Office for National Statistics

2011 Census Quality Strategy

Project:	2011 Census
Project SRO:	Jil Matheson
Project Manager:	Ian Cope

Prepared by: Garnett Compton (Quality Manager)

Last Amended:	18 April 2006
Document Name:	Quality Strategy
Document Status:	Final

CONTENTS

1 Introduction

This strategy sets out a structure for managing and delivering quality in the 2011 Census. It is a high-level document and as such presents a general framework for developing and implementing processes to define, manage, and measure the quality of the 2011 Census. It is not intended as a specification, or to define specific quality standards or how they will be measured.

Lessons about quality learned from the 2001 Census have an important role in defining the approach to managing quality in 2011. The key lessons (see Appendix A) initiated the need for a more holistic and integrated approach to quality.

1.1 What is quality?

In the context of the census, quality refers to the output produced and whether:

- the specific output meet user requirements; and
- the user understands the limitations of the actual data.

However the levels of quality that can be achieved are constrained by costs.

Quality output depends on quality processes. An approach to quality is required that underpins the processes to develop and undertake a census, from topic consultation to the final production of output. How successful the approach is depends on the project's ability to foster, and commit to, a quality culture and 'right first time' thinking. The challenge that this presents, however, is not trivial. It is not enough to implement new processes; these must be supported by a change in people's behaviour and thinking, i.e. moving to a 'quality culture'.

1.2 Why is quality important to the census?

Quality is important to the census because of the wide number of users and potential impact on their outputs. For example, the input of census results to the annual SSA (Standard Spending Assessment) for the distribution of resources to Local Authorities. The census is held once every ten years and provides a benchmark for the whole social statistics system. In many cases it is the only data source, particularly for small areas and for small population groups.

However, the census is not perfect, it doesn't count everyone and some of the responses will only be partially complete. This provides two challenges: to get the initial count as high and complete as possible; and, to implement robust measures to estimate and adjust for undercount and incompleteness. It is therefore critical to have processes which manage and measure quality throughout the process. These measurements will be paramount in

explaining to users the strengths and limitations of the data and its use in their decision making.

1.3 Scope of the strategy

One of the key user requirements for the 2011 Census is the provision of consistent UK outputs. Consistent levels of quality and information/reporting on quality are therefore required. Although this document refers specifically to the Census for England and Wales, both the General Register Office for Scotland (GROS) and the Northern Ireland Statistics and Research Agency (NISRA) have been involved in the production of this report and are committed to applying the principles outlined in the report in Scotland and Northern Ireland respectively. The three Census Offices will work closely to ensure that a common approach to quality is actively pursued throughout the UK.

This is in line with the Statement of Agreement between the Registrar Generals. The section relating to output states:

> "The final product should be consistent, coherent and accessible statistics for the UK and for each component country, a joint database (and/or a common data schema) being a desirable way of facilitating that outcome, with a common approach taken to output specifications, quality, data format and timing of releases."

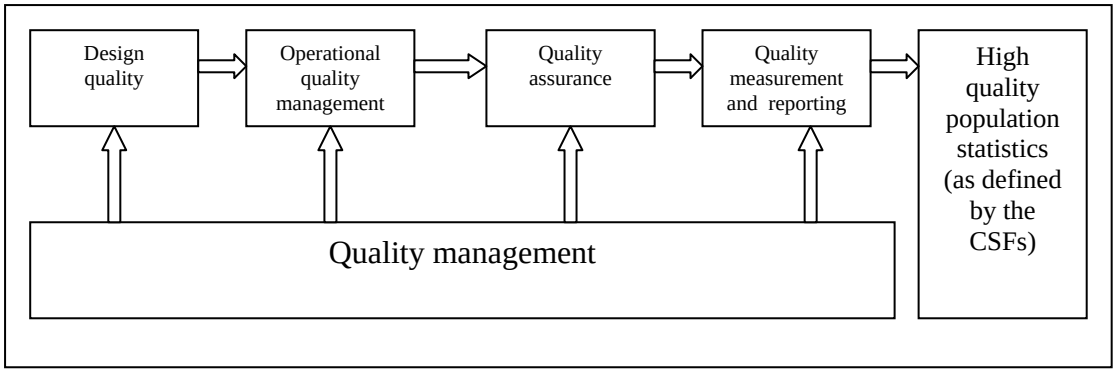
The scope of this strategy is also confined to output directly from the census. It includes all aggregated output and microdata (e.g. SARS) but excludes output derived from census results, such as the mid-year population estimates.

2 2011 quality model

A quality model for the design, development and implementation of the 2011 Census will help to achieve the aim of delivering high quality population statistics. The quality model for 2011 is presented in Figure 1 and considers two particular aspects of quality:

- the specification of quality standards or Critical Success Factors (CSFs) and their impact on the design, development and evaluation of the 2011 Census; and
- the five groups of quality objectives and how they interact to achieve the desired levels of quality set out in the Critical Success Factors.

Figure 1 The 2011 Census quality model



2.1 Defining quality standards

In order to guide decision making during census design, development and implementation, it is necessary to initially define the strategic aims of the census and the level of quality that is required. These aims can then be used after the census to evaluate whether it was successful. For this approach to work, it needs to be real and tangible to the user, i.e. measurable. Strategic aims for the census have already been published and a framework of Critical Success Factors (CSFs) is under development to specify the desired level of quality. CSFs are quality standards which, in effect, describe 'what success will look like' and quantify the strategic aims. These will not be limited to the quality of output but will address the whole spectrum of the census. The CSFs will be defined to address four strategic aims of the census:

- to provide high quality statistics that meet user needs;
- to build user confidence in final results;
- to provide value for money solutions; and
- to protect, and be seen to protect, confidential personal census information.

Specific standards for the CSFs will be finalised in the lead-up to 2011 as:

- user requirements become clearer;
- decisions on funding allocations are taken; and
- there is a greater understanding of the cost-quality relationship and what level of quality is achievable and required.

2.2 Quality objectives

The primary objective of the 2011 Census is to provide high quality population statistics as required by key users, such as policy makers and service providers, on a consistent and comparable basis for small areas and small population groups. A fuller definition of success which looks at user confidence, security and value for money as well as accuracy is defined in the Critical Success Factors (see section 2.1). To ensure that the levels of quality

standards defined in the CSFs are achieved, a number of high-level quality objectives have been defined which cover the entire process of designing, developing and implementing the 2011 Census. Figure 1 depicts how the groups of quality objectives interact.

Quality management objectives

- To obtain a clear commitment to quality with the full understanding of the costs and benefits associated with providing this commitment.
- To foster a culture of quality and transparency in working practices within the census.
- To implement a rigorous and continual process of evaluation to ensure that the Census project is developing and operating in the most effective and efficient manner.
- To be explicit about the trade-offs between cost, quality and delivery times.
- To ensure that the 2011 Census adheres to the National Statistics Protocol on Quality Management.

Design quality objectives

- To undertake regular and open discussions with users about their requirements from the Census, including content, output, methodology and quality standards (CSFs).
- To ensure that the operational and statistical design of the 2011 Census focuses on what is required to meet the strategic aims and CSFs.

Operational quality management objectives

- To identify and define management information requirements for all census business areas and ensure its availability from the operation and supporting systems.
- To define appropriate and meaningful tolerance levels for key processes to enable quick and effective management of the operation.
- To define and collect information that enables the project to achieve value for money when outsourcing contracts.
- To use the full range of management information available during the operational aspect of the census to identify and resolve problems early in the operation.

Quality assurance objectives

- To specify, develop and implement a full range of quality assurance procedures to ensure that the 2011 Census results meet user requirements, are fit for purpose and are timely.
- To produce a detailed plan before the 2011 Census that sets out the design for quality assuring the results, what sources will be used and what will be done if they differ significantly from expected results.
- To establish strong relationships with, and use the expertise within, Local Authorities and other organisations that hold information about population and/or housing.

Quality measurement and reporting

- To ensure that the quality measurement standards implemented in the 2011 Census are consistent, wherever possible, with the National Statistics Key Quality Measures.
- To deliver information on the quality of the Census at the same time as data is delivered.
- To provide quality measures that relate to different geographies (e.g. regional and local authority levels) and different sub-populations (e.g. Armed Forces and students).
- To make available clear, unambiguous descriptions of statistical methodologies.

3 Achieving our quality objectives

Sections 3.1 to 3.5 provide a high-level action plan for achieving the quality objectives of the 2011 Census. These actions will expand as the design develops and, like this strategy, provide a framework for achieving quality within each group of objectives.

3.1 Quality management

Quality management is about the culture and supporting processes within the project. It is about making sure the staff/people have the tools and support required in order to understand their responsibilities and provide a quality performance. It is therefore, much more difficult to implement quality management processes as the topic is harder to define and evaluate than the other aspects of quality (e.g. quality assurance).

3.1.1 Quality Management Plan (QMP)

This plan will set out initiatives for achieving the quality management objectives set out in Section 2.2. The plan will evolve as the project's understanding of quality grows and develops, primarily through a regular period of review and evaluation. The QMP will address:

- *Commitment to quality* Achieving quality requires buy-in and support from everyone in the project including the Census Project Board. Buy-in is a commitment to support a quality system by providing leadership and recognising that achieving quality is a systematic approach that can be resource intensive.
- *Staff development and training* Training and development of staff in quality issues will help to establish and stimulate a quality culture within the project; a culture where staff feel responsible for maintaining and improving quality. Workshops, training, conferences, presentations and regular feedback will all help to increase awareness of quality issues and how good quality practices can be applied within individual business areas.

- *Sharing of best practices* Exchanging ideas, knowledge and best practice with other experts is an effective tool for adding value to products. The key is identifying, promoting and establishing relevant links. It is important to recognise and tap into the vast wealth of experience within the project, ONS and other government departments, and the private sector.
- *Effective documentation* Implementing standard documentation of processes and protocols will allow for consistency of approach, flexible working, clear audit trails, a transparency of the method and a baseline for measuring process improvement.
- *On-going review and evaluation* Processes for continuous review and evaluation will assist the development of the project and an understanding of where improvements can be made and the promotion of best practices within the project.
- *Quality procedures* Procedures aimed at improving and demonstrating quality amongst the standard project processes will be developed and implemented. This would include guidelines for the development of quality products with a 'right first time' approach. For instance, using the PRINCE2 and ONS guidelines, the procedures would specify quality assurance procedures, including:

    - production of product descriptions showing the quality criteria the product must fulfil for sign-off, how, by whom and when the criteria will be assessed;
    - quality review processes and a quality review log to provide an audit trail of the quality review/assurance of a product including who reviewed it, when, comments and how comments were addressed in the product acceptance.

3.2 Quality design

Quality in the design will provide a foundation for building the whole census operation and make the primary goal of high quality population statistics more achievable.

'*The 2011 Census: a design for England and Wales*' document sets out proposed changes to the operational design of the census to meet a number of key statistical policy issues. These and other changes go through a thorough process of testing, evaluation and peer review to ensure that the full benefits of the changes are realised. Complementing this process is the need to be involved in regular discussions with users about their requirements for the questionnaire content and output of the census. User requirements will impact on the design and the amount of testing that may be feasible.

3.2.1 2011 Census testing and evaluation: strategy

Early planning, testing and evaluation is an essential process for the success of the 2011 Census. This process begins with creating and then testing innovations, allowing time to make changes and then to re-test where necessary. The evaluation

of tests also includes the assessment of the procurement for equipment and outsourced services that must be in place for conducting the census.

The 2011 Census design aims to use: new questionnaires, new delivery and collection methods, early consultation, stronger partnerships, new out-sourced technologies and operational targeting methodologies including enumeration, follow-up and publicity. Overall, the testing and evaluation process will enable the Census Division to explore these innovations by confirming, or otherwise, the effectiveness of all aspects in the proposed 2011 Census design, in particular its feasibility and impact on levels of response. The key areas requiring careful testing are the:

- statistical design of the census, including questionnaire content and design, coverage assessment methods and processing rules;
- operational design of the census field work, including post enumeration surveys;
- operational design of the census systems, including volume and integration testing; and
- ability of external suppliers to provide the required systems, products and services.

3.3 Operational quality management

The four operational quality management objectives listed at Section 2 can be summarised as managing the census operation from the recruitment of field staff to the dissemination of output. In order to achieve this there is a requirement for the right information, at the right time and a set of processes and systems in place in order to use and act upon the information gathered. There are two key products ('2011 Census standards and measures' and an 'operational management plan') which, when used together, will be the key to fulfilling these objectives.

3.3.1 2011 Census standards and measures

In order to effectively manage the operation within short timescales, census operational managers must have a good understanding of the business processes involved in the operation and the expected performance levels for each of the processes. In other words there must exist a set of pre-defined standards and measures for key business processes in order to monitor and act upon under-performing areas of the operation.

As well as setting the standards and measures for each of the processes, other information will also be defined and collected. For example, the supporting actions necessary to ensure the standard is met, the mitigating action if the standard is not met and what other processes will be impacted and how.

3.3.2 Operational management plan

Using the standards and measures defined in 3.3.1 the operational management plan is a set of processes defining how the operation will be managed at census headquarters. It will define:

- the roles and responsibilities of each of the operation's management team, including colleagues from outside the project team, and skills necessary to fulfil these roles;
- the size and skills required for a support team;
- the systems required to quickly and effectively manage the operation, such as a Management Information System which enables 'hot spots' to be easily identified and data mining operations for more in-depth analyses; and
- the processes for issue resolution, i.e. what will happen when issues arise and who will be responsible for the final decision.

3.3.3 Procurement and contract management quality

There are two key strategy documents that outline how quality will be achieved up to the award of contract and the process for managing the contract.

- The **procurement product quality strategy** will illustrate how quality will be assured during the procurement cycle, from specification of requirements through to award of the contract. It will outline the processes and documentation that must occur at each step of the procurement cycle to ensure that contracts awarded are competitive and value for money.

- The **census contract management strategy** will set out the procedures for achieving quality post award of contract. This will cover the necessary processes so that the deliverables agreed in a contract can achieve value for money.

3.4 Quality assurance

Quality Assurance (QA) is primarily about the final product, the tabulated results, and assuring that the results conform to expectations. But it is also about assuring the quality of individual level data. That is, it is necessary to ensure that changes or actions (e.g. edit and imputation) to the data do not result in systematic errors that are unlikely to be detectable when QA'ing the main results but may affect the quality of more detailed cross-tabulations.

3.4.1 Quality assurance strategy

The quality assurance strategy will guide the QA work by outlining the quality assurance objectives and the mechanisms (i.e. key principles and deliverables) that will be developed to achieve the objectives.

The QA work will have two key strands, the macro and micro level QA, which will complement each other providing a thorough QA of the results. The emphasis will be on the macro level QA as this is the most important census output and is the primary interest to users. In more detail the two strands are:

- Macro level QA a series of processes to make sure that the national and sub-national (e.g. Local Authorities) estimates are feasible. This will comprise identifying, analysing and obtaining secondary/administrative sources, including the address register, for use in the QA and assessing plausibility. In order to produce acceptable estimates it will be imperative that any differences between the estimates and expected results (e.g. mid-year population estimates) are fully explained.

  There are various initiatives being carried out in ONS and elsewhere (e.g. Local Authorities) assessing the quality and potential use of administrative sources for different statistical products. Close links will need to be developed with these projects to learn and share knowledge on the quality and use of such sources.

- Micro level QA This involves a very detailed analysis of the data undertaken by a team of people with an excellent understanding of the data processing systems (such as edit and imputation) and its interdependencies. These processes will be designed to ensure that no systematic error is introduced as a result of processes such as data capture or edit and imputation.

Within these strands the quality assurance strategy will address:

- Developing and agreeing the methodology for QA'ing the census results. As part of the method it will be necessary to agree what procedures will be implemented if the data does not conform to expectations. For example, comparison of results with secondary sources (e.g. mid-year estimates of population) to confirm that the results meet census and user expectations, including defining expectations.
- Establishing a consultation mechanism that ensures that the development of the methodology is a transparent process. This will achieve two key aims, a level of input from users and stakeholders into the development of the methodology and a way of managing user expectations, i.e. users will be very clear about the process ahead of the actual operation.
- Identifying, establishing and developing links with relevant experts in ONS and other organisations to develop in the QA process to ensure that a variety of experts with relevant topic knowledge are involved in the QA.

3.5 Quality measurement and reporting

The information on quality provided with the output will be the basis on which the user judges the quality of the output and how well it meets their requirements. The information is critical to assist the user's understanding and use of the information.

From a user's point of view this is likely to be a key area. Understanding user requirements will be paramount to ensuring the successful delivery of relevant and timely information concerning the quality of the output or results. There is a link between quality and content of the questionnaire and output required, i.e. there may be a requirement for a certain topic but if a particular level of quality cannot be achieved then it may not be included. Quality and its' implications needs to be discussed fully at user consultations.

To achieve the quality objectives set out in section 2.2 the quality reporting strategy (see section 3.5.1) will outline the approach.

3.5.1 Quality reporting strategy

The Quality Reporting Strategy will outline the objectives and a more detailed action plan as to how these will be achieved, i.e. key deliverables and the necessary mechanisms for producing the deliverables. It will clearly define the consultation mechanisms and how these link in with other consultations, namely topic, question and output consultation. Consultation and the subsequent user requirements will be the key drivers for the development of the other deliverables outlined in the strategy. This will include:

- A quality user requirements specification – based on consultation with users this detailed specification will be used to identify data requirements for the systems development team; and

- A quality product catalogue – A catalogue of products detailing what information will be produced on quality, such as a Quality Report, and, where relevant, which output products the information will accompany. A timetable will also be included.

4 Next steps

Quality is a far reaching topic that means many things to many people. This applies to the census as much as any other statistic, service or product. The 2011 Census Project recognises and understands the importance of quality to users and stakeholders. This strategy sets out a clear framework for achieving quality. How ONS achieves it and meets the quality objectives set out in section 2.2 requires considerable work with a particular emphasis on:

- developing and implementing the products outlined in section 3; and,
- achieving commitment to the quality concepts and processes from the 2011 Census Project and the Census Project Board.

References

Dallender, Janie ONS (2004*). Delivering a quality census*. Internal ONS discussion paper.

Office for National Statistics (2004). *The 2011 Census: A design for England and Wales.* ONS Information Paper

Office for National Statistics (2004). *The 2011 Census: Strategic Aims & Key Research in England and Wales.* ONS Information Paper 2

Office for National Statistics (2004). *National Statistics Code of Practice Protocol on Quality Management.*

Office for National Statistics. *2001 Census - Evaluation Reports*.

Office for National Statistics (2005). *Guidelines for measuring statistical quality*.

Office for National Statistics (2006). *2011 Census Design Document England and Wales Design – v1.0.*

ANNEX A

2001 LESSONS LEARNED

Table 1 below identifies the key lessons learned (events), with respect to quality, from 2001 and shows the effect that these had in 2001. In addition, for each of the lessons learned the action proposed for taking in 2011 has been noted.

Event	Effect	2011 Action
Processes for measuring quality in 2001 were too late in the process.	In key instances it was too late to improve the quality, only report on it.	This is identified as a quality objective for 2011. It will guide developments and help to ensure that requirements for monitoring quality are considered as part of the design development.
In 2001, not enough information on the quality of the data was available in time to resolve or improve the issues.	Lack of information led to some delays in processing while data was being rerun to fix quality issues. In addition, some quality issues were identified too late and as a result output contained errors that subsequently needed revision.	Identified as a quality objective for 2011. Much earlier thinking about quality and where it fits into the operation. In addition, data requirements for monitoring quality defined much earlier and recognise the need for up to date quality information from the data capture process and processing systems.
In 2001, the Quality Survey was done after the 1999 rehearsal and based on a slightly different set of questions than were eventually asked in the 2001 Census.	The results are not entirely consistent with the final outputs as some of the questions changed after the rehearsal. In addition, circumstances which affect the quality of responses may have changed as a result of greater publicity, compulsory requirement to complete the form and societal changes.	Quality Survey will be done after the 2011 Census to provide an accurate reflection of quality consistent with the census outputs.
Significant delay in publishing the results of the 1999 quality survey.	The results were not available alongside the main outputs to enable users to better understand the quality of the data.	An objective exists to publish information on quality alongside the main outputs. In addition, early planning for the 2011 Quality survey identifies the need for a report on the outcomes of the survey within 12 months of the survey closing.
The approach to quality in 2001 was fragmented with no clear owner joining up quality across the project.	No consistent understanding and approach to quality across the project, sometimes lacking in transparency and a clear audit trail of decisions. Lack of time dedicated to resolving quality issues, particularly during processing, resulting in delays and decisions	A quality workstream has been initiated with the responsibility of championing quality through the development and implementation of quality management procedures. The quality workstream will have a key role in leading on

	taken without a clear understanding of the potential impacts downstream.	the development and implementation of issue resolution procedures for the 2011 Census.