

## Statistical Quality Management Framework

### Concepts and definitions

#### Quality and fitness-for-purpose

Statistical quality is a multi-dimensional, relative and dynamic concept. It refers to the sum total of activities and choices made by a producer of statistics in seeking to ensure that sets of official statistics meet the needs of users: that the statistics are fit-for-purpose. This is a challenging concept – for example, different users may require different levels of quality of the same statistical product to meet their own purposes (uses); at the same time, one statistical product may be fit for *some* purposes but not others.

Producers therefore need to understand the uses made of their statistics by different users (Principle 1 and Protocol 1 of the Code of Practice) so that they can make informed decisions about trade-offs – for example, between accuracy and timeliness – and to understand the implications for quality of changing uses or of changes in resource allocation. Producers also need to appreciate the public interest profile of the statistics, and the level of underlying concern about the quality of the underlying data, in order to implement proportionate quality assurance measures. And they need to ensure that users are aware of the strengths and limitations of sets of statistics in ways that inform their use of the statistics (Principles 4.2, 8.1 and Protocol 1.4).

#### The quality ‘hierarchy’

This section locates “statistical quality management frameworks” with a hierarchy that extends from an overarching ‘philosophy’ of quality, through to detailed ‘desk instructions’ that support the individuals whose work has an impact on statistical quality.

#### *Total Quality Management (TQM)*

TQM is a comprehensive, structured approach to organisational management that emphasises continuous improvement to products and services, based on responding to customer feedback.

The European Foundation for Quality Management’s (EFQM) Excellence Model builds on the philosophy of TQM. The Model provides a standardised and generic framework to help an organisation identify its current level of ‘excellence’ and where to focus improvement efforts in ways that align decision-making with the organisation’s objectives and the interests of stakeholders.

#### *Institutional quality frameworks*

TQM and the EFQM Excellence Model apply to all organisations, and support continuous improvement. Their relevance in the current context is partly because of this emphasis on continuous improvement, but also because some statistical offices position their statistical quality activity explicitly within organisational quality management whilst others approach statistical quality in a more ring-fenced fashion.

Statistical Codes of Practice – the UK Code, and the European Statistics Code for example – are about ‘quality’ at a macro level. These Codes address – but do not detail – organisational (or institutional) issues relating to quality, along with those that apply at a process and product level. In this sense the Codes begin to operationalise most aspects of the Excellence Model within the context of standards for the management and production of official statistics.

Other noteworthy institutional quality frameworks – which are more or less consistent with each other but which serve different purposes – are the IMF’s Data Quality Assessment Framework (DQAF), and the UN’s Fundamental Principles of Official Statistics. DQAF provides a common structure and language to support the assessment of data quality, explicitly recognising trade-offs; the FPOS are a set of 10 high level principles for the governance of official statistics that support the production of appropriate and reliable data in ways that meet professional and scientific standards.

#### *Statistical quality management framework*

The purpose of a statistical quality management framework is to set out clearly and succinctly an organisation’s commitment to quality in respect of particular statistical outputs, and to describe the steps that it will take to meet its quality aims. Thus such a framework covers both ‘output’ quality and ‘process’ quality, and should apply equally to statistics produced from administrative data sources and surveys.

Quality management, as a specific area of risk management, is fundamentally about striking a balance between the level of quality required and the resources available to meet a specified level of quality. It is essential for a statistical producer body to be committed to quality, and to ensure that organisational factors, such as professional independence and adequate resource allocation, establish a firm institutional foundation for a culture of quality to exist within the organisation. Quality assurance and quality control are not activities that should be sidelined as ‘optional extras’ and sufficient resource needs to be made available, and time allowed, in planning the statistical production process to ensure that quality issues are appropriately addressed.

The annex to this document outlines what a statistical quality management framework document should cover.

#### *Detailed guidelines*

In order to implement robust processes at all levels that feed into an overall quality product, detailed information is needed about how the organisation puts its quality principles into practice. Such documentation will include detailed descriptions of how processes are established and reviewed, what quality assurance measures are to be applied at each stage of the production process, and how quality control arrangements contribute to the final product and to future improvements. An integral part of detailed guidelines will be desk instructions that describe clearly the various detailed tasks to be undertaken.

## Annex: Outline Statistical Quality Management Framework

### 1 Quality objectives (what we want to achieve)

This should be a brief statement covering what level of quality has been decided as the standard to be attained and how this both (a) meets known users' needs, and (b) maximises the opportunities for extending the use of the statistics.

The objectives should describe clearly the:

- **quality standards** that have been set in relation to any set of outputs. These should be couched in terms of the six dimensions of the ESS quality framework: relevance, accuracy, timeliness and punctuality, accessibility and clarity, comparability, and coherence (Principle 4.2).
- **quality guidelines** covering the detailed processes involved in producing the statistical outputs. The guidelines should identify the main risks to the achievement of the quality standards (in other words, an anticipation of what might go wrong), and plans for their mitigation in the light of the public profile of the statistics. For statistics produced from administrative data, these guidelines should include details of audit and other external review that are necessary to provide appropriate reassurances about quality. Inter alia this should clarify who is responsible for quality at different stages of the production process (Principle 4.4, Protocol 3.5). Presenting the production process in a 'process map' may be beneficial.

This framework applies equally to statistics produced directly from administrative data and from survey data. The rest of the framework covers three tranches of work to build quality into processes and outputs.

### 2 Quality Assurance and Quality Control – Principles 4.2 and 4.3

#### 2.1 (Process) Quality Assurance

Quality assurance covers all procedures focused on providing confidence that quality requirements will be fulfilled. It requires processes and systems in place that are planned and tested, and which should self-correct or flag problems under exceptions. The goal of quality assurance is to prevent, reduce or limit the occurrence of errors in a statistical product and, therefore, to refine the processes in the light of experience.

This section of the SQMF should describe the steps that are taken to monitor whether the processes involved in producing the statistics are working correctly within agreed tolerances. Process quality assurance takes the rules specified earlier and reviews whether, for example, the expected number of records are failing the rules. This stage is not concerned with reviewing the outputs themselves. It will rely on management information.

For surveys, process quality assurance will involve establishing, and monitoring against, targets for elements such as:

- response rates
- the number of records failing validation checks

- the number of records requiring editing or imputation
- the number of outliers requiring treatment

For administrative data, process quality assurance will involve establishing, and monitoring against, targets for elements such as:

- missingness rate (ie observations not present in a dataset, hence requiring imputation)
- the number of records failing validation checks
- the number of records requiring editing or imputation
- the number of outliers requiring treatment

The establishment of validation checks in the case of statistics produced from administrative data should be partly based on the findings of external review and audit of the processes involved in turning the administrative data into statistics.

Information from each stage of quality monitoring should be used to feedback into rule setting, to identify the need for wider quality reviews etc.

## **2.2 (Product) Quality Control**

Quality assurance is about anticipating and avoiding problems; quality control is about responding to observed problems.

This section of the SQMF should describe the part of the quality system that checks that the outputs have achieved the quality that was required, and what steps would be taken in the absence of achieving that level of quality – in terms of determining which errors to correct, and how to correct them. It requires review of the statistical outputs against the standards specified earlier.

Whether statistics are produced from survey or administrative data, quality control of outputs includes reviewing the latest outputs against previous values in the time series, understanding the reasons for changes shown by the statistics (including ‘real world’ changes and artefacts of the methods used to produce the statistics), and triangulation against other data sources.

Occasionally, errors will be identified after statistics have been published. The framework should include information about how these errors will be handled. In such cases, the Code of Practice gives the producer body responsibility to correct errors, and to alert stakeholders of these corrections promptly (Principle 2.7).

Revisions analysis can form part of quality control. Revisions are often necessary because the trade-off between timeliness and accuracy sometimes involves the statistics being published at a point at which full accuracy has not been achieved.

## **2.3 Quality reviews (relates to processes and outputs) – Principle 4.5**

This section should describe the various quality reviews that are proposed to be undertaken. Quality reviews are typically large, relatively infrequent reviews. They may cover a range of activities. For instance they may be heavily user-focused fundamental reviews of what outputs

are being produced, and to what level of quality (in which case there is a feedback loop to the quality standards as described in the quality objectives). They may also focus on any aspect of processes including methods, IT and other processes, presentation etc. They will typically be large enough to be run as formal projects, with formal oversight/steering. Such reviews may be commissioned and conducted entirely within the statistical team. In many cases, there would be merit in involving people from outside the statistical team, for example by soliciting users' views about the statistics, or by formally involving academic and other experts in various aspects of the statistics.

Reviews may also be commissioned and conducted independently of the statistical producer body, for example the UK Statistics Authority's assessment programme, or Eurostat's peer review programme. These particular examples relate to compliance with Codes of Practice, and hence address quality at a macro level. But more generally, reviews that have a 'quality control' character are best conducted by someone independent and with the perspective typically associated with greater seniority and experience.

In the context of statistics produced from administrative data sources, regular, systematic audit of the underlying data is essential to increase both the quality of, and public confidence in, these statistics. 'Quality reviews' should therefore include such audit reviews and other auditing activities that the producer considers are necessary to support public confidence in the statistics. Audit reviews will both set the standards for ongoing quality assurance (as described in section 2.1) and themselves provide validation of the quality assurance processes, although retrospectively. In this sense they complement real-time monitoring (quality assurance) mechanisms.

Examples – NS Quality Reviews, the former triennial reviews of surveys, sample re-designs

There is also an opportunity for (say, annual) mini-reviews of either the whole or parts of the production process. This gives an opportunity for the team to stand back from the detailed operations and review the purpose of the output and to ensure that processes are aligned with the objectives, making changes where necessary.

Examples – annual seasonal adjustment reviews, ONS proposed replacement for annual QMHT reviews.

### **3 Underpinnings**

#### **3.1 Leadership and coordination**

Individual statistical production areas will take responsibility for the quality of their own processes and outputs. But it is important that there is an individual (or more likely a unit) in a statistical office with a general focus on quality across the piece – for example:

- to ensure that information about user needs and resource allocation are considered coherently at an organisational level, in support of decision making about trade-offs;
- to develop and implement quality management systems across the statistical office;
- to ensure that documentation (such as quality reports) is collated in ways that users (of different sets of statistics) can understand readily;
- to provide or oversee training about 'quality';

- to facilitate opportunities for statisticians to influence the design and development of administrative data systems from which statistics are produced; and
- to ensure that any quality ‘problems’ – identified as a result of an error, for example – are addressed in the whole organisation.

### **3.2 Effective upskilling of people**

This section would describe the various aspects around ensuring that members of staff are appropriately skilled in quality management.

Quality doesn’t just happen on its own. Staff at all stages in the production process need to understand how their work affects the quality of the overall product. Staff need quality guidelines to follow, and will need training and support in carrying out their work in a manner that maximises the quality of the statistical outputs (Principles 4.4, 7.6). There should be a feedback loop so that the quality issues that people identify from their ongoing work or that are identified by others can be fed into making improvements to the processes in place, and to the standards and guidance available about the work (Principle 4.5).

### **3.3 Transparent Quality Reporting**

This section would describe the types of reports that should be produced to help users of the outputs and to help those producing them to understand (and improve) their quality. Reporting of quality is also vital for several reasons:

It is essential for users to be informed of the strengths and limitations of the statistics so that they can make an informed decision about whether the particular statistics meet their needs (or the extent to which they do so). It also enables them to consider the potential impacts on any decisions that they may make based on the statistics. (Principles 4.2, 8.1 and Protocol 1.4) Revisions analysis is a necessary (but not sufficient) part of quality reporting for series that are subject to revision. As part of quality reporting, producer bodies should publish both a Revisions Policy describing how revisions are to be made, and details of specific revisions as they are made (Principle 2.6).

It is also the foundation for discussions between producers and users about the level of quality required, and how that level of quality might be achieved within available resources. (Principles 1.2, 1.5, 4.2, Protocol 1)

Internal reporting (management information) is also vital to assure producers that the relevant processes are working effectively, to identify where improvements may be necessary. Such management information may also be published in the interests of open and transparent dialogue.