Quality Management in Government Finance Statistics

Alexandre MAKARONIDIS; Colin STEWART, Juraj HUSTAVA

Eurostat, European Commission, L-2920 Luxembourg

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ABSTRACT

Recent developments demonstrated that the system for fiscal statistics did not mitigate, to the extent necessary, the risk of insufficient quality data being notified to the European Commission. In view of addressing this issue, Regulation 479/2009 on the application of the Protocol on the excessive deficit procedure was amended by Regulation 679/2010, granting Eurostat with extended powers in the field of fiscal statistics.

Communication COM(2011) 211 from the Commission to the European Parliament and the Council 'Towards robust quality management for European Statistics' sets out a strategy to give the EU a quality management framework for and the mechanisms to ensure the high quality of statistical indicators related to reinforced economic governance.

This presentation explains how the Commission (Eurostat) has been developing and implementing a robust quality management approach to government finance statistics (GFS), in particular with respect to debt and deficit statistics for the purposes of the Excessive Deficit Procedure (EDP). The presentation also reflects on the first experiences gained when applying this new approach.

1. Introduction

Events over recent years, in particular the financial crisis and the crisis deriving from the Greek fiscal statistics, have demonstrated that the system for fiscal statistics has not mitigated, to the extent necessary, the risk that data of insufficient quality are notified to the Commission.

In this context, the weaknesses in the quality of upstream public accounting data and their statistical integration within the EDP reporting process were intensified by weaknesses in the statistical governance arrangements in place at that time. The lessons learnt concern the credibility of national statistical systems and of the European Statistical System (ESS) as a whole. This paper describes
Eurostat’s response to this situation, i.e. how the Commission (Eurostat) has been developing and implementing a robust quality management approach to GFS, in particular with respect to debt and deficit statistics.

EU fiscal surveillance and budgetary discipline are based on the Maastricht Stability and Growth Pact – the basic rule being that Member States shall avoid excessive government debt and deficit. Member States are required to comply with two criteria: a deficit to GDP ratio and a debt to GDP ratio not exceeding reference values of 3% and 60% respectively.

Statistics for the excessive deficit procedure (EDP) are produced by re-compiling primary public finance data, referred to as ‘upstream administrative data’. These EDP statistics are based on European GFS concepts and definitions and are produced in accordance with the European System of Accounts 1995 (ESA95), the EU manual for national accounts supplemented by further interpretation and guidance from Eurostat. Recent experience has shown that Eurostat needs to assess the quality of upstream data and of their translation into ESA95.

Eurostat is responsible, on behalf of the European Commission, for assessing the quality of the EDP data notified by national statistical authorities and for providing to policy makers the data to be used within the context of the EDP for past years. The verification of these statistics is one of the most important and sensitive tasks of Eurostat, notably in the context of the recently enhanced European economic governance measures. At national level, national statistical authorities are responsible for ensuring that reported data comply with legal provisions and quality requirements.

2. Reaction to the crisis

One of the first actions of the Commission (Eurostat) with respect to the statistical dimension of the crisis was the revision of Regulation (EC) 479/2009 regarding the quality of statistics for EDP. Article 12 of this revised Regulation confers enhanced verification powers on Eurostat, in particular the right to access primary data sources. And Article 16(1) gives enhanced powers to NSIs, through the requirement for Member State Governments to take the measures necessary for ensuring that the national EDP reporting authorities are provided with access to all relevant data sources. Furthermore, Article 16(2) enhances the obligations of Member States, requiring the clear assignment of responsibilities to and accountability of persons involved in reporting or compiling data for the purposes of EDP statistics.

A second action was Communication COM(2011) 211 [1] of the Commission to the European Parliament and the Council 'Towards Robust Quality Management for European Statistics'. By reference to Regulation (EC) 479/2009, the Communication sets out a strategy to provide the EU
with a quality management framework for statistics and the mechanisms to ensure the high quality of statistical indicators related to enhanced economic policy coordination. It does so by drawing on the lessons learnt from the crisis with the Greek data and the financial crisis, with due regard to the conclusions of the Van Rompuy Task Force - report of 21 October 2010 – and the ECOFIN Council of 17 November 2010.

3. The European Statistics Quality Assurance Framework

It is essential that statistics are ‘fit for purpose’ (i.e. relevant, timely and accurate, produced in compliance with principles such as professional independence, impartiality and objectivity), and that users have confidence that this is the case.

The ESS quality assurance framework [2] is a standardised, formal governance system that documents the structures, responsibilities and procedures in place to ensure continuous improvement of data and processes for satisfying users that statistics are fit for purpose.

This applies to the ESS as a whole, including Eurostat. In recent years, governance of the ESS has been improved, in particular through:

- the adoption of a European Statistics Code of Practice (CoP) in 2005, and updated in 2011 [3],
- the establishment of the European Statistics Governance Advisory Body (ESGAB) in 2008,

The ESGAB added an external assessment body to the ESS and provides an independent supervision of Eurostat and the ESS as regards the CoP. Implementation and monitoring of the CoP has relied to a large extent on a self-regulatory approach (self-assessments, peer reviews and national implementation plans).

4. What are our aims?

In this overall context, there was a clear case for reinforcing the professional independence of ESS members (usually the NSIs), and for progressively moving from a mainly reactive, corrective approach to a preventive quality management approach to European statistics in general, and GFS in particular.
Eurostat has taken measures along two lines of action. The first is aimed at further strengthening the governance of the ESS. Eurostat has revised the CoP and is in the process of amending the Statistical Law, with the objective of strengthening the independence of ESS members. Each MS will monitor and self-assess the implementation of the CoP covering the entire National Statistical System and Eurostat will assess the implementation of CoP in Member States.

The second line of action concerns the development of a preventive approach to EDP verification. This requires moving from taking corrective to preventive action at the earliest moment possible moment. Country risk assessment and effective risk management based on regular dialogue visits targeted at upstream and quality management issues are the backbone of this new approach. Promoting accrual-based accounting in public finance is a complementary support action aimed at harmonising and ensuring the quality of the primary input data.

Quality management of GFS processes is the new centrepiece of Eurostat's preventive approach to EDP verification that is aimed at providing assurance about the quality of the notified EDP data by means of building a system of in-process verification and control into and across the whole process of GFS data collection and compilation.

Regulation 479/2009, Art 8 (1) and (3), also contains an implicit reference to an EDP domain-specific quality management system (QMS) through the requirement for the systematic monitoring of and reporting on the quality of EDP data. Communication COM(2011) 211 goes one step further in that it commits Eurostat to develop, in collaboration with national statistical authorities, a specific QMS applying at GFS process level.

This paper, on the possible features of a QMS in GFS, is intended to describe how such a system could look. It is recognised that some of the contents may appear obvious to some readers, especially those with quality management frameworks already in place.

5. **What is a Quality Management System in the context of GFS?**

Regulation (EC) 479/2009 is a domain-specific act that directly addresses the EDP compilation and notification process. Taking into account that 'Eurostat is responsible, on behalf of the Commission, for assessing the quality of the data and for providing the data to be used within the context of the excessive deficit procedure, in accordance with Commission Decision 97/281/EC', the Regulation justifies action on the grounds that a 'permanent dialogue should be established between the Commission and the Member States’ statistical authorities in order to ensure the quality both of the data reported by Member States and of the underlying government sector accounts compiled in accordance with ESA 95.' (Regulation 479/2009, recitals 10 and 11).
Furthermore, Regulation (EC) 479/2009 defines quality of actual EDP data as 'compliance with accounting rules, completeness, reliability, timeliness, and consistency of the statistical data' and stipulates that the 'Commission (Eurostat) shall regularly assess the quality both of actual data reported by Member States and of the underlying government sector accounts compiled according to ESA 95' (Art 8(1)) and that the 'Commission (Eurostat) shall report regularly to the European Parliament and to the Council on the quality of the actual data reported by Member States. The report shall address the overall assessment of the actual data reported by Member States as regards to the compliance with accounting rules, completeness, reliability, timeliness, and consistency of the data.' (Art 8(3))

In other words Regulation (EC) 479/2009 refers to a domain- or process-specific quality management system for EDP to the extent that in general a QMS may be described as a formal approach to management and control to reassure users that an output is fit for purpose, in that it aims to:

- ensure (i.e. makes sure that it happens) that a product is fit for purpose;
- assure (i.e. by issuing a brief of assurance to users) that this product is indeed fit for purpose.

'Fit for purpose' means in this context that the production process of a product meets a set of concrete specifications, designed to ensure that the properties of the product meet the recognised expectations of its users.

Striving to do a good job or devising procedures to deliver good GFS data is clearly not enough. Statistical methodology, data collection, data storage and processing, release procedures, etc., all must work together. There needs to be a systematic approach to documentation, management and control of the system.

The system is considered to be robust when the system with all its elements is developed in an appropriate way, so that whatever happens within reason the system will be able to cope. A robust quality management system leaves no space for weaknesses and Eurostat needs to make every effort to ensure the highest quality of the framework and of the processes, and thus also of statistical data. Eurostat will monitor and control the system and will continue to build and maintain enduring relationships with and across Member States.

Features of a robust QMS typically include:

- efficient structures,
• high acceptance by actors and stakeholders,
• constant involvement of actors in design and improvement of processes,
• effective network of processes,
• clear procedures and responsibilities, and
• flexible design of country-specific part of QMS.

These are the preconditions for data (statistical product) to flow undistorted from the upstream data owners through the processing stage to the final publication by Eurostat.

As is the case with industrial or business processes, statistical processes can also be quality assured, e.g. ISO 9001 has already been adopted by some NSIs for certain critical statistical processes. In 2008, Eurostat carried out a quality management exercise in another statistical domain, namely the Harmonised Index of Consumer Prices (HICP). At that time, 17 out of the 25 EU NSIs responded that they possessed a formal QMS at institutional level (such as ISO standards, European Foundation of Quality Management Excellence Model, or a formal internal code of practice). In the case of this particular statistical domain (HICP), 15 out of these 17 were applying the QMS at process level. Therefore, addressing the issue of QMS at process level is not new to NSIs.

QMS in the domain of GFS will necessarily have its own specific features. With respect to the actors involved in processing and reporting GFS data, the system will be designed so as to also address the bodies and entities that are directly involved, one way or another, in the statistical production chain: Eurostat, Ministries of Finance, National Central Banks, data providers (if not directly from data owners), and also upstream data suppliers, such as the entities classified inside the sub-sectors of general government, i.e. central, state, and local government, and social security funds - in accordance with Art 12(1) of Regulation 479/2009.

As in the traditional approach to quality in a supply chain, the robustness of GFS data is only assured when it is not only the immediate link in the supply chain that is required to provide assurances of quality, but that this requirement applies to all links at all sublevels (i.e. Eurostat requires mechanisms to ensure and assure quality not only at NSI level, but also across the whole upstream area, and from the perspective of the NSI, NSIs are given access to all relevant information to perform their tasks (Article 16 of Regulation 479/2009)).

6. What is the task for Eurostat and the ESS?
The task is to design a QMS, together with the necessary set of process level quality management standards, tailored to the specificities of GFS. Basically this involves taking the principles and requirements found in industrial standards (which are already applied to some extent in NSIs) on the one hand, and the relevant principles and indicators of CoP on the other, and translating these into domain-specific GFS standards.

This GFS-specific system will need to be developed in co-operation with national experts. It will need to be agreed with and implemented by the national statistical authorities and at some stage certified, in principle, by Eurostat.

Before being able to implement a QMS in the GFS domain, one needs to go through certain preparatory steps, such as:

- become familiar with QM concepts,
- assess systems or elements of systems already in place,
- tailor a GFS-specific system,
- formulate specific GFS standards,
- establish a detailed road-map,
- launch a pilot system,
- finalise and adopt the system,
- establish implementation plans in NSIs, and finally
- implement domain specific QMS.

The next part of the paper attempts to sketch out the elements of a GFS QMS by reference, even if a rather loose one, to ISO standards (9001 standard and related standards) and the CoP, and outline the way forward towards the actual implementation of the system.

7. What might a GFS-specific QMS look like?

A GFS QMS might consist of the following elements (control systems) which could be further developed:

- Domain-specific quality policy and organisation,
• Upstream system (data supply system),
• Data compilation and release system,
• Evaluation and quality control system,
• Feedback system (feedback from users and stakeholders),
• Quality audit and review system,
• Design and change control system,
• Staff training system.

It should be recognised that there is no "one size fits all" solution, which could simply be produced and applied in a top-down manner. However, a framework of requirements, in line with established quality practice and therefore already found in organisations whether they be big or small, public or private, is a reasonable and achievable goal.

It should therefore be stressed that not all control systems need to be implemented as such. However, the range of procedures or activities that could be attributed to each control system needs to be identified and described as they are implemented. No matter how the QMS is structured and which control systems are installed, all key requirements need to be met and the inter-operability of the control systems has to be ensured.

As QM is basically a process-based approach, documentation of processes and procedures is a core requirement of QM, applying to all control systems. In its substance, QM is about documentation and compliance with documentation: it is about documentation, implementation and control. The requirement for documentation is twofold, as it requires (a) documentation of statistical processes and procedures as well as (b) documentation of the QMS itself, usually in the form of a so-called 'quality manual' which forms an integral part of the QMS, being a key instrument for the documentation and the control of the overall QMS.

8. The control systems explained

Whatever QMS is proposed, it has to be linked to the CoP as this is the framework that all ESS members are already committed to. The control systems shown below are therefore explained in a way that links them to corresponding principles from the CoP. Where applicable, the approximate typical terms that one might find in equivalent industry standards are given in parentheses.⁴
Due to constraints on the length of this paper, examples of how control systems can be linked to corresponding principles from the CoP are shown for only the following three elements (control systems): Domain-specific quality policy and organisation; Upstream system (data supply system); and Staff training.

**8.1 Domain-specific quality policy and organisation**

This concerns the express commitment to quality by the organisation - the 'will' to make it happen. It is about a clear policy statement and objectives specific to GFS for the quality policy to be implemented in practice.

The policy statement needs to be communicated to management and staff, and understood, respected and regularly reviewed, in order to be maintained over time. From an organisational point of view, it requires the appointment of a quality manager together with the putting in place of an infrastructure, the appropriate level of staffing, the definition of responsibilities and approved procedures.

Obviously, top management commitment is essential, especially if the commitment at institutional level is to be translated and implemented into real quality actions at GFS process level. The issue of adequate resources is also critical.

For example, at GFS process level some of these key issues may be identified and linked against the CoP in the following way:

*Principle 4 of the CoP, Commitment to Quality*

*4.1.a: Defined quality policy with respect to the GFS process*

*4.1.b: An organisational structure and tools are in place to deal with quality management.*

**8.2 Upstream system (typical industrial equivalent: Procurement)**

The supply system requires a register of suppliers, full specification of data inputs, formally agreed supply and control procedures (e.g. formal cooperation arrangements with upstream suppliers, such as service level agreements or memoranda of understanding), defined data entry and storage procedures and finally traceability throughout the supply chain. In other words, it is about management and control of the supplier–compiler interface and the underlying flow of primary data.
For example, at GFS process level some of these key issues may be identified and linked against the CoP in the following way:

**Principle 2 of the CoP, Mandate for Data Collection**

2.1: A clear mandate for the national statistical authorities to collect information for the production and dissemination of GFS, specified in law or an equivalent binding act.

2.2: The national statistical authorities are authorised to use administrative data, in particular primary accounting data, for GFS purposes.

2.3: On the basis of a legal act, the national statistical authorities may compel response from GFS upstream suppliers and verify quality.

**Principle 6 of the CoP, Impartiality and Objectivity**

6.2: Choices of upstream sources and statistical data collection methods are informed by statistical considerations.

6.3: The quality of upstream input data is monitored and errors discovered in upstream data are documented and corrected at the earliest possible date.

**Principle 7 of the CoP, Sound methodology**

7.3: The business register, and the registers of government controlled units (classified inside or outside general government) are complete, reliable and to up-to-date. There are documented procedures in place to this end.

**Principle 8 of the CoP, Appropriate Statistical Procedures**

8.1: As GFS are based on primary accounting data, the necessary bridge tables are in place in order to translate upstream data into ESA95.

8.2 and 8.3: Questionnaires and other data collection means are systematically reviewed and revised as required prior to each data collection exercise.

8.4: Data collection, data entry, and encoding are routinely monitored and revised as required.

8.7: National statistical authorities are involved in the design of administrative data, in particular public sector accounting systems and standards, in order to make the data more suitable for GFS purposes.
8.8: Formal cooperation arrangements are made with upstream data suppliers which specify the data requirements and set out the responsibilities and commitments of each party involved.

8.9: National statistical authorities co-operate directly with upstream data suppliers in ensuring the quality of the upstream data.

Principle 9 of the CoP, Non-excessive Burden on Respondents

9.1: The range and detail of GFS demands is limited to what is absolutely necessary.

9.2: The reporting burden is spread as widely as possible over the relevant entities.

9.3: The information sought from upstream entities is, as far as possible, readily available from their accounts and electronic means are used where possible to facilitate data supply.

9.4: Administrative sources are used whenever possible to avoid duplicating requests for information.

9.5: Data sharing within the national statistical authorities involved is generalised in order to avoid multiplication of requests.

9.6: The national statistical authorities promote measures that enable the linking of data sources in order to reduce reporting burden.

Principle 10 of the CoP, Cost Effectiveness

10.2: The productivity potential of information and communications technology is being optimised for data collection, processing and dissemination.

10.3: Proactive efforts are made to improve the statistical potential of administrative data, public sector accounting systems and standards in particular.

10.4: The national statistical authorities promote and implement standardised solutions that increase effectiveness and efficiency in upstream data collection.

Principle 12 of the CoP, Accuracy and Reliability

12.3: Revisions to upstream data are regularly analysed in order to improve statistical processes.

Principle 14 of the CoP, Coherence and Comparability
14.1: Upstream data are internally coherent and consistent (i.e. arithmetic and accounting identities observed).

14.4: Upstream data from different sources and of different periodicity are compared and reconciled.

14.5: Comparability of upstream data within and across sub-sectors of General Government and across Member States is ensured within the European Statistical System through periodical and systematic exchanges between the Eurostat and the statistical systems concerned.

8.3 Data compilation and release (typical industrial equivalent: Production, finished goods and shipping)

Similarly to the data supply system, the data compilation system requires documented procedures, allocation of responsibilities, step-by-step manuals and work instructions that are available at the time they are needed, at the place they are needed, to those who need them, including operational manuals and instruction for data storage and processing (IT systems). Business continuity and traceability are key requirements to the data compilation system.

8.4 Evaluation and control (typical industrial equivalent: Calibration, measurement, inspection and testing)

The evaluation and quality control system requires in-process monitoring for compliance with approved procedures, documentation of each run of the process upon its completion, and ex-post evaluation of each run of the process on the basis of the established records. The aim of the system is to monitor compliance with documented procedures in order that corrective action can be devised during the process run or as early as possible upon its completion. The activities falling within the scope of this system are often referred to as quality control - in the narrow sense of the term.

8.5 Feedback system (typical industrial equivalent: enquiries, customer feedback)

The ultimate aim of QM is to produce so as to satisfy the accepted expectations of users. It therefore goes without saying that QM seeks systematic feedback from users and stakeholders in order that the national statistical authority assesses its own performance in order to either devise corrective action, where this is deemed necessary, or take the measures which are aimed to continuous improvement of GFS.

8.6 Quality audit and review
QM requires systematic, independent quality audits (though not necessarily external to the NSI) and a system for reviewing the QMS in place. All aspects of GFS, structures, process and procedures need to be subject to some suitable form of quality audit. Audit planning should be based on risk assessment and be carried out on the basis of a well defined audit plan, comprising scope, objectives, organisation and follow-up of key findings and recommendations of each audit. The aim of the audit is twofold, as it aims at improving the statistical GFS process as well as reviewing and improving the performance of the QMS itself.

**8.7 Design and change control**

Process mapping and process description are basic requirements of the system. Since QM is basically a process-based approach to management, the operational activities comprising the overall process referred to as GFS should be identified and described and the operational procedures comprising these processes clearly defined.

GFS are subject to continuous planned or unplanned change, such as for example as a result of new policy or legislative requirements that impose new requirements for statistics, new accounting systems or financial transactions that may require new ways of treating data, new techniques and technologies that may require changes to IT production tools and systems. Change may also come in response to unforeseen events such as accidents, mishaps, human or technical failures, illness, or finally as a result of planned events such as review and audit.

The design and change control system requires a systematic approach to the management and design of processes in order that the NSI is able to cope with and control the effects of planned or unplanned change.

In more concrete terms there is a fourfold requirement from the GFS system (a) mapping of all relevant processes subject to the QM system, (b) an approved system of procedures to implement planned change, (c) an approved system of procedures to cope with unplanned change, such as a 'business continuity plan', and (d) an approved system of procedures for implementing change in all relevant documentation and communicating change to staff, users and stakeholders as appropriate.

**8.8 Staff training**

Staff training is a key issue in every QMS. The training system requires a systematic approach to both statistical training on GFS as well as training on quality management. In concrete terms, it requires (a) a systematic assessment of training needs, (b) the design of appropriate training courses, (c) a tailor-made training plan for each member of staff, and (d) evaluation of the training system.
For example, at GFS process level some of these key issues may be identified and linked against the Code of Practice in the following way:

**Principle 3 of the CoP, Adequacy of Resources**

3.1: Staff, financial, and computing resources, adequate both in magnitude and in quality, are available to meet current statistical needs.

**Principle 7 of the CoP, Sound methodology**

7.6: National statistical authorities implement a policy of continuous vocational training in GFS and the domain specific GFS QMS for their staff.

7.7: Co-operation with the scientific community is organised to improve methodology, the effectiveness of the methods implemented and to promote better tools when feasible.

9. How much of a QMS is needed?

As said at the outset, the financial crisis has revealed the weaknesses of the system of fiscal statistics. In particular, it has demonstrated its inability to mitigate the risk that data of insufficient quality are notified to Eurostat. It is clear that there has to be some appropriate form of QMS, tailored to the specific needs of GFS, and sufficient for Eurostat to provide users with reasonable assurance about the quality of the notified EDP data.

This does not answer the "how much" question but, as mentioned, there cannot be a one-size-fits-all answer. NSIs will need to strike the right balance between the quality of public sector accounting and audit systems, complexity of national administrative structures and arrangements, and hence the complexity of their national GFS compilation systems, on one hand, and, on the other hand, the necessary effort in order to provide themselves and Eurostat with reasonable assurance about the quality of the notified data.

Therefore, Eurostat is proposing a collaborative approach of common minimum QM standards, both with respect to the necessary control systems as well as the set of the quality standards of each of these systems. This common set of minimum standards will need to be agreed, implemented by NSIs and eventually certified by Eurostat. It is also with this in mind that the ESS agreed to establish a Working Group on GFS quality management, the basic aim of which is to inform and support the ESS activities towards implementing a robust quality management for GFS. The working group has been set up to play a key role in developing, implementing and maintaining the required GFS QMS.
10. What has been the experience so far?

Upstream dialogue visits are now a regular part of Eurostat’s approach to assessing the quality of EDP data notified by the statistical authorities of the Member States. The main objectives of the upstream dialogue visit are to review the GFS reporting system (in particular the primary public accounting data sources and reporting processes, i.e. upstream data and processes), to identify risks or potential problems with the reported data, and to appraise the NSIs’ responsibility, accountability and ability to use their powers of access to source data.

Upstream dialogue visits also focus on issues, among many others, such as:

- Data collection and compilation systems, administrative procedures and control systems,
- Presence and role of quality management procedures with respect to producing the data,
- Supervisory and control systems at national level, reporting procedures, control and IT systems, data transmission to the NSI (directly or indirectly through any other entity, manual, automatic or semiautomatic transfer, frequency, timeliness),
- Audit systems in place,
- Assessment of potential risks in the main data sources, procedures and methods used as well as promotion of good practices.

Although, strictly speaking, upstream dialogue visits are not designed or deployed as quality audits, in practice they already cover the wide range of issues typical of a QMS - at least to the extent that the requirements under consideration derive directly from the EDP Regulation 479/2009 or the CoP as long as there is no agreed QMS for GFS in place.

The experience with the NSIs visited so far has shown that the approach can be open, collaborative and constructive, and action can be targeted at improvement. Eurostat received very positive support from the ECOFIN Council towards the use of upstream dialogue visits.

In conclusion, it may be said that the ESS GFS system has started moving, though at a slow pace, towards a robust QMS. This is not surprising as developing and implementing a QM system tailored to GFS needs is a challenging task and, by its very nature, it is expected to be a medium-term rather than a short-term process.
An outline road map for a GFS QMS is being discussed with members of the Eurostat Working Group on GFS Quality Management. The first step will be a stock-taking exercise to establish the current state of play with regard to quality systems (or elements of quality systems) for GFS currently in place in national statistical institutes. From this starting point, the objective is to design, with close co-operation between Eurostat and NSIs, quality systems and minimum standards, specific to GFS needs, along the lines indicated in this paper.
11. References


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1 This paper is based and draws on various Eurostat working papers, internal documents and public presentations on the subject matter, without providing explicit references to the exact sources. However, the views expressed in the paper are those of the authors and may not be necessarily regarded as stating an official position of the European Commission (Eurostat).
3 Please see also Eurostat’s Concepts and Definitions Database for Quality Glossary
http://tinyurl.com/ESSQualityGlossaryinCODED
4 The paper has drawn heavily on the pioneering work on quality management standards developed for manufacturing industry, as described in: Rothery, B. (1993), ISO 9000, 2 Rev. ed., Gower Press.