Quality Management at the Office for National Statistics (UK)

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1. Introduction

Overarching quality management principles are becoming increasingly important as a means to achieving continuous quality improvement within a statistical organisation. At the UK's Office for National Statistics (ONS), continuous improvement is one of the organisation's strategic goals and work has been ongoing for a number of years to develop and implement methods and tools to assist with quality assurance and for reporting the quality of ONS outputs to users (e.g. Quality Output Measures, Process Quality Measures). The ONS has now entered a phase of pulling all of the disparate aspects of quality development work together into one place and implementing a Quality Management Strategy with the aim of initiating a culture change across the organisation. Certain aspects of this work have not just been developed for the ONS, but more widely for the Government Statistical Service (GSS) which takes in other government departments and producers of official statistics (e.g. the departments for Transport, Education and Health), thus enabling the standardisation of quality management principles and processes across government where possible.

This paper reviews the different aspects of quality development work that have been undertaken over the past five years and provides some background to the structure of the UK Office for National Statistics, which is now independent of Ministerial control. It also outlines recent work focused on pulling the quality initiatives together, plugging the gaps and implementing an overarching quality management approach in the form of a strategy, with associated guidance. Finally, the paper looks ahead to anticipated outcomes of current projects and future plans.

2. Understanding Quality

One of the challenges that has faced the ONS in terms of its development of quality management is ensuring that colleagues and users have a consistent understanding of quality and key quality terminology. To address this, key definitions have been developed across the GSS; this was aimed at ensuring consistency of understanding and application across the UK statistical system. These key definitions (as agreed by the GSS Statistical Policy and Standards Committee) are included in Annex A.

A consistent understanding of these key terms, and primarily the definition of 'quality' itself, is particularly important because the quality of the statistical outputs produced across the GSS is measured by their 'fitness for purpose'. This definition has one main consequence: quality is seen as subjectively dependent on the *purpose* of the statistics. The importance of gaining an understanding of this purpose (and ensuring that users have sufficient information about the potential uses of the statistics to guide their decision-making) has meant that the discussion of quality has had to be broadened beyond solely the accuracy of the statistics

themselves; also taking into account the other ESS dimensions of quality (as set out in the definition of quality in Annex A). For example, considerations of quality must now take into account dimensions such as relevance and accessibility and clarity.

Thus, in order to assess the quality of ONS statistical outputs, the organisation must give some consideration to the amount of information that is provided to users. It is this information that enables users to understand the potential uses of the statistics and whether the outputs are appropriate for the purposes that they have in mind. Consequently, assessing and reporting quality as a whole (across the ESS dimensions) is crucially important and thus this paper will not only outline internal quality management initiatives within the ONS but also the broader development of indicators and guidance relating to quality measurement and reporting.

3.　Previous Quality Developments

Over the past five years, ONS has undertaken a number of quality initiatives. One of the major projects has focused on developing sets of "quality indicators" or measures:

a) Output Quality Measures. This work aimed to develop a set of 'statistical measures' that could be easily calculated and, once shared publicly with the user, could be used to determine the quality of the statistical data being released. Typical measures contained within this set included: non-response rates, editing rates, the standard error, the coefficient of variation, etc. UK statistical producers are encouraged to publish such figures alongside statistical outputs, thus allowing the user to make an informed decision about the quality of the statistical release. Work to update the current ONS guidance on this is ongoing but the current version is available at:

　http://www.statistics.gov.uk/downloads/theme_other/Guidelines_Subject.pdf

b) Process Quality Measures. This work marked a new era of quality work within the ONS which included a focus on the quality of each process that feeds into the calculation of a statistical output. Eurostat's Leadership Expert Group on Quality (2002), in their final report, highlighted the importance of process quality to a statistical organisation stating that:

> *"in theory, good product quality can be achieved through evaluations and rework. However, this is not a feasible approach since it is costly and time consuming. Instead, it is believed that product quality will follow from improvements in process quality".*

Work for Eurostat, undertaken by ONS in 2009/10, built on previous work that developed the *Handbook on Improving Quality by Analysis of Process Variables* (Eurostat, 2004). A set of process quality measures were established in, which included response rates, scanning rates, editing rates, etc., which seemed to duplicate the output quality measures work that had previously been undertaken. However, the work highlighted the need to understand the dual purpose of these measures, where it is the intended use of the measure that is important. For example, a response rate can be used to indicate how significant the non-response bias is likely to be and so can be used as a good output quality measure. However, a response rate could also indicate to a statistical producer how well response chasing strategies are working and as such can be deemed a good measure of process quality.

The work also concluded that deeper methodological work was required to look more closely at the processes within a statistical production line which most affect the quality of the final output. This would allow an organisation to focus its resources more heavily around the processes that have the greatest impact. The project also identified the need to concentrate only on measuring those processes that were "easily measurable". Implementing measures that are too arduous a task to

monitor in a statistical organisation that is already suffering from limited resource would not have been welcomed.

Both of these pieces of "quality assurance" work were undertaken in isolation, and were not considered as part of an overarching quality management structure. To implement the use of these measures at the ONS so that the quality of statistical processes and outputs improved was going to require a shift in culture.

4.   The UK Code of Practice for Official Statistics

The Statistics and Registration Service Act (2007) brought about the independence of the ONS and the creation of the UK Statistics Authority. The Authority was required to establish a code of practice for statistics (from here on referred to as "the Code"), and to assess statistics against the Code. The Code was published in January 2009 (UK Statistics Authority, 2009). Compliance with the Code allows statistical outputs to carry the "National Statistics" label. The aim is for the label to be recognised as a stamp of assurance that the statistics have been produced and explained to high standards and that they serve the public good. The Code applies to all UK bodies that are responsible for official statistics, hence the Code does not just apply to the ONS, but has wide applicability across the UK Government Statistical Service (GSS).

The need to adhere to the Code brought about new GSS-wide development work, especially in the Quality arena. More guidance was needed to assist producers of national and official statistics to adhere to the Code, along with better training and a better awareness of quality management principles.

The Code contains eight Principles and three Protocols and it is the development of guidance and practices for the fourth Principle, "*Sound methods and assured quality*", that is most relevant to this paper:

> **Principle 4***: Sound methods and assured quality. Statistical methods should be consistent with scientific principles and internationally recognised best practices, and be fully documented. Quality should be monitored and assured taking account of internationally agreed practices.*

The next section outlines some of the more recent developments that have been undertaken to support Principle 4 of the Code.

5.   Work to support the UK Code of Practice (Principle 4)

The Code applies to the wider UK GSS, hence a GSS-wide task force was set up to progress the development of new quality work. The overall aim of the work was to assist the GSS in becoming Code compliant and ensure that the appropriate tools and reporting materials were developed, approved and made available to all.

More detail is provided here of the work undertaken against specific elements of Principle 4 of the Code which relate to "assured quality" (Practices 3, 4, 5 and 6). Practices 1 and 2 relate more to the sound methods element of Principle 4.

a)   *Principle 4, Practice 3: Adopting quality assurance procedures, including consideration of each statistical product against users' requirements, and of their coherence with other statistical products.*

Work was undertaken to develop guidance and templates for producers of official and national statistics

to present quality information to users that would supplement a statistical release and analyses. The good practice includes a model for presenting quality information against the European Statistical System (ESS) dimensions of quality.

Two templates have been developed for use across the GSS: the first contains static qualitative information, which should be released once and updated occasionally; the second contains the more dynamic, quantitative measures (such as the response rates, the coefficient of variation, etc.) which should be produced for each statistical release.

The guidance does not aim to be prescriptive, but intends to give producers of statistics the flexibility to meet the needs of their individual outputs whilst introducing consistency.

b)   *Principle 4, Practice 4: Publish quality guidelines, and ensure that staff are suitably trained in quality management.*

Work was undertaken to develop two new quality training courses to assist with the training and development of GSS staff. One of the courses is aimed at senior managers whilst the other targets lower grade (operational) staff so that education is top down. The first notable step within this training was to agree the definitions of "quality management", "quality assurance" and "quality control", (as outlined in Annex A). The courses are practical and use real case studies from across the GSS to demonstrate good practice, covering both survey and administrative data. A guidance document has also been developed to accompany the training course, pulling all of the quality concepts into one place and outlining the areas of good practice.

c)   *Principle 4, Practice 5: Seek to achieve continuous improvement in statistical processes by, for example, undertaking regular reviews…*

A prototype self-assessment questionnaire for undertaking regular reviews had already been developed by ONS, known as the Quality, Methods and Harmonisation Tool (QMHT). The task force was instructed to consider and review the use of this tool, and to consider ways of possibly streamlining the breadth of review materials that were already available for use across the GSS. It was eventually agreed to merge all GSS review materials and to hold them as separate worksheets within QMHT (Excel based). This ensures that all review materials are stored together, are easy to locate and are accessible by all. As a result of this development, the GSS now has a single tool with which to review the quality of the process and the statistical output produced. This will facilitate the process of continuous improvement as well as highlighting areas in need of development and areas of best practice that can be shared across the GSS.

d)   *Principle 4, Practice 6: Promote comparability within the UK and internationally by, for example, adopting common standards,…,questions, definitions, … and classifications.*

Work has been underway to develop a Harmonisation Strategy, the goals of which are to ensure that all producers of official and national statistics seek to use harmonised standards, questions and definitions when designing and implementing surveys. Any progress towards achieving this goal is measurable (to some extent) through the use of the Quality, Methods and Harmonisation Tool discussed above.

Work has also been undertaken to update an A to Z of harmonised standards, and more information is

available on this from the relevant section of the ONS website[1]. Thirteen topic groups have also been set up to address specific data harmonisation issues by providing advice to users and, when necessary, revising harmonised standards and questions.

As a result of this work across the GSS a coherent set of guidance was developed. However, within the ONS, much of the work on 'quality' is done by the business areas rather than centrally. With the new guidance and templates, there was also a need to gain 'buy in' across the organisation and to ensure that there was momentum to raise awareness and adherence to the guidance produced. The ONS Director General identified the need for a renewed ONS Quality Management Strategy.

6.   ONS Quality Management Strategy

A new Quality Management Strategy was developed and launched in 2011, aimed at all staff. The strategy is owned by one of the high level committees within the ONS and 'sponsored' by the Director General. It brings together the key elements from the Code and the work from the GSS task force and emphasises the importance of quality to the ONS as set out in the inclusion of quality as one of the ONS strategic aims (ONS, 2010a). The Quality Management Strategy sets out three goals for achievement by 2015 and aims to encourage and instil a culture of "continuous quality improvement" throughout the organisation.

The three ONS quality goals are:
   a) To use quality management to encourage and promote a culture of continuous quality improvement through self-assessment and quality reviews;
   b) To produce relevant outputs with up-to-date metadata; and
   c) To produce standardised outputs.

Work to achieve these quality goals is well underway in some areas of the ONS, however there is now a need to ensure that the goals and aims are implemented across all areas within ONS, and the support of the Director General is essential in ensuring that this happens.

The three ONS Quality Goals will be achieved as follows:
a) To use quality management to encourage and promote a culture of continuous improvement through self-assessment and quality reviews:
   • Ensure staff know about relevant policies, guidance and standards.
   • Ensure staff are trained in quality management.
   • Have documented quality assurance processes in place, and ensure these are adhered to.
   • Review all statistical surveys and outputs on a regular basis. This will assist in preparation for the UK Statistics Authority Assessment process. The Quality, Methods and Harmonisation Tool (QMHT) has been devised to help conduct self-assessments.

b) To produce relevant outputs with up-to-date metadata:
   • Statistical outputs are produced to meet known, documented user needs. These needs should be assessed in line with the ONS User Engagement Strategy (ONS, 2010b), or divisional user engagement strategy if available. Business areas will set targets to review periodically how well they meet these needs and document best practice and lessons learned. This documentation should be shared across the ONS.

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[1] http://www.ons.gov.uk/about-statistics/harmonisation/index.html

- All regular outputs must include Basic Quality Information (BQI) and links to a Summary Quality Report (SQR)/Quality & Methodology Information (QMI) published on the ONS website.

c)   To enhance the standardisation of ONS outputs:
- Common standards, concepts, sampling frames, questions, definitions, methods, statistical units and classifications are adopted where feasible, in line with the Code and the ONS Design Charter.
- Up-to-date guidance and harmonised questions are used where these are available. If these standards are not available, this should be reported to the relevant area. If standards are available but not used, explanations should be provided in the relevant SQR/QMI document.
- Information on standardisation should be included in SQR/QMI reports and these should be documented.
- Other corporate guidance is considered.

The implementation of the Quality Management Strategy will be supported by ONS's Quality Centre, whose role it is to communicate the strategy to all business areas, develop and provide guidance and training, and set up monitoring processes so that progress against the goals can be assessed. The Quality Centre will report to a high level board (chaired by the Director General) on a six-monthly basis, highlighting areas of achievement and concern.

At an operational level, the Quality Management Strategy requests that business areas put certain elements in place for this to work: a Quality Champion; a Quality Management Plan; and a Quality Management Strategy Implementation Plan. Business areas are also responsible for ensuring that relevant staff are trained in quality management principles and aware of the relevant ONS policies.

7.   Next Steps

Work is continuing to ensure that previous quality development work is reviewed and updated as a consequence of developments both within the UK and the wider statistical community. For example, the use of administrative data has been more common within the domains of population and social statistics. However, administrative data are now becoming increasingly used within the field of business statistics. Consequently, a European Statistical System network (ESSnet) project on uses of administrative and accounts data in business statistics was established in 2009 by Eurostat. The ONS lead the work package which is developing quality indicators for business statistics involving administrative data (for an update on this work see Frost, 2011). The output of this project (aimed to be completed in June 2013) will be a list of quality indicators that can be used across the European Statistical System. Although these indicators are mainly input and process indicators (because of their relevance to the use of administrative data as an input), the ONS will use these indicators and incorporate them within the overall guidance that the ONS already has in place for producers of statistics: Guidelines for Measuring Statistical Output Quality (ONS, 2007). This will be done as part of the process to update and streamline this guidance, including incorporating statistical areas that were initially omitted from the guidance (e.g. population statistics).

Work to further investigate the correlation of process quality measures with the quality of a statistical output is also required but awaits financial backing. The implementation and use of these measures are viewed as key to encouraging a culture of continuous quality improvement.

8. Conclusions

This is an exciting time for the ONS as it draws together the guidance and developments from across the

GSS and Europe to ensure that it continues in its efforts to be a world-class statistical organisation. As outlined in this paper, the issue of quality is being addressed on two fronts: in terms of quality management and continuous improvement and in terms of quality reporting. The first to ensure that producers of statistics can understand how to improve the quality of their outputs and thus face the requirements of legislation and ever increasing demands for higher quality statistics using fewer resources. The second (improving quality reporting) to enable users to have greater understanding of the statistics produced and their potential uses and limitations.

The challenge for the ONS now is to continue this culture of continuous quality improvement and to embed this across the ONS as a whole. Doing so will ensure higher quality statistics and will maintain and build public trust.

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Annex A: Definitions of key quality terminology

Term	Brief definition	Full definition
Quality	"Fitness for purpose"	The quality of a statistical product can be defined as the fitness for purpose of that product. More specifically, it is the fitness for purpose with regards the following dimensions: relevance, accuracy, timeliness, accessibility, comparability, coherence.
Quality management	"encompassing approach to quality work"	Quality management provides the organisation with an encompassing approach to the quality work. It focuses on the full statistical process, and aims to improve quality and coordinate quality initiatives. It also encourages and promotes a culture of continuous improvement, self-assessment and quality reviews. For the purposes of this work, "quality management" includes: • the Principles governing our work, as set out in the UK Code of Practice for Official Statistics; • the coordination of ongoing quality initiatives that ensure we are Code compliant (e.g. quality reporting, evaluation activities, etc); • work that builds on existing standards and best practice; • the measurement, monitoring and management of data quality on a day to day basis; • auditing of statistical processes; • ensuring that all staff are sufficiently equipped to produce quality outputs (e.g. that appropriate training and guidance exist); • promoting a culture of systematic quality improvement work.
Quality reviews	N/A	Reviews may be internal or external and cover the processes or outputs of official statistics, or both. Review is part of the cycle of improvement and aims to identify areas for further examination and improvement. Reviews are a way to audit compliance with the Code of Practice Principles.
Quality assurance	"anticipating and avoiding problems"	Quality assurance covers all procedures focused on providing confidence that quality requirements will be fulfilled, and anticipating problems. It requires processes and systems in place that are planned and tested to perform under all conditions, and to self-correct or flag problems under exceptions. The goal of quality assurance is to prevent, reduce or limit the occurrence of errors in a survey and, therefore, to get it right first time. *Statistical example:* Quality assurance is about creating evidence that errors have not slipped through. For example, testing survey questions to demonstrate that interviewers and respondents understand the concepts and vocabulary, providing "other" boxes so that exceptional answers will not be forced into mis-codings, providing clear routing so that all relevant questions are asked (and not others), and including triangulations for consistency checking.
Quality control	"responding to observed problems"	Quality control is directed only at what can be measured and judged acceptable or not; if measurement is not possible, then quality control cannot be performed. Quality control is used to measure actual performance, compare it to standards and act on the difference, thus it only focuses on *accuracy*. Quality control is most commonly applied at the process stage of a survey to work that is typically performed by persons with various levels of training and ability, and where the task is repetitive and manual. It therefore applies to activities such as coding, data capture and editing.

Term	Brief definition	Full definition
		Statistical examples: Quality control is best used to define the quality of the process and identify causes of failure, which informs quality management on where to improve quality assurance so that the causes are mitigated and the process overall improved. For example, measuring the response rate to a survey should lead to investigation of reasons for "missingness" which might suggest an alternative delivery or incentive to reply. Quality control checks might be applied at the data capture and validation stages where automated checks compare new values to previous ones and throw out those that look suspect. The suspect values would then be looked at manually which would lead to quality improvements over time. Process quality measures might be applied to certain processes as a quality control check (e.g. editing hit rates or response rates). Values would be compared back to those previously obtained from applying the measure, allowing a survey manager to react where values are dropping.

ABSTRACT

Official Statistics within the United Kingdom are steered by a Code of Practice, which serves to establish common standards across a decentralised Government Statistical Service (GSS). The Code provides recommended good practice in the production of Official Statistics and is a requirement for National Statistics. In particular, Principle 4 states that "…Quality should be monitored and assured taking account of internationally agreed practices."

In order to develop more detailed best practice for statistical producers, and to therefore support them in adhering to Principle 4, a GSS-wide Quality Task Force was established in 2010. The Task Force was charged with developing policies, standards and good practice associated with: quality management; quality assurance; quality reviews; and quality measurement and reporting.

The work of the GSS Task Force builds on previous work to develop quality indicators, via two Eurostat projects, namely:
- *Output Quality Indicators for measuring and reporting quality to users; and*
- *Process Quality Measures, which if used appropriately, can enable continuous quality improvement during all stages of the statistical production.*

At the Office for National Statistics (ONS), work has recently been underway to develop a Quality Management Strategy. Staff training and guidance has also been developed (at all levels) and rolled-out to ensure that the appropriate messages are reaching staff. Increasing knowledge and obtaining 'buy-in' have been the greatest challenges, but it is hoped that the ONS can eventually embed a quality culture. The aim of this paper is to provide an overview of the work undertaken to date and to discuss how these quality initiatives have been implemented.