http://www.ons.gov.uk/ons/guide-method/census/2011/index.html
[6] http://www.scotlandscensus.gov.uk/census-results
[7] http://www.nisra.gov.uk/census/2011/results.html

planning for the 2021 Census, ONS, NRS and NISRA should consider the suggestions listed below. The Authority will review the producer bodies' responses to this Assessment report as part of its Assessment of the 2021 Census.

We suggest that ONS, NRS and NISRA:

1	Share their experiences of effective engagement gained on the 2011 Census with other statistical teams (para 1.12).
2	Further develop partnerships with key users and census data distributors to: • facilitate the wider use of the data and statistics by other users, such as through collaboration with, and support provided to, voluntary sector groups, local government, census data resellers and data application developers • consider secondments to develop knowledge and a common understanding between the statistical producer, data suppliers and user organisations • identify opportunities for data suppliers and users to contribute to the quality assurance of official statistics and the development of outputs (para 1.18).
3	Discuss with users the potential for: • enabling the quicker release of data, including for small areas such as the travel to work data • widening access to anonymised samples such as by users in the commercial and local government sectors • greater flexibility in creating univariate and multivariate tables for bespoke geographies and population groups (para 1.26).
4	We suggest that each statistical producer implement ways of informing users of substantive revisions alongside the statistics in the context of the developments in online dissemination (para 1.27).
5	Identify (together with WG): • the areas of success and how to build on them • the areas of practice where alternative approaches would strengthen the delivery of the census in each country, as well as in delivering comparable and consistent UK census data and statistics • the needs of users in relation to cross-UK census data and how well these were met by the 2011 Census (para 1.32).

Summary of Assessment findings and conclusions

1.5   The main messages emerging from our review of the 2011 Census, informed by feedback about the experiences of both users and the statistical producers, as well as from the published documentation and census outputs, concerned:

- the effectiveness of engagement with users
- collaboration and partnership
- accessibility and dissemination
- coherence across the UK

In particular, we discuss the findings in relation to the common themes and lessons that the statistics producers can apply more broadly.

User engagement

1.6   As part of the development of this report we spoke to a number of users of Census outputs in each census office area. By necessity this user engagement did not have the scale of the engagement that each of the census offices carried out before, during and after the 2011 Census; however we ensured that our consultation covered a wide range of users in terms of topic areas, interests and level of use of the data. Users were very positive about the overall conduct and quality of the data from each of the 2011 Censuses. The scale of this achievement contrasts with the dissatisfaction which accompanied the 2001 Census in England and Wales in some local areas. The success, particularly for ONS, reflects the deep reflection and learning it undertook after that census and throughout the development of the 2011 Census. A key part of this was the work with local authorities – both in developing a better understanding and approach to the use of administrative data to support quality assurance, and in supporting the participation in, and enumeration of, the Census.

1.7   Users said that, overall, they felt that the user engagement approaches were successful, and that the statistical producers were responsive in answering queries and in accommodating their needs. One especially effective approach used by NRS was the roundtable sessions in which users shared their experiences and questions in a number of small groups, each facilitated by an NRS analyst. Users found the roadshows run by ONS helpful, but more as a way of hearing the latest news and developments. The Census Advisory Groups[8] were a constructive means for users from a range of backgrounds to provide advice and reflect their particular perspectives and needs. The engagement mainly occurred in the initial stages – through the planning and production of the Census. Those groups convened especially for the Census met infrequently in later stages.

1.8   NISRA was able to build on its strong ties with its community of users through the 2011 Census. In its lessons learnt, NISRA identified the importance of direct contact with users. Comments from users reiterated that they found the opportunity for an in-depth conversation about their experiences and concerns helpful.

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[8] The Census Advisory Group for NRS was the Population and Migration Statistics (PAMS) Committee (Scotland): http://www.nrscotland.gov.uk/statistics-and-data/statistics/user-consultations-groups-and-seminars/the-population-and-migration-statistics-committee-scotland-pams

1.9   StatsUserNet[9] – the online forum hosted by the Royal Statistical Society – was a helpful tool enabling users and producers to share news and comments. Users from a range of backgrounds used it for seeking advice and sharing views. It was an effective vehicle for promoting consultations and for obtaining an early insight into potential issues in the statistics and their delivery, primarily used by ONS. In Scotland, ScotStat[10] was a useful tool for sharing comments and provided a central means for NRS to directly contact users.

1.10   Statistical producers should carefully consider the timing of consultations and engagement, to avoid clashes such as with holidays, elections, and other consultations. ONS recognised the importance of undertaking engagement throughout the planning, production and dissemination phases after local government users had to draw attention to their needs and difficulties in accessing information in later release phases. There can be a danger that the main census programme ends while the main use of the data and statistics is in its early stages by users. While we recognise that there can be a necessary overlap between the completion of this phase of the ongoing census and the initiation of planning and consultation for the next census, producers need to make clear to users that their ongoing requirements will continue to be met.

1.11   Adopting a range of methods of engaging allows users to provide their feedback in ways that best suit them, and enables the statistical producers to gain a wider perspective of users' experiences. The consultation and engagement with users has begun for the 2021 Census. We welcome the alternative means of engaging users that the census offices are considering, such as Citizen Space[11], webinars and social media.

1.12   *We suggest that the statistical producers share their experiences of effective engagement gained on the 2011 Census with other statistical teams.*

Collaboration and partnership

1.13   The high level of satisfaction among users with the 2011 Census was partly driven by the open, mutual approach to engagement and collaborative working adopted by the statistical producers. We regard it as an example of good practice that other statistical producer teams can also apply.

1.14   NRS played an advisory role with some voluntary sector groups, demonstrating the partnership style of engagement used by the census offices. It also established collaborations with academics. The Church of Scotland project[12] to create census reports for each parish in Scotland is a good example of NRS's support providing wider benefits. Other local groups and councils used the resulting products, with their bespoke geography.

1.15   ONS supported users in the commercial sector by providing regular contributions to the Census & Geodemographics Group[13] of the Market Research Society and to the Demographics User Group[14]. Both provided detailed, expert feedback throughout the Census. ONS also developed strong

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[9] http://www.statsusernet.org.uk/home
[10] http://www.gov.scot/Topics/Statistics/scotstat
[11] http://www.citizenspace.com/info
[12] http://www.scotlandscensus.gov.uk/church-scotland
[13] https://www.mrs.org.uk/mrs/census_and_geodemographics_group
[14] http://www.demographicsusergroup.co.uk/

ties with the UK Data Service[15] (UKDS) and provided much of its support regarding delivery of the data to academics via UKDS. The relationships with UKDS and other census data distributors such as SASPAC[16] were central in helping ONS to improve the consistency of the data and variable structures across the table specifications. These improved the design of the batch files and the effectiveness of the machine loading of high volume census outputs.

1.16   The census offices also drew on the expertise of academic and local authority users in the planning and testing of the Census – in relation to the content, as well as quality assurance. NRS formed a local testing panel for checking the data, drawing on the panel members' specific knowledge of the areas. ONS also used an independent review panel to confirm the quality of the data, considering methods, data sources and key estimates for specific issues and groups.

1.17   We commend the census offices for the ways that they have each worked with key users and census data distributors.

1.18   *We suggest that ONS, NRS and NISRA further develop such partnerships to:*

- *facilitate the wider use of the data and statistics by other users, such as through collaboration with, and support provided to, voluntary sector groups, local government, census data resellers and data application developers*

- *consider secondments to develop knowledge and a common understanding between the statistical producer, data suppliers and user organisations*

- *identify opportunities for data suppliers and users to contribute to the quality assurance of official statistics and the development of outputs*

Accessibility and dissemination of Census statistics

1.19   The power of the census is in being able to provide a rich picture of the population, while at the same time enabling the further use of the detailed information for small geographical areas within the UK countries. Its richness in detail matches the variety of uses and users. In response to the different needs and skills of users, the census offices adopted a range of approaches for disseminating the data, supported by statistical summaries and detailed analyses, definitional information and user guides. These provided clear and helpful explanations and guidance to the census data and main findings. In addition, each of the census offices published supporting methodological and quality information to assist with users' understanding and interpretation of the Census results. Census estimates at a UK level were also made available from the European Census Hub[17].

1.20   Users greatly valued the use of infographics and interactive data visualisations, particularly to support sharing the findings from the Census with non-expert audiences. ONS told us that local government users were keen to be able to use similar infographics themselves, asking if the census offices could provide templates for them to insert their local data.

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[15] http://census.ukdataservice.ac.uk/

[16] http://saspac.org/

[17] http://www.ons.gov.uk/ons/rel/census/2011-census/european-commission-census-regulation-statistics/index.html

1.21 NISRA was able to adapt its Northern Ireland Neighbourhood Information Service[18] (NINIS) for use as its census dissemination tool. While not ready for the early releases of census data, the other census offices had some success with the development and release of their data explorer tools. It will be important to build on these recent achievements, by continuing the improvements in the light of user feedback about their functionality, and in extending the range of data sources available through them.

1.22 The richness of detail in the census provides one of its greatest challenges – providing entry points that quickly assist users in locating the information of specific interest. The dissemination approach, based around a model of high volume of predesigned data tables, compounded the difficulties. The census offices responded to the challenge by providing data table finders and index lists with search functions. These solutions were of help, but users still reported having difficulties in locating specific items.

1.23 Flagging corrections to data presented in data dissemination tools is challenging. ONS and NRS do not currently indicate and explain corrections alongside the data on their new data explorers, although they are working to provide relevant guidance notices. ONS found a solution for Nomis[19], its official labour market statistics web tool managed by Durham University.

1.24 Users also reported a desire for greater flexibility in table design. The census offices well understand the constraints of the current approach. They have responded positively to feedback from some expert users promoting an alternative model of using common data structures to underpin the data, together with user-defined tabulation and automated disclosure control. The implications of the change in approach, for example that some detail may not be possible, need to be clear in guiding the design of future systems. As well as new challenges, however, the alternative approach will present new opportunities for use.

1.25 Users from each of the countries strongly expressed their need for the more timely release of data and their disappointment that there was no substantial improvement compared with 2001 Census. This was a particular concern of users of small area data, including the flow data (such as travel to work).

1.26 *We suggest that ONS, NRS and NISRA discuss with users the potential for:*

- *enabling the quicker release of data, including for small areas such as the travel to work data*

- *widening access to anonymised samples such as by users in the commercial and local government sectors*

- *greater flexibility in creating univariate and multivariate tables for bespoke geographies and population groups*

1.27 *We suggest that each statistical producer implement ways of informing users of substantive revisions alongside the statistics in the context of the developments in online dissemination.*

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[18] http://www.ninis2.nisra.gov.uk/
[19] http://www.nomisweb.co.uk/census/2011

Coherence of 2011 Census across the UK

1.28   The National Statistician and the Registrars General for Scotland and Northern Ireland established an agreement[20] that set out the basis for the harmonisation of the three 2011 Censuses. It included the date of the Census (27 March 2011); a common population base (usual residents), applied to a set of standard outputs; a range of harmonised questions and outputs (particularly univariate tables); a consistent approach to disclosure control, estimation method to adjust for under-enumeration, and the timing of release. ONS published the UK-wide statistical outputs from a single unit record file to ensure harmonised statistics.

1.29   ONS sought the views of its Census Advisory Group[21] about what went well and their suggestions for improvement. Part of the feedback identified the benefit of the consistent set of univariate statistics across the UK at output area level. However, the users said that there is a need to maintain consistency across the 'local characteristics' data tables across the UK. Users shared similar views with us during our consultation. They also identified a need for improved consistency across the three census offices in applying statistical disclosure control within data tables. The census offices did not make consistent choices where they changed table designs due to the need to protect confidentiality. This made it difficult for users to compare the results.

1.30   A major strength of the approach taken by the census offices was to communicate frequently throughout the planning and delivery stages. NISRA found the daily teleconferences with ONS worked particularly well to support the quality assurance activities. NRS, which undertook its own census processing and production for the first time, experienced a significant delay in the timing of its releases compared with the original plans. An advantage of the later running of the processing by NRS was that its team was able to learn from the experiences of ONS and NISRA in developing data testing and quality assurance approaches. However, it also caused corresponding delays to the production of the UK-wide statistics. The release of population counts by five-year age bands and sex for local authorities across the UK as a whole occurred in March 2013 when the Scotland data were available.

1.31   The three census offices have each reviewed their own operations and documented their lessons learnt. It would be beneficial for them (with the Welsh Government (WG)), in supporting their continued shared statistical activities, to consider their experiences of working jointly to deliver census outputs that meet that the local, as well as UK-wide needs.

1.32   *We suggest that ONS, NRS, NISRA and WG together identify:*

- *the areas of success and how to build on them*

- *the areas of practice where alternative approaches would strengthen the delivery of the census in each country, as well as in delivering comparable and consistent UK census data and statistics*

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[20] http://www.ons.gov.uk/ons/guide-method/census/2011/the-2011-census/the-2011-census-project/national-statistician-and-registrars-general-s-agreement---august-2012.pdf
[21] http://www.ons.gov.uk/ons/guide-method/census/2011/consultations--users-and-local-partners/user-and-advisory-groups/general-cag/cag-presentations/index.html

- *the needs of users in relation to cross-UK census data and how well these were met by the 2011 Census*

Section 2: Census assessment process

2.1 The population census is the largest and most high-profile statistical operation conducted in the UK, although with separate censuses in England and Wales[22] (by ONS), Scotland (by NRS[23]) and Northern Ireland (by NISRA). In this report, we generally refer to 'the Census' to include the three separate censuses. We also refer to ONS, NRS and NISRA collectively as 'the census offices'.

2.2 The Authority has carried out its Special Assessment of the 2011 Census in three phases:

- The first phase, carried out between October 2009 and January 2010, assessed compliance with the *Code of Practice for Official Statistics* for those areas where the planning for 2011 was essentially complete at the end of 2009. The Authority published the Assessment report from this phase in March 2010[24]

- The second phase assessed compliance with most of the remaining *Code* practices, in particular plans for developing and disseminating 2011 Census outputs. This Assessment report was published in June 2011[25]

- The third phase – which this report covers – was carried out after the release of the first Census outputs (from July 2012 onwards), and involved an assessment of the statistical outputs in the light of users' views

2.3 Phase 2 led to ten Requirements, with a deadline of January 2012 (listed in Box 1 below). Annex 1 summarises the actions taken by each of the census offices with respect to each Requirement. In June 2012 the Statistics Authority confirmed the designation of the 2011 Census statistics for each of the separate censuses[26,27,28] as National Statistics.

2.4 The Phase 3 assessment is a review of the continuing compliance with the *Code* by the census offices. It commenced in July 2012 after the release of the first Census outputs. We considered the 2011 Census statistics in relation to:

- Their orderly and impartial presentation, released free from political pressures

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[22] ONS is responsible for conducting the Census in England and Wales but the Welsh Government has also published Census results, focusing on the key trends for Wales. These are reviewed alongside the outputs from ONS, in Section 3

[23] On 1 April 2011, General Records Office Scotland (GROS) merged with the National Archives of Scotland to form a new body, the National Records of Scotland (NRS): http://www.scotland.gov.uk/News/Releases/2011/03/10144001. In this report we refer to GROS as it was responsible for planning the 2011 Census in Scotland

[24] http://www.statisticsauthority.gov.uk/assessment/assessment/assessment-reports/assessment-report-28---census-phase-1--8-march-2010.pdf

[25] http://www.statisticsauthority.gov.uk/assessment/assessment/assessment-reports/assessment-report-115---census-phase-ii.pdf

[26] http://www.statisticsauthority.gov.uk/assessment/assessment/assessment-reports/confirmation-of-designation-letters/letter-of-confirmation-as-national-statistics---assessment-reports-28-and-115---england-and-wales.pdf

[27] http://www.statisticsauthority.gov.uk/assessment/assessment/assessment-reports/confirmation-of-designation-letters/letter-of-confirmation-as-national-statistics---assessment-reports-28-and-115---northern-ireland.pdf

[28] http://www.statisticsauthority.gov.uk/assessment/assessment/assessment-reports/confirmation-of-designation-letters/letter-of-confirmation-as-national-statistics---assessment-reports-28-and-115---scotland.pdf

- That the statistics are produced to a level of quality that meets users' needs and accompanied by appropriate information about the quality of the statistics

- That the statistics are accompanied by full and frank commentary, readily accessible to all users

2.5 As well as reviewing the published outputs, we sought the views of a range of users. The feedback focused on the users' experience of using the 2011 Census statistics, the nature of their use and how well they believed the statistical outputs met their needs. We contacted users through StatsUserNet, via the Authority website, and directly with invitations to complete a brief questionnaire or for interview. The feedback received in relation to the Census in each country is summarised in the country practice profiles in Sections 3 to 5.

Box 1: Ten requirements from Phase 2

1. Publish information about the outcomes from user consultations in a timely manner and explaining clearly decisions based on these consultations

2. Inform users about any changes to plans for publishing the outputs prospectus and timetable, explaining clearly the reasons for any changes

3. Publish more information about Census Advisory Groups and about the UK Census Outputs Working Group

4. Adopt clear pricing policies for any supplementary statistical services related to Census outputs

5. (GROS and NISRA) improve the signposting to relevant methodology papers on ONS's website

6. (GROS and NISRA) publish details of quality assurance advisory groups and accessible information about plans for quality assuring Census data

7. Publish accessible information about Census output geography to help users understand the policies and why key decisions were made

8. Publish information about statistical disclosure control methodology to help non-expert users understand the methods and why they were chosen

9. Publish plans to develop commentary and analysis that aid interpretation of the Census results

10. Publish a list of administrative sources which will be used to quality assure the Census results, and information about the quality of these sources

Section 3: A review of statistics from 2011 Census for England and Wales produced by the Office for National Statistics (ONS) and additional statistics produced by Welsh Government (WG)

3.1   This country profile summarises the statistical practices of the statistical producers in three main areas: user engagement, dissemination and accessibility of the data and statistics, and lessons learnt.

Findings

3.2   Users providing feedback to the Authority were satisfied with the quality of the 2011 Census data, the nature of the presentation of the census statistics and supporting information, and accessing the data through Nomis. But some reported difficulties using ONS's website and accessing small area data in secure settings; would like more flexible ways of creating tables of their own design; and the more timely release of census statistics. Overall, users were positive about their engagement with ONS. However, they identified the need to continue engagement after the initial phases, to support the use of the data. (See paragraphs 3.6 to 3.11.)

3.3   ONS's statistical bulletins were straightforward to read, with clear summaries of the main findings, and helpful, well-designed charts, maps and tables. The summary and detailed reports were successful in providing greater insight into the census data. The infographics were also an effective means of highlighting key findings, while the interactive tools were a popular means of engaging non-expert users. (See paragraphs 3.12 to 3.17.)

3.4   ONS used existing tools for the release of census reference data tables through its website, Nomis[29] and Neighbourhood Statistics[30] (NeSS). It released anonymised samples of individual records in safeguarded data sets and via secure settings for approved researchers. It has begun to release data through a new, online data explorer which has promise for supporting easy access to a range of data for non-expert and expert users. It has also developed a new application programming interface which enables access by other websites to utilise the data. (See paragraphs 3.18 to 3.30.)

3.5   ONS conducted a thorough and frank evaluation of its operation and production of the 2011 Census. The evaluation provides a sound basis for ONS's ongoing development of official statistics, including: the use of alternative sources and methods; quality assurance approaches; dissemination systems and procedures; engagement with users, and collaborations with data supply partners and other statistical producers. (See paragraphs 3.31 to 3.39.)

User engagement – some users' views

3.6   We invited responses through StatsUserNet and the Authority's website, as well as by directly contacting users from a range of different sectors. We received six email responses and spoke with six individual users and a user

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[29] http://www.nomisweb.co.uk/census/2011

[30] http://neighbourhood.statistics.gov.uk/dissemination/datasetList.do?$ph=60&updateRequired=true&step=1&CurrentTreeIndex=-1&Expand1=1#1

group. Five of the individual users were from local government. We also received comments from two groups of commercial users, as well as users in a non-departmental public body, the voluntary sector and an academic.

3.7 Their use of census data ranged from: informing local planning such as for housing, education, transport and health services; business decisions, such as using bespoke small area geographies for understanding catchment areas and developing geodemographic products; bids for grants and lobbying; and, carrying out research such as supporting the deeper understanding of health and socio-economic topics. The users produced their own local area profiles, detailed analyses of the characteristics and experiences of specific population sub-groups. Third-party census data distribution organisations such as the UK Data Service and its InFuse website[31], and the Greater London Authority with its software tool, SASPAC[32], also supported users.

3.8 Overall, the users were very positive about the 2011 Census for England and Wales in terms of its data quality and the responsiveness of ONS. Some users had had direct contact with ONS through roadshows, user group meetings and advisory groups. They reported engagement as particularly intense in the early days, during the planning and the first releases, but then tailed off. One local government user in the CLIP[33] group said that they had to collate responses from other users and write to ONS to press for further engagement. The local government users valued ONS's collaboration during enumeration and the use of local data in the quality assurance.

3.9 Users were broadly content with the presentation of data and metadata. They would have liked data released in a more timely way and had expectations of a quicker release than achieved with the 2001 Census. However, users were frustrated with the changes to the design of tables which happened following the application of statistical disclosure control (such as record swapping) and in an attempt to rationalise the complicated design and inconsistencies between datasets. ONS told us that this change in approach to design and releasing data was discussed with users at a workshop in May 2013. From 31 July 2013 to March 2014 a series of Local Characteristics[34] data were released, but some users told us that they were unhappy with the delayed release of these outputs.

3.10 Users said ONS's website was hard to use for searching for specific information; however, they found Nomis straightforward to use for accessing the detailed tables. There was strong interest in more flexible ways of creating bespoke tables. The users accessing data through bulk data downloads said they were generally satisfied with accessibility. However, they are looking forward to being able to use the ONS API in future. Some users, particularly in commercial organisations and local government, were dissatisfied with the restrictions on accessing safeguarded and secure datasets containing detailed small area data.

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[31] http://infuse.mimas.ac.uk/
[32] http://saspac.org/
[33] Central and Local Information Partnership: http://clip.local.gov.uk/lgv/core/page.do?pageId=32017
[34] Local Characteristics data included tables on ethnicity, national identity, language and religion, health and unpaid care, migration, demography and families, housing, labour market, qualifications, travel to work, and car or van availability

3.11   Some users said that they would have liked greater consistency between the census data across the UK countries in terms of data definitions, table structures, release schedules, the coordination of production of outputs and engagement.

Review of statistical outputs

3.12   ONS released its first statistics[35] from the 2011 Census for England and Wales on its website on 16 July 2012 – around 16 months after the Census was taken (on 27 March 2011) and one month sooner than for the 2001 Census. The release included the headline estimates of the usually resident population for England and Wales at regional and local authority level by age and sex, and estimates of occupied households.

3.13   ONS published 64 releases[36] of census data between July 2012 and March 2015, with 45 for England and Wales, seven specifically for Wales and 12 UK releases. ONS presented the data in reference tables on its website, in Nomis and Neighbourhood Statistics, and as samples of anonymised individual-level census records (i.e. microdata). It published 13 statistical bulletins, focusing on the headline estimates and main findings for census topics. ONS published the bulletins on its website, with additional narratives in short articles called 'stories' and concise topical analyses in articles called 'summaries'. It illustrated the statistics using infographics and interactive data visualisations[37], such as maps and comparator tools for various topics (such as ethnicity; religion; country of birth and passport) and animated population pyramids for 2001 and 2011 Censuses. It also released video summaries explaining the findings in some of the bulletins. ONS followed up the descriptive statistics in the bulletins with analytical reports[38], providing further insight into topics such as migration, health and disability, ethnicity and national identity, travel to work, labour market, and housing.

3.14   The statistical bulletins[39] gave the main findings for the key demographic characteristics of the population, as well as for specific topics, such as the provision of unpaid care and migration. They provided helpful background and context to support the use of the more detailed data in subsequent releases for local and small areas. Each bulletin contained supporting material with definitional information, and an explanation of the purpose of the Census, highlighting some of the uses of the data. Narratives of the findings for each census topic were given at the national level; they also summarised the patterns among local authorities. The bulletins illustrated the statistics using charts, maps and tables. ONS accompanied these outputs with updates to the user guide, including links to further sources of information.

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[35] http://www.ons.gov.uk/ons/rel/census/2011-census/population-and-household-estimates-for-england-and-wales/index.html
[36] http://www.ons.gov.uk/ons/guide-method/census/2011/census-data/2011-census-data-catalogue/census-data-quick-view/index.html
[37] http://www.ons.gov.uk/ons/guide-method/census/2011/census-data/2011-census-interactive-content/index.html
[38] http://www.ons.gov.uk/ons/guide-method/census/analysis/index.html
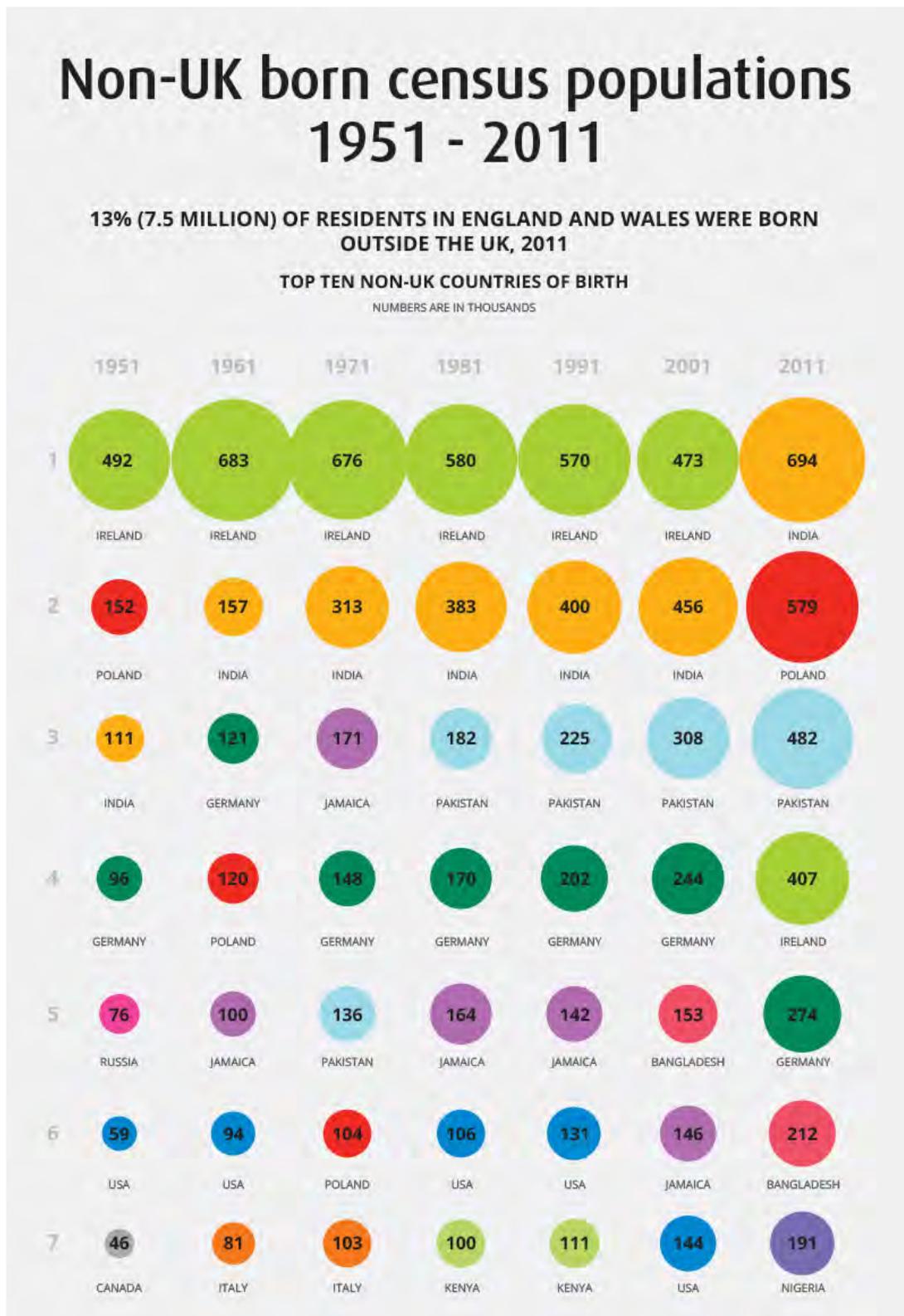[39] For example: http://www.ons.gov.uk/ons/rel/census/2011-census/key-statistics-for-local-authorities-in-england-and-wales/index.html

3.15   ONS had trouble in delivering tables according to the original data specifications, previously discussed with users in consultation, when applying statistical disclosure control (SDC). ONS originally based the table design largely on the tables produced from the 2001 Census. Users were keen to have consistency over time and to be able to make comparisons between the censuses. However, delays were experienced during the production of local and detailed characteristics outputs in using the original table specifications, due to the disclosive nature of some of the cross tabulations. Consequently, ONS, following consultation with users, redesigned the tables affected, preventing disclosure by aggregating at higher levels for some variables – sometimes by area but otherwise by aggregating other variables, such as age, using wider bands. The delay meant that ONS changed its release schedule: it had planned a phased release broadly with data tables becoming more detailed in each successive release (with finer breakdowns of variables). Instead, ONS released the data tables in groups of topics.

3.16   This delay caused some users inconvenience, particularly those in local government who needed the data for all topics before they could provide local profiles for their areas. While generally positive about ONS's engagement, these users felt that ONS could have handled the situation more effectively. ONS told us that it felt in hindsight that it could have done more to make clear the potential impact that the change to SDC approach might have on table design, in its early planning discussions with users.

3.17   The statistics were objective and released in an orderly way. We found ONS's statistical bulletins to have straightforward presentation, with clear summaries of the main findings, and helpful, well-designed charts, maps and tables. The summary and detailed reports were successful in providing greater insight into the statistics. The infographics were also an effective means of highlighting key findings, while the interactive tools such as the quiz 'How well do you know your area?'[40] provided a popular means of engaging non-expert users.

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[40] http://www.ons.gov.uk/ons/external-links/census-2011/know-your-area-quiz.html

Figure 3.1: Part of ONS's infographics on non-UK born populations recorded in censuses between 1951 and 2011[41]

Non-UK born census populations 1951 - 2011

13% (7.5 MILLION) OF RESIDENTS IN ENGLAND AND WALES WERE BORN OUTSIDE THE UK, 2011

TOP TEN NON-UK COUNTRIES OF BIRTH
NUMBERS ARE IN THOUSANDS

	1951	1961	1971	1981	1991	2001	2011
1	492 IRELAND	683 IRELAND	676 IRELAND	580 IRELAND	570 IRELAND	473 IRELAND	694 INDIA
2	152 POLAND	157 INDIA	313 INDIA	383 INDIA	400 INDIA	456 INDIA	579 POLAND
3	111 INDIA	121 GERMANY	171 JAMAICA	182 PAKISTAN	225 PAKISTAN	308 PAKISTAN	482 PAKISTAN
4	96 GERMANY	120 POLAND	148 GERMANY	170 GERMANY	202 GERMANY	244 GERMANY	407 IRELAND
5	76 RUSSIA	100 JAMAICA	136 PAKISTAN	164 JAMAICA	142 JAMAICA	153 BANGLADESH	274 GERMANY
6	59 USA	94 USA	104 POLAND	106 USA	131 USA	146 JAMAICA	212 BANGLADESH
7	46 CANADA	81 ITALY	103 ITALY	100 KENYA	111 KENYA	144 USA	191 NIGERIA

[41] http://www.ons.gov.uk/ons/rel/census/2011-census-analysis/immigration-patterns-and-characteristics-of-non-uk-born-population-groups-in-england-and-wales/non-uk-born-census-populations-1951---2011---full-infographic.html

Accessibility

3.18   ONS provided links on the 2011 Census web pages for each data release to other useful reference tables, stories and analytical reports. It clearly signposted users to supporting material including: the FAQs, user guides and quality information.

3.19   The weaknesses of ONS's website are well known and have been the subject of broad discussion, including by the House of Commons Public Administration Select Committee[42]. ONS undertook to minimise the difficulties for users in accessing census data and other information through its website, in full knowledge of the constraints of the website's infrastructure, combined with the vast amount of information generated through the 2011 Census. The search facilities remain cumbersome but ONS used a variety of means to help users find data, with web pages listing all census releases[43] by type of table, topic and release date. In addition ONS staff working in Census Customer Services staff were briefed and provided with guidance to assist users in navigating the website, if users contacted ONS via this route. ONS also released some products to support data searches, on Nomis, for example:

- An Index of Tables and Topics[44] in an Excel spreadsheet that enabled users to search for the data table(s) containing the data of interest

- A census data catalogue[45] (PDF file) listing the contents of every data release and providing links to individual Excel and PDF files and relevant web pages, for reference tables, statistical bulletins and supporting information

- The Census prospectus[46] described the release strategy, explaining each type of output and the schedule

3.20   As well as using its website, ONS published the second release stage (of key and quick statistics) through NeSS and through Nomis. NeSS provides a useful means of accessing data for a wide range of sources, including the Census. ONS adapted it, to simplify access for the 2011 Census data release in October 2013[47]. Users can run simple and more advanced queries. It is straightforward to navigate and to download the information needed. It gives a description of the dataset metadata along with the selected variables of data when downloaded.

3.21   ONS had originally aimed to use a new online data explorer for the release of the 2011 Census data but did not achieve this development in time due to the project's complexity. Instead, it opted to use Nomis – a well-established tool, designed to handle complex statistics, including data for small areas and

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[42] http://www.parliament.uk/business/committees/committees-a-z/commons-select/public-administration-select-committee/news/publication-of-communicating-statistics-report/

[43] http://www.ons.gov.uk/ons/guide-method/census/2011/census-data/2011-census-data-catalogue/index.html

[44] http://www.ons.gov.uk/ons/guide-method/census/2011/census-data/2011-census-data-catalogue/2011-census-index-of-tables-and-topics.zip

[45] http://www.ons.gov.uk/ons/guide-method/census/2011/census-data/2011-census-prospectus/2011-census-catalogue.pdf

[46] http://www.ons.gov.uk/ons/guide-method/census/2011/census-data/2011-census-prospectus/index.html

[47] http://www.neighbourhood.statistics.gov.uk/dissemination/Info.do?page=census2011onness/2011-census-on-neighbourhood-statistics.htm

showing tables with multiple variables. Nomis staff worked with ONS in the development of both SDMX[48] and CSV formats and the later design of tables including the structure of tables. It was the sole source for the data tables from the third, fourth and fifth release stages which presented data for small areas using the census output area classification. ONS's web pages for the data releases each provided an outline of the content and headline messages, with an accompanying link to the data on Nomis.

3.22   ONS provided a landing page for the 2011 Census on the Nomis website, with clear access to all the releases and different types of data (such as national, key and quick statistics, as well as the local and detailed characteristics tables). It also provided a Nomis table finder to simplify data selection by using its table number or by picking keywords, such as cohabiting couples, to narrow the range of tables. Users can download complete tables in CSV format or query individual tables to select the part they are interested in. Nomis also provides useful explanatory information with the data, setting out the variables used in the table and the method of disclosure control applied (such as record swapping). The background information provides a brief explanation of the main use of the data, such as household composition for local authority planning and targeting resources to areas with particular attributes.

3.23   Some users in local authorities told us that, while they had not previously used Nomis, they found it quick to learn and straightforward to find and download the data. Users liked that they could access all the census data through Nomis and that they could search and select the parts of the tables that they needed. They also found it a useful introduction to the labour market statistics. However, the presentation of the Census tables in Nomis meant that there was a constraint in the degree of flexibility for user-specified tables.

3.24   ONS subsequently released a beta edition of its new Data Explorer[49] in autumn 2013, which was developed in partnership with BT. The Data Explorer is a user-friendly tool for extracting elements, or all, of pre-designed tables. It enables users to more easily search across the large number of individual tables to find the data of interest. Users can select particular population characteristics and areas and it enables two views: by topic and by area. Users can view the data in tables, maps and charts, which are straightforward to create. Pop out boxes explain important aspects of the data. Users can download the data for further use. Like Nomis, the Data Explorer is constrained in its data structures – it does not have flexibility for users to create new cross tabulations, beyond those prepared by ONS. The usefulness of the Data Explorer will grow as ONS populates it with more data.

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[48] Statistical Data and Metadata Exchange – a data transfer format that enables information about the data to be included so that the data can describe itself to other systems.
[49] http://www.ons.gov.uk/ons/guide-method/census/2011/census-data/ons-data-explorer--beta-/index.html

Figure 3.2: Nomis landing page for 2011 Census data tables

Figure 3.3: ONS Data Explorer

3.25   ONS has also developed an application programming interface (API) to support the use of data from the Census and other sources by software developers. Census data are now also available for use via the ONS OpenAPI[50] (in beta form) for the development of new website or mobile device applications. The UK Data Service (UKDS) is one of the early adopters of the API. It advised ONS about the development of the interface.

3.26   All of the 2011 Census tables are available for bulk download[51] into users' own systems in machine readable form using automated procedures. ONS agreed the format of the bulk data tables with the census data distributors. It also released the final table layouts in advance of the release of the bulk data so that users could prepare. We spoke with several users and census data distributors, including UK Data Service, who obtained the data through bulk data downloads – all were satisfied with the process and with the engagement with ONS. They would have liked to have been able to use the API but appreciated the complexity of the development. The API will be more significant for supporting users of other data sources that have regular and frequent release, such as economic and labour market data.

3.27   Census microdata (a sample of anonymised records) were released in three forms:

- safeguarded data file with a 5% sample of individual-level data disseminated through the UKDS

- anonymised record-level data for a maximum of a 10% sample, available in a secure environment (ONS's virtual microdata laboratory – VML) to approved researchers

- a teaching file with a 1% sample of individual records available on the ONS website

3.28   Commercial users told us that they were frustrated at the limited options made available to them for accessing the secure data – their use largely revolves around creating bespoke geographies for their specific business needs and product development. It was also difficult and costly for local authorities to send analysts to work in ONS's offices to access the VML.

3.29   ONS recognised the challenges of accessing the 2011 Census data and attempted to offset these difficulties through the guides and links on its web pages. Despite these efforts, some users told us that they found it difficult to locate specific data of interest. These tended to be users trying to access specific information within reference data tables, rather than those downloading bulk data. All the users were positive though about the assistance they received from ONS in responding to queries. There was also strong interest in having a more flexible means in future for users to create their own bespoke tables.

3.30   A further challenge to adopting online tabulation tools for the dissemination of official statistics is ensuring that corrections to data and statistics are clear to users. ONS's standard procedure is to place a notice on the release pages on its website and alongside the data. However, ONS had trouble providing information alongside the data for an error to the religion not stated category

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[50] https://www.ons.gov.uk/ons/apiservice/web/apiservice/home
[51] http://www.ons.gov.uk/ons/guide-method/census/2011/census-data/bulk-data/index.html

which occurred in published data for three London boroughs[52]. It provided appropriate information via the Census corrections page and through an email alert. However, information needs to be clear at the point of use for users who miss those messages. ONS found a solution for Nomis, by including a footnote to the data tables for the respective local authorities. However, it was not able to provide such updated metadata on the Data Explorer although ONS told us that this situation is now being rectified.

Figure 3.4: Data table from Nomis with footnote giving an error correction notice

DC2107EW - Religion by sex by age

📊 Download (.xlsx) - or older .xls format
Table population: All usual residents
Religion by Sex

Units: Persons

Date	2011
Geography	Tower Hamlets
Measures	value

	All persons	Males	Females
All categories: Religion	254,096	130,906	123,190
Christian	68,808	32,157	36,651
Buddhist	2,726	1,229	1,497
Hindu	4,200	2,317	1,883
Jewish	1,283	673	610
Muslim	87,696	44,029	43,667
Sikh	821	407	414
Other religion	825	462	363
No religion	48,648	27,163	21,485
Religion not stated	39,089	22,469	16,620

In order to protect against disclosure of personal information, records have been swapped between different geographic areas. Some counts will be affected, particularly small counts at the lowest geographies

Due to an error in the processing of census data, the number of usual residents in the 'Religion not stated' category has been overestimated by a total of 62,000 for three local authorities: Camden, Islington and Tower Hamlets. More information from http://www.ons.gov.uk/ons/guide-method/census/2011/census-data/census-products--issues-and-corrections/index.html

2011 Census evaluation – the lessons learnt

3.31　ONS highlighted a wide range of lessons learnt within its *General Report of the 2011 Census*[53] based on some areas of success, as well as some areas of further development across the whole of its delivery of the Census. These are frank and reflect a high degree of self-evaluation of its planning, procedures

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[52] 26 February 2015: http://www.ons.gov.uk/ons/guide-method/census/2011/census-data/census-products--issues-and-corrections/index.html
[53] http://www.ons.gov.uk/ons/guide-method/census/2011/how-our-census-works/how-did-we-do-in-2011-/2011-census-general-report/index.html

and statistical practices by staff in all areas of the census operation. It provides a firm basis for ONS to plan its developments for the 2021 Census, as well as applying lessons more widely to other areas of its statistical practice.

3.32 ONS identified in *General Report* many aspects of the 2011 Census that were innovative and successful, including:

- better engagement with users and stakeholders, particularly local authorities, which engendered higher levels of support and confidence in the census

- development of a purpose-built address register to facilitate mail-out of questionnaires and improve management of the field operation, including questionnaire tracking

- use of a reduced and more flexible and specialised field force, to enable more resource to be focused on achieving increased response rates in hard to enumerate areas

- introduction of a secure online census

- improvement in overall response and successfully reducing the variation of non-response across all local authorities

- more flexible dissemination of an increased range of census results and analysis across the suite of ONS websites

(Page xi *2011 Census: General Report for England and Wales*)

3.33 A number of the successes shown in the delivery of the 2011 Census reflect the lessons learnt from the 2001 Census. These included ONS's approach to user engagement, to quality assurance and SDC. These issues each reflected strong concerns among users after the 2001 Census.

3.34 The users we spoke to during this phase of the Special Assessment also highlighted most of the areas of success for the 2011 Census identified by ONS. Their comments reflected their confidence and satisfaction with the data quality and overall appreciation of the extensive engagement undertaken by ONS throughout the planning and early output production phase. ONS identified in discussions with the Assessment team that it had not maintained the same level of engagement from the planning and early production in later years, particularly as it moved from a census project to 'business as usual'. It told us that it addressed the issue after prompting from local authority representatives. It recognises that user engagement needs to be a planned, ongoing activity, to ensure it identifies and resolves issues promptly and to support further use.

3.35 The quality assurance for the 2011 Census was more rigorous and comprehensive than in previous censuses – endorsed by an independent review panel led by Professor Ian Plewis from the University of Manchester. Evidence compiled included operational intelligence, information from local authorities, from the census coverage estimation process, as well as administrative data from comparator sources. The developments made by ONS during the 2011 Census have been central to the considerations of the greater use of administrative data in future. The developments also encouraged the

Coalition Government[54] to support the recommendation of the National Statistician for a further census in 2021 with a greater use of administrative data and online completion.

3.36   Disclosure control continues to be an issue that exercises some frustration among users, particularly those requiring access to detailed small area data. Overall, users were accepting of the approach taken in the 2011 Census by ONS but had not fully appreciated the impact that it would have on table design. ONS identified a number of lessons learnt from the 2011 Census experience, including: looking at other methods that would support small counts and greater detail in tables, developing the methods and systems using 'real' test data and involving a UK-wide disclosure working group.

3.37   A critical issue raised both by users and ONS in discussion with us was the impact of approaching the design of census outputs in terms of table structures. Set table designs have consequent constraints on users in selecting and manipulating the census data to meet their individual needs. ONS identified a key choice in future of approaching the dissemination of census results through producing a large number of small datasets or a small number of large datasets.

3.38   ONS used the first approach in the 2011 Census. Expert users and data distributors such as UKDS recommend focusing on the design of data structures rather data tables. There would be implications for the SDC of data which would need clear and open evaluation involving users. The main benefit though would be users being able to create bespoke tabulations. Use of consistent data structures would support the greater reuse and linkage with other sources. ONS identifies in its *General Report* that it should take decisions on outputs and dissemination before deciding the SDC method. It recognises that this will require early thought and development.

3.39   ONS has conducted a thorough and frank evaluation of its operation and production of the 2011 Census. The review provides a sound basis for ONS's ongoing development of official statistics, including: the use of alternative sources and methods; quality assurance approaches; dissemination systems and procedures; engagement with users, and collaborations with data supply partners and other statistical producers.

Welsh Government statistical outputs

3.40   The Welsh Government (WG) published a series of statistical bulletins[55] using the 2011 Census data for Wales. These included three releases describing the main population and household characteristics, particularly focusing on the demographic variables (age, sex, and ethnicity) by household composition and tenure, and a summary of the Census data for small areas. It published two detailed bulletins[56] on the Welsh language data. WG accompanied ONS's releases of data tables for Wales with brief statistical bulletins giving the headline results for Wales[57].

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[54] http://www.publications.parliament.uk/pa/cm201415/cmselect/cmpubadm/601/60104.htm
[55] http://gov.wales/statistics-and-research/census-population/?lang=en
[56] http://gov.wales/statistics-and-research/census-population-welsh-language/?lang=en
[57] For example: http://gov.wales/docs/statistics/2012/120716-census-2011-first-results-wales-en.pdf

3.41   The statistical bulletins were straightforward and appropriately highlighted the key findings. The narrative in *Characteristics of Households in Wales* included relevant contextual information, placing the statistics within the economic context and highlighting the Welsh Government National Housing Strategy. WG supported the commentary well, using clear and relevant illustrative charts, tables and maps. It also provided some supporting explanatory information, such as summarising quality issues on the comparability, coherence and accuracy of the ethnicity data. The bulletins provided links to, and comparisons with, other relevant data sources (such as the Labour Force Survey, Pupil Level Annual School Census and the Welsh Language Usage Survey). They also signposted the 2011 Census releases for the other UK countries.

Section 4: A review of statistics from 2011 Census for Scotland produced by National Records for Scotland (NRS)

4.1   This country profile summarises the statistical practices of NRS in three main areas: user engagement, dissemination and accessibility of the data and statistics, and lessons learnt.

Findings

4.2   Overall users were satisfied with the quality and presentation of the 2011 Census for Scotland. They welcomed the variety of options for accessing the data; however, some users were disappointed in the time taken to release the small area data. Users praised the responsiveness of the NRS staff. (See paragraphs 4.8 to 4.12.)

4.3   NRS published its first set of Census results for Scotland in December 2012. This was later than originally intended with a change in its planned content. NRS had various difficulties, including resource and technical challenges. It discussed these issues with the Population and Migration Statistics Committee Scotland in 2011 but did not share this with other users until late in 2012. NRS recognised that it was slow to engage with users about its initial production delays and put effort into greatly improving its engagement with users. (See paragraphs 4.13 to 4.16.)

4.4   After the initial delay, NRS delivered the outputs to meet its revised schedule. It continued to release data some months behind the equivalent releases for the other UK countries. The statistical bulletins were straightforward and informative. NRS provided clear access to census outputs via the Scotland's Census website[58], including a new data explorer and data warehouse for bulk data. (See paragraphs 4.19 to 4.25.)

User engagement – some users' views

4.5   We invited responses through StatsUserNet and the Authority's website, as well as by directly contacting users from a range of different sectors. The nine respondents were from central and local government, academics and commercial organisations and a non-departmental public body.

4.6   We conducted five interviews with users from a variety of backgrounds who reported different uses of the data, and interests in different types of outputs.

4.7   The variety of the census data supported a wide range of uses including:

- providing an evidence base for policy making at a national and local level

- providing census profiles for local areas which are used to examine socio-economic trends and feed into service planning

- supporting work on equalities monitoring covering ethnicity, disability, gender and age

- informing economic development and transport planning

- creating deprivation scores

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[58] http://www.scotlandscensus.gov.uk/census-results

- teaching purposes

- informing commercial decisions such as locations of businesses and existing or potential customers

4.8   The user responses were generally positive, particularly about the engagement and helpfulness of NRS staff. Users told us that they valued the responsiveness of NRS to queries and the efforts made to engage widely with different groups across Scotland.

4.9   Users accessed the data in a variety of ways, with the majority of those who responded to our consultation accessing the more detailed data. Users told us that they download the data from Census Data Explorer[59] using the 'standard outputs'[60] or from the data warehouse[61], and others commissioned bespoke tables. Some noted that they found notifications emails alerting them to new releases very helpful.

4.10 Some users commented that the online system was better than the previous census. However, when downloading small area data some issues were noted as the file names did not make clear the contents of the tables and so it took a lot of time to look at all the pre-defined tables to determine if the contents were relevant to their own needs. Users noted that the array of tables could be bewildering. They suggested that there is scope for improvement in the labelling and cataloguing of tables. Some users said that they would like to have a more flexible way of creating bespoke tables in future rather than relying on the pre-defined tables.

4.11 There was a delay in the release of the 2011 Census statistics in Scotland compared with other areas of the UK (see paragraphs 4.13 to 4.16). Users found that this initial delay impacted on planned later work such as with small area data. While there was an understanding that NRS was under pressure to provide higher-level statistical bulletins, the more-expert users needed the small area data to complete their own work. Users told us that they found NRS's timetable helpful, even though it delayed the release of the Census data.

4.12 NRS sought to engage more fully with users and undertook a number of user consultation events after the release of the statistics, including a well-attended event in June 2014. NRS undertook a user satisfaction survey in June-July 2015 on 'Citizen Space'[62], as well as by contacting known users. It received 85 responses. It documented the findings in its General Report[63]. Overall NRS said that users were generally positive. Across all questions and responses, around two-thirds reflected either satisfied or very satisfied markings. The main area of dissatisfaction focused on the timing of the outputs. Other issues highlighted difficulty locating data and the range and quantity of tables.

Release strategy

4.13 According to the original agreement[64] between the National Statistician and the Registrars General, NRS had planned to release the Census data concurrently

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59 http://www.scotlandscensus.gov.uk/ods-web/home.html
60 http://www.scotlandscensus.gov.uk/ods-web/standard-outputs.html
61 http://www.scotlandscensus.gov.uk/ods-web/data-warehouse.html
62 https://consult.scotland.gov.uk/national-records-of-scotland-survey/5f6d1d09/consult_view
63 http://www.scotlandscensus.gov.uk/news/scotland%E2%80%99s-census-2011-general-report
64 http://www.scotlandscensus.gov.uk/documents/strategy/scot-2011-cen-outputs-strat.pdf

with ONS and NISRA, with the first release in the summer of 2012. NRS published its proposed running order for the release of statistical products in August 2011 (link no longer live). In 2011, it became clear to the statisticians in NRS that the programme was not going to produce outputs to this timetable due to some technical and resource challenges. NRS decided to publish the first statistics in December 2012 with a reduced range of statistics compared to the original plan.

4.14 NRS raised both the change in release date and the reasons for the delay at a meeting of the Population and Migration Statistics Committee Scotland (PAMS) in November 2011[65]:

- 'At this point in time we are focussing on some challenges with our downstream processing system as census data is rapidly delivered from the processing site. These challenges have come about from the loss of key statistical staff and some complex IT issues.'

- 'The IT issues have mainly been overcome and our staffing situation is currently being addressed at board level but there will be an impact on the delivery of census data for further demography work, and on the first release of census publications.'

4.15 However, it did not provide the information to other users at that time. In October 2012, NRS told the PAMS Committee that 'we are recognising, as we move into the later stages of data processing that focus on the adjustments, that the complexities in the data (which we fully expected to see) require a greater degree of work than originally thought'[66]. On 5 November 2012, NRS held a Census Stakeholder Information Day to inform the membership of PAMS and other key stakeholders of progress on the processing of the census data. At this session NRS explained to users that 'initial findings raised issues with coding and ways in which some questions were answered'[67] and that this had impacted on the quality assurance approach. NRS published the presentations from this event on its website; however, they are not available from the website, Scotland's Census. The presentation slides do not go into detail about the reasons for the delay. NRS also notified users about the publication date and planned content of the first release by email and an announcement on the website[68].

4.16 NRS published[69] the first results from the 2011 Census in Scotland on 17 December 2012. A series of releases then followed up until January 2015. Data tables were output at different levels such as level of geographical detail and grouped by variable topics (see Table 4.1 below). NRS provides an outline of the planned tables in Scotland's Census 2011 Outputs Prospectus[70]. It regularly updated the prospectus. At times, NRS changed the planned layouts shortly before release, for statistical disclosure reasons.

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[65] http://www.nrscotland.gov.uk/files/statistics/consultation-groups/pams-paper2-11-25-census-update.pdf
[66] http://www.nrscotland.gov.uk/files/statistics/consultation-groups/pams-3-october-2012/pams-paper2-12-10-census-update.pdf
[67] http://www.nrscotland.gov.uk/files/statistics/consultation-groups/census-stakeholder-day/sid-5nov2012-qa-outline.pdf
[68] http://www.scotlandscensus.gov.uk/news/first-results-scotlands-census-now-available
[69] http://www.scotlandscensus.gov.uk/documents/censusresults/release1a/rel1asb.pdf
[70] http://www.scotlandscensus.gov.uk/documents/censusresults/outputsprospectus2015.pdf

Table 4.1: Release stages of the 2011 Census for Scotland[71]

Release 1	
Release 1A **17 December 2012**	• Estimates (rounded to the nearest thousand) of the usually resident population of Scotland on Census Day, broken down by age and sex. Also provided are estimates of the total usually resident population in each council area (rounded to the nearest thousand)
Release 1B **21 March 2013**	• Usually resident census population estimates (rounded to the nearest 100) for Scotland, by five-year age bands and sex • Usually resident census population estimates (rounded to the nearest 100) for each council area, by five-year age bands and sex; and • Estimates of number of households (rounded to the nearest 10) for Scotland and each council area
Release 1C **(part one)** **23 July 2013**	• Unrounded estimates of the usually resident population of Scotland and each Council and Health Board Area on Census day, by single year of age and sex; • Unrounded estimates of the number of households in each council area, by size of household; and • Unrounded estimates of the usually resident population of Scotland and each council area on Census day, by whether living in a household or communal establishment.
Release 1C **(part two)** **15 August 2013**	• Unrounded estimates of the usually resident population and number of households with at least one usual resident for postcodes, Output Areas, Datazones and inhabited islands in Scotland.
Release 2	
Release 2A **26 September 2013**	• Provides data on Population, Ethnicity, Identity, Language, Religion, Health, Housing and Accommodation
Release 2B **14 November 2013**	• Provides data on Education, Labour Market
Release 2C **18 December 2013**	• Provides data on Living Arrangements
Release 2D **9 April 2014**	• Provides cross-tabulated data on Household by deprivation dimensions, Long-term health conditions, Central heating
Release 3	
2014 – January 2015	In excess of 250 Local Characteristics and Detailed Characteristics tables. These were published on a topic by topic basis and, given the number of tables involved, most topics were split into multiple releases. Published by broad topics throughout 2014 and early 2015 in the following order: • Ethnicity, Identity, Language and Religion • Population and Households • Health • Labour Market & Education • Housing and Accommodation • Transport

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[71] http://www.scotlandscensus.gov.uk/census-releases

4.17   'Release 1' and 'Release 2' included statistical bulletins[72] which highlighted key points and included tables and charts to illustrate the data. For each batch of tables issued under Release 3, NRS published a statistical news release summarising the main points, followed by a combined narrative of the key points across all of the topics covered in the release[73]. It also published some analytical reports[74] providing further detailed statistical narrative for topics of wide public interest, such as analysis of: equality by ethnicity and religion and disability; characteristics of migrants in Scotland; household composition; inhabited islands; and the Gaelic language. NRS plans to release additional population bases for workplaces and daytime in October 2015.

4.18   NRS produced a teaching file containing 1% sample of anonymised individual level microdata[75] at the Scotland level for teaching purposes in June 2014. NRS plans to release samples of microdata in October 2015. These include a 10% sample of individuals and a 10% sample of households, available in a secure setting equivalent to the Virtual Microdata Laboratory (VML) managed by ONS. NRS will also release a 5% sample of individuals available to approved researchers via specific end-user license arrangements. It says that the sample will be drawn from the 10% secure individual sample but less detailed, reflecting the wider access arrangements and the need to preserve the confidentiality of personal census information about individuals.

Review of statistical outputs

4.19   The statistical bulletins were clear and objective, written in an accessible way, with difficult terms explained. A clear layout with subheadings and hyperlinks made it easy to navigate through the bulletins. The main points were clearly summarised at the start of the document and replicated on the website. The charts effectively communicated the story behind the statistics. However, they are not always clear when printed in black and white or greyscale.

4.20   Notification of revisions and corrections are published on the Scotland's Census website[76]. However, NRS does not make clear the nature and scale of the corrections alongside republished data. For example, an error occurred in the UK Parliamentary Constituency profiles; NRS published a note of this and advised correctly that users discard previously downloaded copies. However, the republished files did not alert users to the revisions, so that users could download the data from the landing page without information about the corrections. It also does not record corrections on the Data Explorer web pages. NRS should ensure that revisions to statistics are clearly indicated, giving the reason and extent of the corrections.

Accessibility

4.21   NRS redeveloped the Scotland's Census website[77] to disseminate census estimates. The website also provided statistical bulletins, supporting information, advice on using census data and the timetable for the release of

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[72] http://www.scotlandscensus.gov.uk/statistical-bulletins
[73] http://www.scotlandscensus.gov.uk/documents/censusresults/Census_Release3_Key_points.pdf
[74] http://www.scotlandscensus.gov.uk/analytical-reports
[75] http://www.scotlandscensus.gov.uk/microdata
[76] http://www.scotlandscensus.gov.uk/revisions-and-corrections
[77] http://www.scotlandscensus.gov.uk/

2011 Census products. In October 2013, NRS updated the website to provide additional functionality via the Census Data Explorer. This online tool provided access to the data in a variety of formats: area profiles; maps and charts; standard output and a data warehouse. The standard outputs allowed users to select tables and geographies and present the results in either table or map format. NRS also provided an indexing tool – Scotland's Census Tables Index – to help users search for the data tables containing the data of interest.

4.22　NRS primarily aims the data warehouse at users of bulk data and provides options for downloading large volumes of census data. The 'Standard data files' replicate the format of the tables as provided through the standard outputs section of the website and offers the tables in CSV format with textual descriptions of each geography. The 'Bulk data files' option provides zipped files containing tables in CSV format with geographic areas. The data warehouse also provides access to additional tables (for example, those published as part of further analysis projects) and commissioned tables. Some users told us that the labelling format used by NRS made it difficult to identify the table contents. It took users time to work through the available tables to identify the information that met their needs.

4.23　In July 2015, NRS secured funding to support the inclusion of Scotland's Census data on 'DataShine', a visualisation tool from University College London (UCL). 'DataShine Scotland' utilises the DataShine framework to map the various Key and Quick Statistics from Scotland's 2011 Census (see Figure 4.1).

Figure 4.1: Screenshot of 2011 Census for Scotland in the DataShine web tool[78]

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[78] http://scotland.datashine.org.uk/
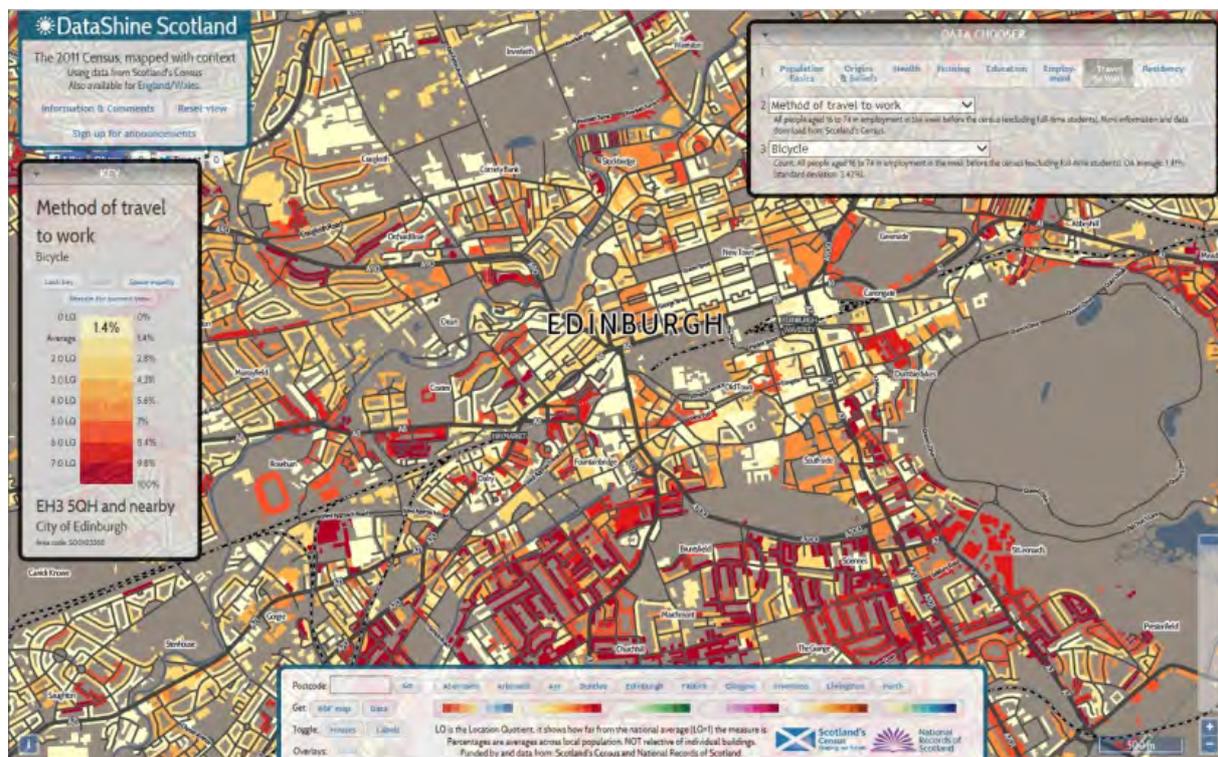
4.24   In addition, on 'DataShine Scotland Commute' users can now access visuals showing travel-to-work-flows between each Council Area, split by direction and mode of transport (see Figure 4.2 below).

Figure 4.2: Screenshot of Travel to Work flows from DataShine Scotland Commute[79]
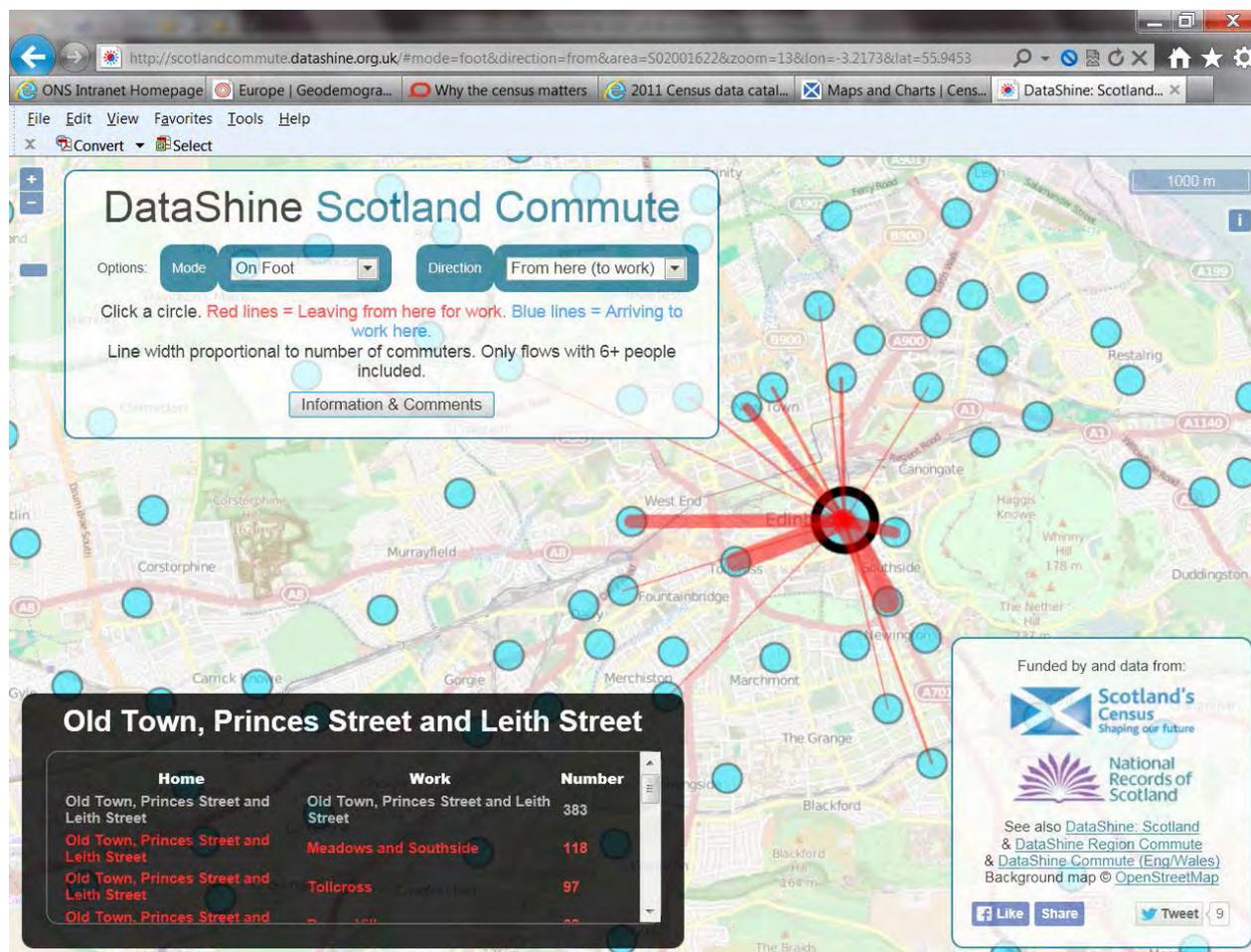

4.25   In advance of the 2015 UK Parliamentary Elections, NRS prepared census profiles[80] allowing users to learn more about their local UK Parliamentary Constituency using Scotland's Census data. It provided the profiles in PDF format and as an Excel tool, enabling users to choose the particular areas they were interested in. Each of the 59 census profiles contained a set of visualisations of the data and included a comparison with Scotland as a whole. NRS told us that these became one of the most downloaded products from Scotland's Census website. NRS published[81] in November 2015 a similar set of profiles for the 73 Scottish Parliamentary Constituencies and 8 Scottish Parliamentary Regions, ahead of the May 2016 elections to the Scottish Parliament.

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[79] http://scotlandcommute.datashine.org.uk/
[80] http://www.scotlandscensus.gov.uk/uk-parliamentary-constituency-profiles-scotland
[81] http://www.scotlandscensus.gov.uk/news/scottish-parliamentary-constituency-profiles-and-regions

Figure 4.3: Example of 2011 Census for UK Parliamentary Profiles[82]
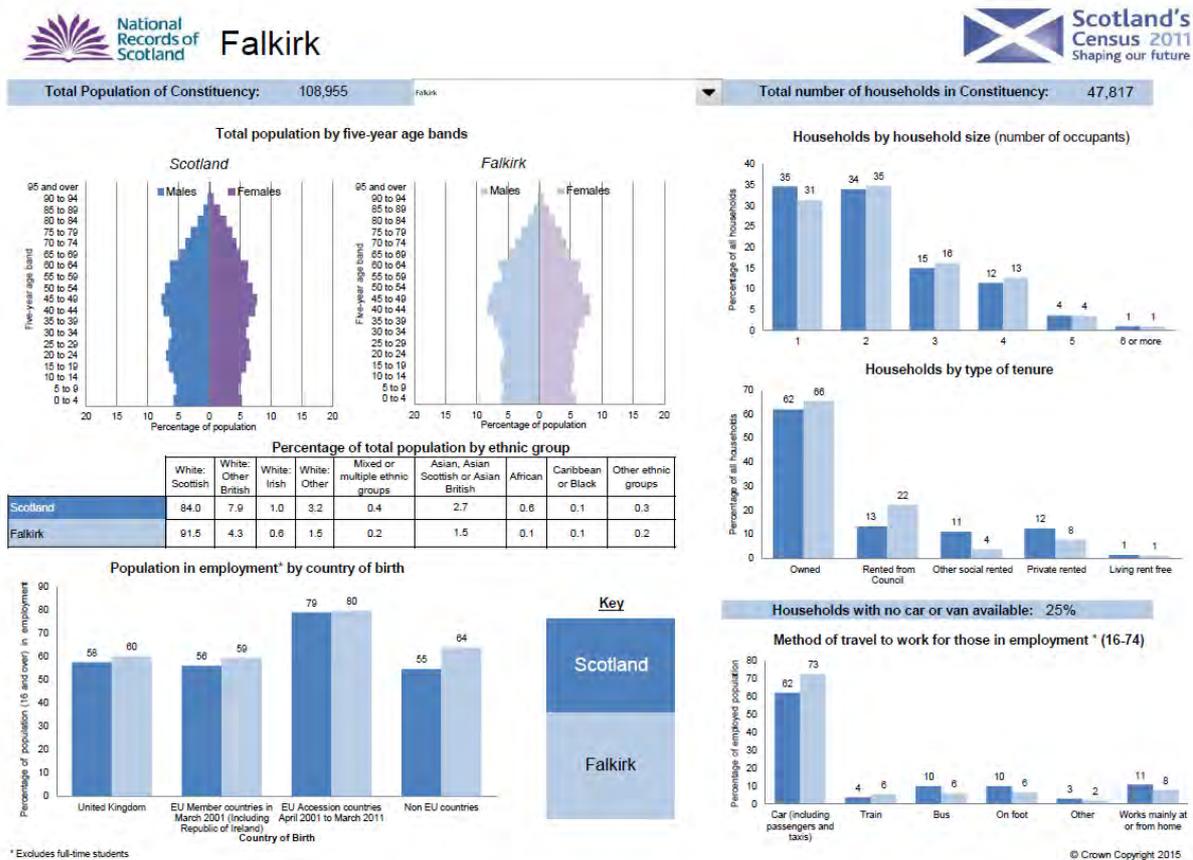
Quality assurance

4.26 NRS developed a phased approached to the quality assurance of the 2011 Census data. This approach[83] focused initially on the loading and validation of data, checking the distribution of variables, and generating response rates. It then undertook detailed analyses of the demographic variables at local authority level. This stage also included the Census Coverage Survey. NRS applied the same method of coverage adjustment as used by ONS. The final stage of assurance focused on checking the census output area data.

4.27 NRS established a Census Data Quality Advisory Group, comprising staff from NRS and local authorities, to assist in the testing in phase 2. The group used its local knowledge and data sources to help confirm the quality of the census data and formed a central role in the assurance of the census results.

2011 Census evaluation – the lessons learnt

4.28 NRS's General Report[84] reviews its entire census operation, from the consultation and planning stages, through to the production and dissemination of outputs and evaluation. As part of this report, NRS identified both its areas of success and a range of lessons learnt from carrying out the census in Scotland.

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82 http://www.scotlandscensus.gov.uk/uk-parliamentary-constituency-profiles-scotland
83 http://www.scotlandscensus.gov.uk/documents/methodology/cen-dat-qual-assur-2011.pdf
84 http://www.scotlandscensus.gov.uk/news/scotland%E2%80%99s-census-2011-general-report

It is a frank account of the challenges and difficulties it faced and will provide an important basis for its planning for Scotland's 2021 Census.

4.29   NRS described its key successes[85]:

- Undertaking for the first time the planning and conducting all aspects of the entire Scottish Census operation – including data processing

- High levels of engagement with users and other stakeholders which engendered higher levels of support and confidence in the census

- The inclusion of several new topics on the census questionnaire including some unique to Scotland, for example nature of long term health condition

- A high level of overall response

- Introduction of secure online response facility

- More flexible means of dissemination and analysis of an increased range of census data and background information via the Scotland's Census website

- Keeping costs within budget

4.30   NRS also identified a number of key learning points:

- Being the first time that NRS had conducted all aspects of the census in Scotland, there was inevitably a steep learning curve with aspects that could be improved upon for future censuses

- It took far longer to produce outputs than had been originally intended. A variety of issues contributed to this but it undoubtedly had an impact on users and the utility of the data

4.31   NRS reported a number of challenges and lessons to be learnt for any future census operation, summarised in themes:

- Programme management

- Legislation and the Parliamentary process

- Stakeholder management

- Census Coverage Survey

- Data collection and field operation

- Data processing and statistical methodology

- Output content production and dissemination

4.32   NRS identified that it needs to ensure that the correct balance is struck between meeting users' needs locally, as well as at UK level and internationally. It is necessary to identify the requirements to meet UK and international obligations. NRS also said that it needs to give more time in the early stages to planning the detailed resources and activities for the entire length of the programme, including the testing and quality approaches.

4.33   With respect to the legislative and Parliamentary process, NRS identified the need to secure an early statement by Government, outlining the key aspects of the 2021 Census for Scotland. This needs to include the early and ongoing

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[85] http://www.scotlandscensus.gov.uk/news/scotland%E2%80%99s-census-2011-general-report

engagement with the lead Parliamentary Committee, developing and maintaining strong relationships with Scottish Government (including the Legal Directorate) and updating the Scottish Parliament over time.

4.34 NRS also recognised the need to manage the complex interactions with the wide variety of other stakeholders. It should ensure that it targets the methods and degrees of approach as appropriate for the different stakeholders.

4.35 NRS wants to build on the success of the 2011 Census Coverage Survey by better management of field workloads, ensuring the availability and suitability of field office accommodation and IT systems. It also wants to better manage the variations in workload across the country for main census operation, with payment linked more clearly with achieved workload. It also sees the need to undertake more work around the enumeration of communal establishments to improve quality of the data, as well as to consider a greater use of administrative data and technology to improve enumeration of hard to count communities.

4.36 Regarding the data processing and statistical methodology, NRS recognised the need to ensure sufficient testing of downstream processing with a great variety of scenarios. These need to be ready earlier. It also thought that it is important to consider an iterative design and testing approach, with strong feedback loops and the ability to make changes during live operations. It said that it is vital to allow more time to consider the Scottish requirements in any joint developments.

4.37 One of the critical areas NRS identified was on output content production and dissemination. It said it will be important to consider evolving dissemination techniques early, as well as the associated implications for statistical disclosure control and geographical detail. But it is also important to decide on the dissemination approach early enough to allow sufficient time for system and method testing. NRS said it wants to deliver future census results more quickly and in line with other UK census offices. It also recognised the need to consider more visualisation techniques to help check plausibility.

4.38 NRS wants to build on its experiences of involving users in the 2011 Census by increasing user engagement during the production phase. It said that it is important to maintain on-going dialogue with users, to understand their changing needs and priorities, including during output production.

Section 5: A review of statistics from 2011 Census for Northern Ireland produced by Northern Ireland Statistics and Research Agency (NISRA)

5.1   This country profile summarises the statistical practices of NISRA in three main areas: user engagement, dissemination and accessibility of the data and statistics, and lessons learnt.

Findings

5.2   Overall users were satisfied with the quality and presentation of the 2011 Census for Northern Ireland, and with their engagement with the statistical producer. They were able to access the data tables through NISRA's main release tool but said that they would like greater flexibility in creating bespoke tabulations in future. Some reported difficulties in searching for specific data. (See paragraphs 5.5 to 5.10.)

5.3   NISRA's statistical bulletins were clear with helpful narrative and additional analyses. NISRA also provided some interactive data presentations on its website and clear supporting information including the quality assurance approach and imputation method. (See paragraphs 5.19 to 5.22.)

5.4   NISRA undertook a thorough and frank review of its conduct and production of the 2011 Census. It described some key successes, as well as identifying a wide range of ways to further improve its processes. (See paragraphs 5.31 to 5.41.)

User engagement – some users' views

5.5   We invited responses through StatsUserNet and the Authority's website, as well as by directly contacting users from a range of different sectors. Five users responded to the questionnaire. Four of the five users were from Northern Ireland Government Departments and one user was from local government. We conducted four interviews – with two academics, plus a user in a non-departmental public body and one in a department of the devolved administration.

5.6   The Census supported a variety of uses including:

- providing census profiles for local areas

- supporting decision making for local policies, particularly involving the demographic information about ethnicity, health and travel

- increasing understanding of specific groups such as:

   o   language data to support the development of equality policies such as for people with knowledge of Irish and Ulster-Scots

   o   the kinship care involving children

   o   variations in small areas' characteristics, such as religion

- cross analyses – eg not in education, employment or training by gender and geography

- economic activity statistics and travel to work information at ward level

- modelling housing market social housing needs for planning and research

- teaching purposes

- producing reports and lobbying

5.7   The user responses were generally positive, particularly about the website, Northern Ireland Neighbourhood Information Service[86] (NINIS), as well as the presentation of the statistical bulletins and commentary. Overall, they found that the statistics were arranged under easily understood themes on NINIS, and straightforward to use, with the option of downloading data or quick look buttons. However, some users said that searching on NISRA's website, particularly when trying to locate information across topics or specific data tables, was difficult. A user noted that when trying to get individual ward information to compare a statistic between wards they had to download multiple Excel files and then had to calculate the figure in each, which they found time consuming. They wondered whether the ward-level data could be in one file, provided as a text file if necessary. Some users said that they would like to have a more flexible way of creating bespoke tables in future, with dynamic build of tables.

5.8   Census data were not released in line with the timetable set out in the outputs prospectus. One user commented that they would have liked their requested bespoke analysis provided more quickly but they realised there had to be a prioritisation. The users who responded to our consultation identified some data gaps: internet and computer usage; income; and sexual orientation, although NISRA told us that these topics were not included in the 2011 Census questionnaires following extensive public consultation.

5.9   The users were satisfied with their engagement with the statistical team in NISRA. They said it was helpful to chat directly to the people involved with the Census. They welcomed progress reports and said that they received speedy responses to queries.

5.10 NISRA undertook its own user satisfaction survey in September 2014, publishing its report[87] in March 2015. It received 42 individual responses. Its findings are consistent with the feedback that we received: users were broadly satisfied with the communication, range, timeliness and overall dissemination of the products. NISRA summarised the main areas for improvement as including ease of access to the data and greater table-building flexibility.

Release strategy

5.11 NISRA prioritised making all census data available through a single portal and so redeveloped its Northern Ireland Neighbourhood Information Service (NINIS) to give users access to the high volumes of large datasets. The website[88] provided all the statistics and tables, commissioned tables, metadata, look-up files, data visualisations, statistical summaries (called 'Short Stories'), maps and charts, as well as additional supporting material.

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[86] http://www.ninis2.nisra.gov.uk/
[87] http://www.nisra.gov.uk/archive/census/2011/evaluation/user-satisfaction-survey-report.pdf
[88] http://www.nisra.gov.uk/census/2011Census.html

5.12   NISRA largely coordinated its releases to coincide with those for England and Wales produced by ONS. The data tables were output at different levels such as geographical detail and grouped by variable topics in four release stages from July 2012 (see Table 5.1).

Table 5.1 Release stages of the 2011 Census for Northern Ireland[89]

First release – Population and Household Estimates[90]

- Phase 1 – 16 July 2012: Population by age and sex for Northern Ireland
- Phase 2 – 19 September 2012: Population by age and sex for Local Government Districts

Second release – Key[91] and Quick[92] Statistics

- Phase 1 – 11 December 2012: Key Statistics for Northern Ireland and Local Government Districts
- Phase 2 – 30 January 2013: Key Statistics for Assembly Areas (AAs), Electoral Wards, Super Output Areas (SOAs) and Small Areas (SAs)
- Phase 3 – 28 February 2013: Quick Statistics for all geographies and Population and Household Estimates for lower geographies
- Phase 4 – 18 April 2013: Three additional Quick Statistics tables covering approximated social grade and communal establishments

    26 March 2015: Quick Statistics showing characteristics of usual residents who have lived outside Northern Ireland for a year or more

Third release – Detailed Characteristics[93]

- Phase 1 – 16 May 2013: Detailed Characteristics for Northern Ireland (including Religion, Identity and Health)
- Phase 2 – 28 June 2013: Detailed Characteristics for Northern Ireland (including Ethnicity, Country of Birth and Language)
- Phase 3 – 11 September 2013: Remaining Detailed Characteristics for Northern Ireland (including Housing and Labour Market)
- Phase 4 – 28 November 2013: All Detailed Characteristics for the remaining geographical levels
- Phase 5 – 26 March 2015: Detailed Characteristics tables for approximated social grade, year of most recent arrival in Northern Ireland and internal migration

Fourth release – Local Characteristics[94]

- Phase 1 – 20 March 2014: All Local Characteristics
- Phase 2 – 26 February 2015: Travel to Work or Place of Study for Northern Ireland

    26 March 2015: Additional Local Characteristics for Northern Ireland

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[89] http://www.nisra.gov.uk/census/2011/results/key-statistics.html
[90] http://www.nisra.gov.uk/census/2011/results/population.html
[91] http://www.nisra.gov.uk/census/2011/results/key-statistics.html
[92] http://www.nisra.gov.uk/census/2011/results/quick-statistics.html
[93] http://www.nisra.gov.uk/census/2011/results/detailed-characteristics.html
[94] http://www.nisra.gov.uk/census/2011/results/local-characteristics.html

Additional releases

- Postcodes Estimates[95] – 26 September 2013
- Headcount and Household Estimates for Settlements[96] – 26 March 2015
- Alternative populations[97]:
    - 24 September 2014: Short-term resident population statistics
    - 19 November 2014: Workplace Population Statistics for Northern Ireland
    - 18 December 2014: Daytime Population Statistics for Northern Ireland
    - 26 February 2015: Additional Daytime Population Statistics for Northern Ireland
- Specialist products:
    - microdata[98]: safeguarded and secure samples and teaching file

5.13　NISRA published the planned tables and layouts in advance on its website as part of the Northern Ireland Census 2011 Output Prospectus[99]. However, the outputs were subject to redesign before release, partly to respond to user requirements and data quality issues, or because of applying statistical disclosure control.

5.14　NISRA provided commentary in a statistical bulletin alongside every major data release. The bulletins each provided: a description of the statistics, with associated context for each topic; comparability with the 2001 Census outputs, where appropriate; and links to relevant sources of information. NISRA updated the accompanying reference material with each release, including definitions of terms and concepts for any new topics covered.

5.15　Users that required all the tables in a given set were able to download these as bulk data from the NINIS website or request them from Census Customer Services. NISRA agreed the format of the bulk data with a set of users in advance of publication. Its purpose was to provide a consistent, machine-readable format for tables to be loaded into existing or customised systems for the analysis and dissemination of census statistics. The advantage of this approach was that third-party suppliers could readily gain access to large amounts of published census data and disseminate these to their users in a consistent format.

5.16　NISRA put in place special access arrangements for approved researchers for some more-detailed census information, where the impact of disclosure control on the usefulness of the data would be too great. NISRA released microdata in samples of individual and household records, drawn from census data and anonymised to protect confidentiality. Academics and researchers use the microdata samples to develop more sophisticated analyses of population data than are available from the standard published census tables. For example, they undertake studies of the health and labour market status of specific groups

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[95] http://www.nisra.gov.uk/census/2011/results/postcode.html
[96] http://www.nisra.gov.uk/census/2011/results/settlements.html
[97] http://www.nisra.gov.uk/census/2011/results/alternative-populations.html
[98] http://www.nisra.gov.uk/census/2011/results/specialist-products.html
[99] http://www.nisra.gov.uk/census/2011/results/output-prospectus.html

within the population, such as carers, people with disabilities and ethnic and religious minorities.

5.17 NISRA hosts a secure environment through which researchers and other parties can access Census Secure Microdata Files. These are 10% samples of anonymised (but detailed) data from the 2011 Census, which researchers can use to perform statistical analyses. Two samples are available: a secure individual sample and a secure household sample. They are accessible only via the NISRA secure environment.

5.18 Two safeguarded individual samples were also released (one at Northern Ireland level and one at local government district level). They are 5% samples of census records and contain less variable detail than the secure microdata. Users can use them with licensed access via the UKDS.

Review of statistical outputs

5.19 NISRA summarised the main findings at the start of each bulletin. It described the statistics in an accessible, objective manner, using straightforward language, with appropriate and clear charts. The charts do not all print clearly in black and white. The bulletins gave an outline of the purpose of the census and an indication of the variety of use made of the data. The bulletins also provided links to the detailed tables alongside the narrative, as well as an annex listing the tables with individual links to NINIS.

5.20 The bulletins accompanying the detailed characteristics tables (such as on health, religion and national identity) explained the specific questions for each topic and provided context for the statistics. For example, they examined the findings for particular population sub-groups, made comparisons over time as well as with the Republic of Ireland, other UK and EU countries. The narrative was particularly helpful in providing a summary of the main finding in words, rather than having an over-reliance on giving the numbers in the text. The detailed bulletins explained the main concepts or terms; but these definitions were not always in the summary; instead, they tended to be in the main body of the bulletins.

5.21 The bulletins each had an appendix giving the background to the Census, as well as explaining about non-response and about the degree of uncertainty around the figures. It also gave links to a range of supporting documents. These include the method paper explaining, for example, how the census overcame under-enumeration and quality assurance report, with an explanation of the approach taken and the various comparator data sets used to benchmark the estimates, the response rates and confidence intervals. Other links included the NISRA revisions policy; a comparison of 2001 and 2011 Censuses; and, a comparison of the census data for the four UK countries.

5.22 NISRA also signposted users to other relevant outputs, including frequently asked questions, infographics, population data visualisations (such as the population pyramid), and data releases and other relevant research (such as on religion and fertility patterns).

Accessibility

5.23 The usability of NINIS was vital for many users, to access directly and to select the specific census data needed. Overall, it was relatively straightforward to

navigate around – it was sufficiently well signposted with instructions and search boxes to help users learn how to use it. Users can quickly learn how to produce tables with single variables as well as multivariate tables, including by different area types. Supporting explanatory information was easy to find. The table locator was helpful in confirming the presence of specific combinations of variables. The search facility was important in narrowing down the range of tables.
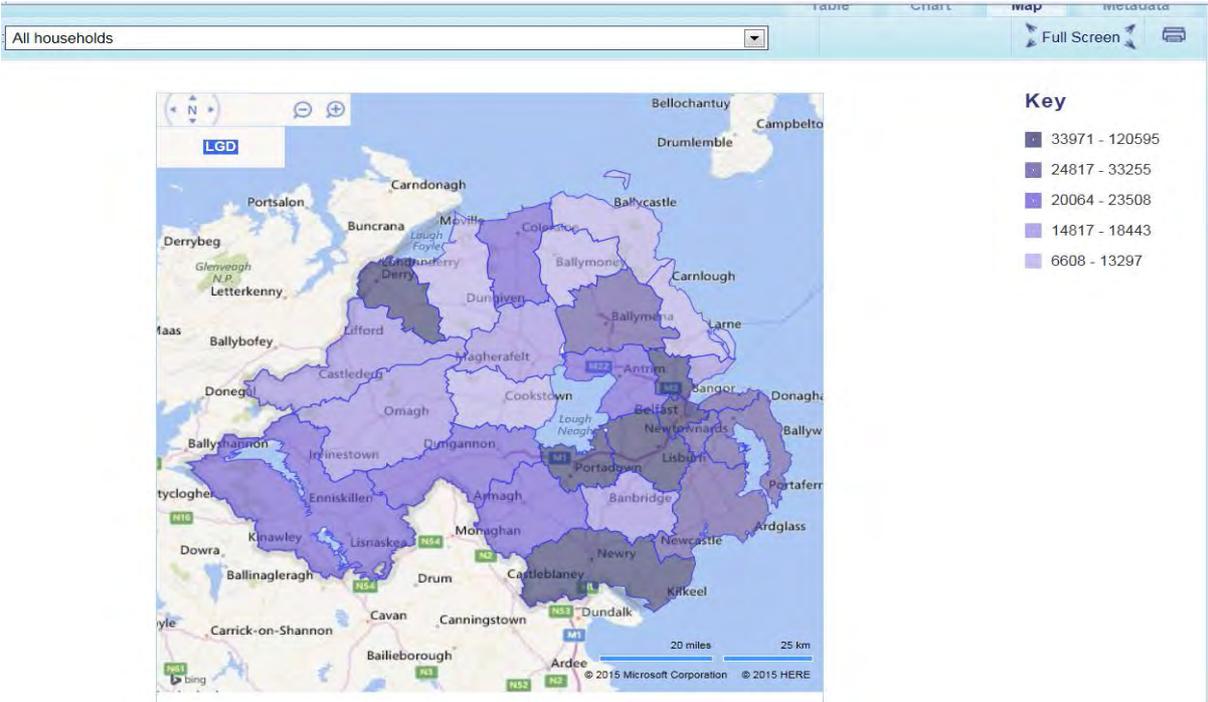
5.24 NISRA's website provides the bulk data in ZIP files for download (for example, on the local or detailed characteristics web pages). Each package contains the data files for individual areas in CSV format, consistent with open data requirements to be machine readable and accompanied by metadata files with the variable coding information.

Figure 5.1: Example table on NINIS[100]

[100] http://www.ninis2.nisra.gov.uk/public/Home.aspx

Figure 5.2: Illustration of the map function in NINIS

Figure 5.3: Table listing on NINS with type of access through online tabulation, Excel spreadsheet or bulk download through a zip file

Quality assurance

5.25   NISRA first published *2011 Census Quality Assurance Report*[101] in December 2012. It then updated the report in March 2015 with additional information about quality assurance (QA) checks undertaken on the detailed data. The QA report provides links to key documents such as the overall QA strategy for the 2011 Census for Northern Ireland, and other papers such as the Methodology Overview for the First Release, with a synopsis of the key census processes. It also details the imputation approach used for both the individual and household questionnaires and gives the resulting imputation rates by question.

5.26   NISRA investigated coverage by comparing with high quality administrative data sources such as the Health Card Register (a list of people registered with GPs and activity data such as the collection of prescriptions), in conjunction with information collected by census field staff, to identify non-responding households. The check involved a random sample of around 30,000 actual census returns. NISRA compared these with the distribution of key demographic variables for records derived from the Health Card Register for the same address. This allowed NISRA to replicate the records for missing households using the Health Card Register. It also used a census coverage survey of 15,000 households with the aim of estimating the key demographic characteristics of those missed by the Census.

5.27   The QA report also lists the comparative sources used in relation to specific variables (for example, marriage registration and same-sex civil partnership data for checking distributions of census data by marriage and same-sex civil partnership status) and links to earlier QA reports such as for population and household estimates released in 2012.

5.28   NISRA also lists in the QA report the upstream activities done by the data processors, Lockheed Martin UK Ltd, and downstream activities conducted by its own census team and ONS. The main activities by the statistical producers were to:

   ● validate that the captured data were delivered by the contractor in line with the agreement

   ● identify and address any duplicates in the data

   ● identify and impute any missing values in the data (in line with a method agreed across the UK)

   ● undertake an assessment of coverage and adjusts the results as appropriate

   ● apply the necessary statistical disclosure control

5.29   Two joint fora covering England, Wales and Northern Ireland – the Data Quality Forum and the Processing Operations Management Forum – reviewed any issues identified by the contractor or in the downstream activities. Both groups met daily during live operations. NISRA also carried out plausibility checks on the data.

5.30   The QA report provides a detailed description of the assurance arrangements undertaken on the census data both by the data supplier and by the statistical

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[101] http://www.nisra.gov.uk/Census/key_QA_2011.pdf

producers. It describes accuracy in terms of the capture accuracy levels and imputation rates.

2011 Census evaluation – the lessons learnt

5.31   NISRA highlighted a wide range of lessons learnt within its *Northern Ireland Census 2011 General Report*[102], published in March 2015. The report reviewed the census operation from the consultation and planning stages through to the production and dissemination of outputs and evaluation. NISRA identifies some of its main successes but also a wide range of lessons that it says it plans to apply as it prepares for the next census.

5.32   It identified its key successes as:

- better engagement with users and other stakeholders, thereby engendering higher levels of support for and confidence in the census

- inclusion of several new topics on the census questionnaire

- a high level of overall response

- development of a purpose-built address register to facilitate mail-out of questionnaires and improved management of the field operation, including questionnaire tracking

- restructuring of field force duties to enable more resource to be focused on following up non-response, while employing a reduced field force

- introduction of a secure online response facility

- outsourcing of a range of support activities to specialist service providers, and

- more flexible means of dissemination and analysis of an increased range of census data via the NINIS and NISRA websites, including the development of innovative data visualisation techniques

(Source: *Northern Ireland Census 2011 General Report* p132)

5.33   NISRA identified some key lessons from conducting the 2011 Census, which have informed recommendations for a similar programme in any future census. These included:

- *Supporting material.* It is important that supporting publicity materials are provided and passed on to community organisations, to enable them to give their own presentations with the right messages cascaded down through networks, much earlier in the programme.

- *Face-to-face contact.* There is no substitute for personal, face-to-face contact. The most effective engagement is achieved in-person; in such a way that there is no competition or conflict of interest in asking direct questions that really make the difference to a particular section of the population.

- *Strategic planning.* To develop an approach where regional activities are followed-up at the local level allows both parties to assimilate first-hand, up-to-date information into effective plans.

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[102] http://www.nisra.gov.uk/census/2011/evaluation.html

- *Early engagement, consultation and planning.* At regional level to enable discussions and reasoning to cascade down to grassroots and preparations to be made for supplemental actions to maximise participation.

5.34   NISRA identified a wide range of recommendations for the planning and operation of a future census. It highlighted that field operations should include: building in considerable contingency time into the field management roles; properly scoping IT-related tasks and volume tested; and, considering the impact of external commitments (to other jobs) of managers on census operations. It also noted the need to provide the right supplies to the right people at the right time for the success of any field operation. Consequently, it recognised the need to test the associated processes, systems and any contractors as fully as possible, as well as undertaking more contingency planning.

5.35   NISRA found that the resource required for contract management could lead to risks so it saw the need for greater emphasis on strengthening the links between the operational delivery and the contract management teams, with realistic testing programme timescales. It also recognised that the complexity of special enumeration should not be under-estimated; early development of this work could save money and effort later on.

5.36   NISRA highlighted the success of its Census Coverage Survey (CCS), being conducted on schedule, within budget and provided sufficiently robust information to enable the statistical adjustments for coverage. However, it thought the overall response rate (81.9 per cent) was disappointing, compared with that achieved by ONS in England and Wales (90.4 per cent). In any future CCS, it recommended that there should be a review of the sample that may provide further improvements to the measurement of coverage.

5.37   It identified that one of its main difficulties in the downstream processing was that the systems did not undergo complete testing prior to live processing using data with census type scenarios. This led to many requests for change, to ensure that the processing would work in an automated, robust manner. It also experienced delays within individual processes that had knock-on effects on later processes, creating pressure on the operational teams, with less time for some other activities such as quality checking. For the next census, NISRA recommended the earlier preparation and development of the system design, so that a full end-to-end test using simulated census data can be undertaken.

5.38   NISRA said that the key lessons learnt from the evaluation of the coverage system are that:

- working groups, involving relevant experts and business areas, and external reviews are critical to ensuring that high quality methods are developed to provide the basis for engaging with stakeholders

- transparency in communications is important to help users understand complex methods

5.39   NISRA and ONS applied common statistical disclosure control procedures. NISRA also noted that the approach created some difficulties during later stages of output production. It noted that the level of detail available was slightly lower (in terms of number of rows and columns) in many tables compared with equivalent outputs in 2001, and that this may have disappointed

some users. ONS and NISRA highlighted that they could have assisted users more by clearly demonstrating how the advantages outweighed the perceived disadvantages. NISRA noted a future challenge to persuade users that the presence of a small number of slight inconsistencies between tables is acceptable. Providing 'real' test data will help. It also thought that any census test or rehearsal should test the whole of the process from start to finish, including SDC processing and outputs. Having a UK-wide disclosure control Working Group set up during the evaluation and development phases would provide consistency across the census offices.

5.40   NISRA thought that its QA of the 2011 Census was more rigorous and comprehensive than in any previous Northern Ireland census. However, it noted some lessons that could inform its future practice. Access to an early extract of data was invaluable as it gave the opportunity to examine the data prior to the planned formal deliveries. The QA team were able to identify at an early stage if the data were in line with the agreed specification; if there was any evidence of systematic errors being introduced; and how well the questionnaire had been understood by the general public (for example, whether the routing had been followed correctly).

5.41   As well as identifying ways of improving its management of QA environment, NISRA also thought that it could improve its tools for checking the results, particularly focusing on those used to generate visualisations of possible errors or implausible estimates.

Annex 1: Actions taken in response to Phase 2 Assessment Requirements[103]

Requirement	ONS	NRS	NISRA
1. Publish information about the outcomes from user consultations in a timely manner and explain clearly their decisions based on these consultations	ONS published[104] details of the outcomes from user consultations in a timely manner, and clearly explained its decisions based on any consultations. In addition, ONS produced a single document[105] summarising changes based on user feedback	NRS published[106] a document 'Update on Statistical Outputs' on 12 April 2012 which provided information on the outcome of user consultation on statistical outputs.	NISRA published[107] details of the outcomes from user consultations in a timely manner, and has clearly explained its decisions based on any consultations.
2. Inform users about any changes to plans for publishing the outputs prospectus and timetable, and explain clearly the reasons for any changes	ONS published[108] its prospectus which provides details of the timing and content of releases – including England and Wales, and UK releases	NRS published[109] the Version 1 of the Census Prospectus on 19 June 2012 which provided details of the timing and contents of the releases.	NISRA published[110] its prospectus which provides details of the timing and content of releases and is based on ONS' prospectus
3. Publish more information about Census Advisory Groups and about the UK Census Outputs Working Group	ONS published[111] details of the Census Advisory Groups and the UK Census Outputs Working Group, including membership of each of the seven groups and the agendas for each meeting. ONS published	NRS published[112] details of the Census Advisory Groups, including minutes of the group on the GROS website, linked to from the Scottish Census website. In addition, NRS has provided links to the details of the UK Census	NISRA published[113] details of the Census Advisory Groups, including minutes, the terms of reference and scope of the group. In addition, NISRA has provided links to the details of the UK Census

[103] Assessment report 115: http://www.statisticsauthority.gov.uk/assessment/assessment/assessment-reports/index.html
[104] http://www.ons.gov.uk/ons/guide-method/census/2011/the-2011-census/producing-and-delivering-data/2011-census-outputs/index.html
[105] http://www.ons.gov.uk/ons/guide-method/census/2011/the-2011-census/producing-and-delivering-data/2011-census-outputs/update--2011-main-statistical-outputs-consultation.pdf
[106] http://www.gro-scotland.gov.uk/files2/the-census/progress-reports/2011-census-stats-outputs-update-april2012.pdf
[107] http://www.nisra.gov.uk/Census/2011%20Census/2011%20Census%20Planning/Consultation.html
[108] http://www.ons.gov.uk/ons/guide-method/census/2011/census-data/2011-census-prospectus/release-plans-for-2011-census-statistics/index.html
[109] http://www.scotlandscensus.gov.uk/documents/censusresults/Outputs%20Prospectus%20-%20Nov%202012.pdf
[110] http://www.nisra.gov.uk/Census/2011CensusProposedOutputs.html
[111] http://www.ons.gov.uk/ons/guide-method/census/2011/the-2011-census/census-consultations/uag/index.html
[112] http://www.scotlandscensus.gov.uk/en/planning/user.html
[113]
http://www.nisra.gov.uk/Census/2011%20Census/2011%20Census%20Planning/Census%20Advisory%20Group.html

	a range of papers considered by working groups on a range of topics, including: data quality; population bases; and question selection and testing.	Outputs Working Group on ONS's website.	Outputs Working Group on ONS's website.
4. Adopt clear pricing policies for any supplementary statistical services related to Census outputs	ONS has adopted[114] and published clear pricing policies for supplementary statistical services	NRS has adopted clear pricing policies for supplementary statistical services. It published[115] a clear pricing policy as part of its prospectus	NISRA has adopted clear pricing policies for supplementary statistical services. NISRA published[116] a clear pricing policy as part of its prospectus
5. GROS and NISRA should improve the signposting to relevant methodology papers on ONS's website	NA	NRS has improved the signposting on its website[117] to relevant methodology papers held on ONS's website, providing links to the appropriate ONS web pages. This includes information on edit and imputation, coverage estimation and adjustment, and statistical disclosure control.	NISRA has improved[118] the signposting to relevant methodology papers on ONS's website. NISRA has highlighted any deviation from the methods adopted by ONS and linked to ONS's web pages; this includes information on statistical disclosure control; and the coverage assessment and adjustment.
6. GROS and NISRA should publish details of quality assurance advisory groups and accessible information about plans for quality assuring Census data	NA	NRS has published information on quality advisory groups and accessible information on plans for quality assuring the Census. Quality Advisory Groups: Terms of Reference[119] Minutes of group[120] Quality Assurance of the 2011 Census[121]	NISRA has published information on quality advisory groups and accessible information on plans for quality assuring the Census: Advisory Groups[122] Quality Assurance of the 2011 Census[123]

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[114] http://www.ons.gov.uk/ons/guide-method/census/2011/census-data/2011-census-prospectus/release-plans-for-2011-census-statistics/commissioned-tables/index.html

[115] http://www.scotlandscensus.gov.uk/documents/censusresults/Outputs%20Prospectus%20-%20Nov%202012.pdf

[116] http://www.nisra.gov.uk/archive/census/2011/Outputs/1_release_plans_section.pdf

[117] http://www.scotlandscensus.gov.uk/en/planning/methodology/

[118] http://www.nisra.gov.uk/Census/2011Censusmethodology.html

[119] http://www.scotlandscensus.gov.uk/documents/cdqawg/cdqawg-terms-of-ref-nov2012.pdf

[120] http://www.scotlandscensus.gov.uk/census-data-quality-advisory-working-group-cdqawg

[121] http://www.scotlandscensus.gov.uk/en/planning/methodology/assurance.html

[122]

http://www.nisra.gov.uk/Census/2011%20Census/2011%20Census%20Planning/Census%20Advisory%20Group.html

7. Publish accessible information about Census output geography to help users understand the policies and why key decisions were made	ONS published[124] accessible information about census output geographies and the reasoning behind key decisions, including: Information[125] about the different output geographies including, for example, the reasons for changes to Census output areas and the creation of Workplace Zones Information[126] on Best-fit methods used to create output geographies	NRS published[127] accessible information about census output geographies in the update to the Census Prospectus in November	NISRA has published[128] *Policy for main geographic outputs from the 2011 Census* which clearly explains to users the Geography policies adopted and the reasoning behind key decisions.
8. Publish information about statistical disclosure control methodology to help non-expert users understand the methods and why they were chosen	ONS published[129] information about statistical disclosure control methods to help non-expert users understand the methods and why they were chosen. ONS published[130] this information in the form of several web pages and papers on statistical disclosure control including a Question and Answer document[131] on statistical disclosure control	NRS confirmed that it has reviewed ONS statistical disclosure control methodology and that there are no deviations for Scotland. NRS has published[132] information on statistical disclosure control methodology NRS has provided users with links[133] to ONS's documentation on statistical disclosure control	NISRA has published[134] accessible information about statistical disclosure control methods that will be applied to Census outputs NISRA is using a similar approach to ONS and has provided users with links to ONS's documentation on statistical disclosure control; NISRA has made clear where its methods deviate from ONS's in the case of religion being used in place of the ethnicity variable in Northern Ireland.

[123] http://www.nisra.gov.uk/archive/census/2011/2011_Census_Quality_Assurance_Strategy.pdf
[124] http://www.ons.gov.uk/ons/guide-method/census/2011/the-2011-census/producing-and-delivering-data/output-geography/output-geography-policy/index.html
[125] http://www.ons.gov.uk/ons/guide-method/census/2011/the-2011-census/producing-and-delivering-data/output-geography/index.html
[126] http://www.ons.gov.uk/ons/guide-method/census/2011/the-2011-census/producing-and-delivering-data/output-geography/best-fit-policy/index.html
[127] http://www.scotlandscensus.gov.uk/documents/censusresults/Outputs%20Prospectus%20-%20Nov%202012.pdf
[128] http://www.nisra.gov.uk/Census/2011Censusmethodology.html
[129] http://www.ons.gov.uk/ons/guide-method/census/2011/the-2011-census/processing-the-information/statistical-methodology/index.html
[130] http://www.ons.gov.uk/ons/guide-method/census/2011/the-2011-census/processing-the-information/statistical-methodology/statistical-disclosure-control-for-2011-census.pdf
[131] http://www.ons.gov.uk/ons/guide-method/census/2011/the-2011-census/processing-the-information/statistical-methodology/statistical-disclosure-control-for-2011-uk-census---q-a.pdf
[132] http://www.scotlandscensus.gov.uk/en/planning/methodology/disclosure.html
[133] http://www.ons.gov.uk/ons/guide-method/census/2011/how-our-census-works/how-we-took-the-2011-census/how-we-planned-for-data-delivery/protecting-cofidentiality-with-statistical-disclosure-conctrol/index.html
[134] http://www.nisra.gov.uk/Census/2011Censusmethodology.html

9. Publish plans to develop commentary and analysis that aid interpretation of the Census results	ONS published plans to develop commentary and analysis that aid interpretation of the Census results as part of its online prospectus. ONS provides[135] users with information on the content of each of its four scheduled	NRS has published[136] plans to develop commentary and analysis that aid interpretation of the Census results as part of its online prospectus. NRS has improved the text on the website, providing[137] a clearer indication of the contents of the Prospectus for users.	NISRA has published[138] plans to develop commentary and analysis that aid interpretation of the Census results as part of its online prospectus
10. Publish a list of administrative sources which will be used to quality assure the Census results, and information about the quality of these sources	ONS published a list of administrative sources that were used to quality assure the Census and has provided information on the quality and reliability of the sources. Administrative sources[139] used to quality assure the English and Welsh Census ONS has amended its Statement of Administrative Sources[140] (SoAS) to make clear which administrative sources have been used to quality assure the Census	NRS has published[141] a list of administrative sources which were used to quality assure the Census and has provided information on the quality and reliability of the sources.	NISRA has published a list of administrative sources which were used to quality assure the Census and has provided information on the quality and reliability of the sources. Administrative sources[142] used to Quality Assure the Northern Irish Census NISRA has amended its Statement of Administrative Sources[143] to make clear which administrative sources have been used to quality assure the Census

[135] http://www.ons.gov.uk/ons/guide-method/census/2011/census-data/2011-census-prospectus/release-plans-for-2011-census-statistics/index.html

[136] http://www.scotlandscensus.gov.uk/documents/censusresults/Outputs%20Prospectus%20-%20Nov%202012.pdf

[137] http://www.gro-scotland.gov.uk/census/censushm2011/producing-delivering-data.html

[138] http://www.nisra.gov.uk/archive/census/2011/Outputs/1_release_plans_section.pdf

[139] http://www.ons.gov.uk/ons/guide-method/census/2011/the-2011-census/processing-the-information/data-quality-assurance/overview-of-administrative-comparator-data-used-in-2011-census-quality-assurance.pdf

[140] http://www.ons.gov.uk/ons/guide-method/the-national-statistics-standard/code-of-practice/statement-of-administrative-sources/index.html

[141] http://www.scotlandscensus.gov.uk/documents/methodology/census-overview-comparative-sources-uksa.pdf

[142] http://www.nisra.gov.uk/archive/census/2011/2011_Census_Quality_Assurance_Strategy.pdf

[143] http://www.nisra.gov.uk/aboutus/default.asp96.htm

www.statisticsauthority.gov.uk