Statistical Commission
Fiftieth session
5 – 8 March 2019
Item 3 (d) of the provisional agenda
Items for discussion and decision: national quality assurance frameworks

Background document
Available in English only

United Nations National Quality Assurance Frameworks Manual for Official Statistics (UN NQAF Manual)

Prepared by the Expert Group on National Quality Assurance Frameworks (EG NQAF)

UNITED NATIONS

NATIONAL QUALITY ASSURANCE FRAMEWORKS MANUAL FOR OFFICIAL STATISTICS (UN NQAF MANUAL)

Including recommendations, the framework and implementation guidance

Draft

(15 February 2019)

Preface / Note on the results of the worldwide consultation

The draft of the United Nations National Quality Assurance Frameworks Manual for Official Statistics (UN NQAF Manual) has been developed by the Expert Group on National Quality Assurance Frameworks (EG NQAF) since its re-establishment by the United Nations Statistical Commission at its forty-eight session in March 2017.[1] The UN NQAF Manual builds on and replaces the generic United Nations National Quality Assurance Framework template and guidelines (UN NQAF template and guidelines) adopted in 2012.

On 27 November 2018 an earlier version of the draft UN NQAF Manual was sent for worldwide consultation and review of all Member States and shared for information with the international and supranational organizations that are members of the Committee for the Coordination of Statistical Activities (CCSA). By 17 January 2019, more than 60 countries and three international/regional organizations provided their feedback. Respondents expressed strong support for the draft Manual. Half of the respondents provided detailed comments.

All comments were very carefully reviewed by the Expert Group and incorporated as much as possible in the present draft UN NQAF Manual that is before the Statistical Commission. In incorporating suggestions, the Expert Group aimed to maintain the overall scope and length of the text and considered the general consensus on substance and presentation, that has been reached. Therefore, adding additional references was given preference over adding additional detailed guidance on specific issues that are beyond the scope of the Manual. However, the Expert Group took note of these requests and will consider how best to make information about specific tools and topics available as additional materials. Also, the provision of additional examples representative of countries in different circumstances and the sharing of best practices requested by several respondents exceeds the scope of the Manual. Many countries have already updated the information about their national practices on the United Nations Statistics Division (UNSD) website.[2] Additional information about best practices is expected to emerge and to be shared as part of activities in support of the implementation of a national quality assurance framework (NQAF).

Subsequently to the Statistical Commission, the UN NQAF Manual will undergo a detailed proof-reading process which will also ensure that the use of terms is harmonized across the Manual. It will then undergo a formal English language editing and layout process before publication.

Acknowledgements
(forthcoming)

[1] For more information on the Expert Group on National Quality Assurance Framework, please visit the following website: (https://unstats.un.org/unsd/methodology/dataquality/expert-group/).
[2] https://unstats.un.org/unsd/methodology/dataquality/quality-references/

Table of Contents

Abbreviations and acronyms

API	Application Programming Interface
COSO	Committee of Sponsoring Organizations
CSPA	Common Statistical Production Architecture
DQAF	International Monetary Fund's Data Quality Assessment Framework
EFQM	European Foundation for Quality Management
EG-NQAF	Expert Group on National Quality Assurance Frameworks
ES CoP	European statistics Code of Practice
ESS	European Statistical System
EU	European Union
Eurostat	Statistical office of the European Union
FPOS	Fundamental Principles of Official Statistics
GAMSO	Generic Activity Model for Statistical Organizations
GSBPM	Generic Statistical Business Process Model
GSIM	Generic Statistical Information Model
IAEG-SDGs	Inter-agency and Expert Group on the SDG indicators
IMF	International Monetary Fund
ISI	International Statistical Institute
ISO	International Organization for Standardization
NGO	Non-Governmental Organization
NQAF	National Quality Assurance Framework
NSDS	National Strategy for the Development of Statistics
NSO	National Statistical Office
NSS	National Statistical System
OECD	Organisation for Economic Co-operation and Development
PDCA	Plan-Do-Check-Act cycle
PGISA	Principles Governing International Statistical Activities
ROSCs	Reports on the Observance of Standards and Codes
SDGs	Sustainable Development Goals
SDG-WG	Sustainable Development Goal indicator working group
SDMX	Statistical Data and Metadata eXchange

TQM	Total Quality Management
UN	United Nations
UN NQAF	United Nations National Quality Assurance Framework
UNECA	United Nations Economic Commission for Africa
UNECE	United Nations Economic Commission for Europe
UNECLAC	United Nations Economic Commission for Latin America and the Caribbean
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCWA	United Nations Economic and Social Commission for Western Asia
UNSD	United Nations Statistics Division

Chapter 1. Contents and use of this Manual

1.A. Objective, structure, users and uses

1.1. Chapter 1 describes the objective, structure, users and uses of the *United Nations National Quality Assurance Frameworks Manual for Official Statistics* (UN NQAF Manual). It provides a basic introduction to data quality and definitions of important terms used in this Manual.

1.2. *Decision of the Statistical Commission*. The United Nations Statistical Commission at its 48th session agreed to update the *generic United Nations National Quality Assurance Framework template and guidelines* (UN NQAF template and guidelines) adopted in 2012 to address the new challenges posed by the enlarged data ecosystem and the 2030 Agenda for Sustainable Development. In its decision 48/106 the Commission

a. requested the Expert Group on National Quality Assurance Frameworks (EG-NQAF) to take into account the work on data quality already undertaken at the national, regional and global levels to avoid duplicating existing efforts and with a view to harmonizing existing frameworks, and to consider the relationship with the Fundamental Principles of Official Statistics;

b. emphasized the importance of ensuring the quality of data derived from new sources and new data providers, including those outside the official statistical system; and

c. requested the Expert Group to address issues involved in the implementation of the national quality assurance framework, including issues of coordination, and the need to support countries in its implementation.[3]

1.3. *Objective of the Manual – responding to the new data ecosystem*. New data sources, data providers and statistics producers are emerging fueled by technological advances and new demands for detailed and timely data for policy making in the context of the 2030 Agenda for sustainable development. This new emerging data ecosystem poses challenges and opportunities for official statistics. For example, in the future, national statistical offices (NSOs) may see their role in producing data for official statistics diminished while adopting a new role as curator of data and statistics produced by others. This Manual provides guidance for developing and implementing a national quality assurance framework (NQAF) and aims at addressing quality assurance in different circumstances and situations, hereby supporting countries in safeguarding the role of official statistics as trusted source of information in a changing environment.

1.4. The Manual is directed at assuring the quality of official statistics throughout the entire national statistical system (NSS) consisting of the NSO and other producers of a country's official statistics (see definitions of NSO and NSS in Section 1.C). The Manual also provides guidance for the use of and engagement with statistics producers and data providers that are outside of the NSS that cooperate with NSS members in the production of official statistics. For example, the Manual addresses quality assurance in the use of different data sources (Chapter 7) and Sustainable Development Goal (SDG) indicator data

[3] See E/2017/24-E/CN.3/2017/35, decision 48/106.

and statistics (Chapter 8). Hereby, the Manual responds to the challenges posed by the new data ecosystem, which is characterized by the emergence of new data sources, new data providers and statistics producers.

1.5. The Manual does not aim to replace any of the existing statistical quality assurance frameworks and guidelines for official statistics. Countries and individual producers of official statistics that are already fully engaged in quality assurance and are following one of the existing quality frameworks may view this Manual only as an additional reference point that supports what they are already doing, and a source of information on the application of quality assurance in different situations.

1.6. *Structure of the Manual*. The UN NQAF Manual contains recommendations, the updated United Nations National Quality Assurance Framework (UN NQAF) and practical guidance for its implementation. Specifically, Chapter 2 presents recommendations for quality assurance which are mainly based on the Fundamental Principles of Official Statistics (FPOS), hereby identifying and clearly spelling out the responsibilities of the members of the NSS for assuring the quality of data and statistics. Chapter 3 contains the updated UN NQAF with 19 quality principles and their associated requirements. The Annex A to this Manual complements Chapter 3 by providing for each requirement elements to be assured that reflect good practices. Chapter 4 to Chapter 8 give guidance for the implementation of UN NQAF (or any other quality assurance framework). They give an overview of quality assessment tools (Chapter 4), institutional arrangements and actions for implementation (Chapter 5 and Chapter 6), special considerations for different data sources (Chapter 7) and for SDG indicator data and statistics (Chapter 8). Chapter 9 discusses how quality assurance at the national and global levels are linked. Figure 1.1 shows how the Manual is structured.

Figure 1.1: The structure of the UN NQAF Manual

Part	Chapter	Title
Introduction	Chapter 1	Contents and use of this Manual
Recommendations	Chapter 2	Recommendations on quality assuarance for official statistics
UN NQAF	Chapter 3	The UN National Quality Assurance Framework: principles and requirements
Implementation	Chapter 4	Assessment tools and risk management
	Chapter 5	Development and implementation of a national quality assurance framework
	Chapter 6	Implementation of quality assurance within the national statistical system
	Chapter 7	Quality assuarance for statistics compiled from different data sources
	Chapter 8	Quality assuarance for SDG indicator data and statistics
References	Chapter 9	Quality assurance in the global statistical system
UN NQAF Annex	Annex A	Detailed Checklist of elements to be assured

1.7. *Users and uses - How to use this Manual*. All chapters of the Manual can be read independently, hereby offering different entry points to the topic of quality assurance for official statistics:

a. Chapter 2: This brief chapter is important to readers that are interested in recommendations for quality assurance for their organization. The United Nations (UN) recommendations on statistical quality assurance in Chapter 2 are meant to support the NSO in achieving an adequate mandate and institutionalization of statistical work and quality assurance in their country throughout the NSS. Only then countries will be able to assure the availability and quality of official statistics produced throughout the national statistical systems by a multitude of statistics producers. Even in well-established statistical systems there may be serious gaps when it comes to the quality of official statistics. One such example is the lack of access to data from administrative or private sources in some countries.

b. Chapter 3 and Annex A: This chapter provides readers with a comprehensive framework for statistical quality assurance, which they can adopt or adapt for their own organization or compare with their own existing framework. The updated UN NQAF in Chapter 3 of the Manual is based on the previous UN NQAF template and guidelines of 2012. As its predecessor, it is descriptive and only constitutes guidance in the sense that it provides the components and a general structure within which individual country-specific NQAFs can be developed. No attempt is being made to prescribe to countries what specific quality assurance framework should be followed as countries should make their choice according to national circumstances. Annex A is a listing of the elements to be assured under each requirement which can be directly used by countries to assess their compliance with the various quality requirements.

c. Chapter 4 to 8 on implementation: Readers may want to refer or "jump" to the chapter or parts of a chapter that is of most interest to them. Chapter 4 to 8 provide guidance for the implementation of NQAF and can be read independently from each other and other parts of the Manual.
    i. Chapter 4 lists the various tools and instruments for quality assessment and has a small section on risk management.
    ii. Chapter 5 is concerned with the development and implementation of NQAF at the NSO and other statistical agencies.
    iii. Chapter 6 is building on Chapter 5 and discusses the role of national NSS-wide bodies for the implementation of NQAF throughout the NSS.
    iv. Chapter 7 approaches quality assurance from the perspective of the data source that is being used which is very relevant for the discussion of quality assurance of data from new data sources.
    v. Chapter 8 provides an introduction to statistical quality assurance for statisticians involved in the compilation of SDG indicators.

d. Chapter 9: This chapter provides reference materials for statisticians that are interested in the link between quality assurance at the national and global level. It discusses the collaboration within the global statistical system on assuring data quality at the global level, taking into consideration the need for international comparability of data, especially in the context of the compilation of the indicators for monitoring progress towards national, regional and global goals and targets of the 2030 Agenda for Sustainable Development.

1.8. *Relationship with the generic UN NQAF template and guidelines of 2012.* The updated UN NQAF in Chapter 3 is based on the generic UN NQAF template and guidelines of 2012. The template and guidelines were reviewed and amended as necessary to reflect the emergence of an enlarged data ecosystem with potential new data sources, data providers, new technologies and methods, such as earth observation/remote sensing and big data. The structure of the UN NQAF template has not been changed for reasons of continuity and to facilitate comparisons.

1.B. Introduction to quality management

1.9. *Definition of quality*. Quality is the degree to which a set of inherent characteristics of an object fulfils requirements (see International Standards Organization, ISO 9000:2015). In the context of statistical organizations, and in this Manual, the object is the statistical output or product, the process, the institutional environment or the whole statistical system. A simple definition of quality is "fit for use" or "fit for purpose". It is the users' needs that define the quality. Different users may have different needs that must be balanced against each other to give the quality concept a concrete content. Over the past twenty years, statistical agencies have arrived at the consensus that the concept of quality of statistical information is multi-dimensional and that there is no one single measure of quality. For a statistical product, the general definition is operationalized by specifying a set of factors or dimensions that characterize its quality: Relevance, Accuracy and reliability, Timeliness and punctuality, Accessibility and clarity, Coherence and comparability. The dimensions of quality are interrelated and, there are trade-offs between some of them. Adequate management of each of them is essential. At the same time, they must be seen in relation to each other within the statistical production processes.

1.10. *Quality management frameworks and quality management*. Quality management frameworks provide a coherent and holistic system as a basis for quality management (see definition in Section 1.C). There are various general quality management frameworks applicable to any organization, such as Total Quality Management (TQM), International Organization for Standardization (ISO), Six Sigma, European Foundation for Quality Management (EFQM), Balanced Scorecard, Lean and Lean Six Sigma. These frameworks are largely based on common definitions and principles, but their main focus and formalization vary. For example, ISO emphasizes certification and standardization of "processes", while Six Sigma focuses on quality control of the "products/outputs" using statistical methods. Lean emphasizes improvement in efficiency by reducing waste.

1.11. In many ways, TQM, which was developed in the last century, is the foundation of all general quality frameworks. TQM is "a set of systematic activities carried out by the entire organization to effectively and efficiently achieve company objectives so as to provide products and services with a level of quality that satisfies customers, at the appropriate time and price".[4] The strategic core of all major TQM models is continuous improvement, often illustrated with reference to the Plan-Do-Check-Act (PDCA) cycle

[4] The Deming Prize Committee 2006.

made popular by Deming. This cycle is a four-step process which guides all changes for continuous improvement.

1.12. *Statistical quality frameworks*. The above-mentioned general quality frameworks inspired the statistical quality frameworks such as the European statistics Code of Practice, the International Monetary Fund's Data Quality Assessment Framework (DQAF), the Organization for Economic Co-operation and Development (OECD) Recommendations on Good Statistical Practices and UN NQAF presented in Chapter 3.[5] These are also inspired by and consistent with the FPOS which emphasizes independence, impartiality and protection of data on individuals. Such requirements of official statistics were first formulated jointly in the FPOS in 1992.

1.13. Purpose of NQAF: NQAF provide a coherent and holistic system for statistical quality management which assures trust and quality of official statistics. The UN NQAF in Chapter 3 contains the components that should be considered in managing and assuring the quality of official statistics.

1.14. *Benefits*. The main benefits of having NQAF for official statistics are as follows:

a. It provides a generic model for the members of the NSS to adopt, develop or revisit their own quality assurance framework.

b. It offers a mechanism for systematic monitoring and ongoing identification of risks and quality issues across the NSS to develop timely corrective measures. Hence, it supports quality improvements and their maintenance over time.

c. It supports NSS coordination by providing common guidance on quality assurance and reference material for training.

d. It gives greater transparency to the processes by which quality is assured and reinforces the credibility of statistics producers and the coordinating agency (typically the NSO) within the NSS.

e. It serves as a common ground to promote dialogue on quality challenges and opportunities at the national, regional and international level.

f. It provides a basis for creating and maintaining a quality culture within the national statistical system.

1.15. *Quality management and risk management*. Risk management has many similarities with quality management. The approach is a bit different, but risk and quality management frameworks are not mutually exclusive, they are complementary. The implementation of risk-based thinking is one of the requirements of the ISO 9001:2015. Risk management itself is guided by the Committee of Sponsoring Organizations (COSO) framework. Risk and quality management should not operate independently of each other. A coordinated approach is cost effective and facilitates management involvement and support (see Chapter 4 for further information).

[5] The various quality assurance frameworks cover the same or similar aspects of statistical quality. Some are referred to as code of practice stressing their normative character.

1.C. Important terms used in this Manual

1.16. *References*. This list below provides definitions of important terms used in this Manual. The main reference for the definitions is the OECD Glossary of Statistical Terms.[6] Also, Statistical office of the European Union (Eurostat) offers a comprehensive glossary of statistical terms on their metadata server.[7] Some of these definitions originate from the Statistical Data and Metadata eXchange (SDMX) Glossary (Standard Data and Metadata eXchange).[8] In addition to these general glossaries, there are also numerous thematic glossaries for specific statistical domains. The definitions presented below are used throughout this Manual, but countries may have their own definitions.

Application Programming Interface (API): An API for statistical data is a programming interface that enable users of statistics to integrate data from a statistical agency into their own systems, combine with own data and create services, applications and visualizations. Whenever the statistical agency updates data it automatically becomes available to users.

Common Statistical Production Architecture (CSPA): A system that covers statistical production across the information elements and processes defined by the Generic Statistical Information Model (GSIM), Generic Activity Model for Statistical Organizations (GAMSO) and Generic Statistical Business Process Model (GSBPM).

Data Ecosystem: A system in which a number of actors interact with each other to exchange, produce and utilize data. In a simple definition, a system can be understood as a set of connected parts forming a complex whole. There are multiple other definitions of data ecosystem. The United Nation Development Program (UNDP) model[9] consists of data producers, data objects, infomediaries (i.e. media and other commercial information services) and data users, while other models put the NSO-led NSS at the center of a system consisting otherwise of government agencies, academia and research institutions, the private sector, civil society and international and regional organization.

Data and statistics: Statistics is numerical information relating to an aggregate of data on units or observations. Generally, this Manual uses the term "statistics" when referring to an output of a statistics production process and the term "data" when referring to input or possibly throughput in the statistics production process (data includes microdata which depending of the context can be also an output).

Data providers and statistics producers: This Manual distinguishes data providers that provide an input to the statistics production process (such as respondents and holders or owners of statistical, administrative and other forms of data) and statistics producers that produce a statistical output. Depending on the specific context, this Manual only refers to holders or owners of data when using the term data provider.

[6] https://stats.oecd.org/glossary/.
[7] http://ec.europa.eu/eurostat/ramon/index.cfm?TargetUrl=DSP_PUB_WELC.
[8] https://sdmx.org/?sdmx_news=new-sdmx-glossary-available.
[9] UNDP, 2017 - Data Ecosystems for Sustainable Development, cited in PARIS21's publication, Proposing a framework for Statistical Capacity Development 4.0.

Data sources, types of: This Manual distinguishes three data sources according to their purpose and by the entity responsible for their compilation. These are statistical data sources such as surveys, administrative data sources and other data sources. In general, other data sources include data sources associated with the term "big data" unless included already, in some instances, in statistical or administrative data sources. New data sources can be often associated with other data sources but may as well belong to statistical or administrative data sources, depending on national circumstances.

Generic Statistical Business Process Model (GSBPM): GSBPM describes the processes used for the production of statistics, from specifying the needs, through design and building, data collection, processing and analyzing to dissemination.

Generic Statistical Information Model (GSIM): GSIM is an internationally agreed set of definitions, attributes and relationships that describe the pieces of information that are used in the production of official statistics.

Generic Activity Model for Statistical Organizations (GAMSO): GAMSO extends and complements the GSBPM by modelling additional activities that support statistical production.

Metadata: Metadata are data that define and describe other data. We can distinguish structural metadata and reference metadata. **Structural metadata** define and accompany the data and consist of identifiers and descriptors which are essential for discovering, organizing, retrieving and processing a statistical data set, e.g. titles, subtitles, short descriptions, dimension names, variable names etc. **Reference metadata** are of more general nature and describe statistical concepts and methodologies used for the collection and generation of data and provide information on data quality thus assisting users with the interpretation of the data. Contrary to structural metadata, reference metadata can be decoupled from the data, i.e. they can be generated, collected or disseminated separately from the statistics to which they refer.

National quality assurance framework (NQAF): A coherent and holistic system being a basis for statistical quality management which assures trust and quality of official statistics.

National statistical office (NSO): The national statistical office is the leading statistical agency within a national statistical system. "National statistical office" and "National statistical institute" mean the same. In general, the NSO has a coordination role within the national statistical system (NSS) and is responsible for the development, production and dissemination of official statistics across multiple statistical domains.

National statistical system (NSS): The national statistical system is the ensemble of statistical organizations and units (statistical agencies) within a country that develop, produce and disseminate official statistics on behalf of the national government (and other levels of government). It is the responsibility of each country to define the scope of its national statistical system. See also **"Statistical agencies"**, **"Data providers and statistics producers"** and **"Data ecosystem"**.

Official statistics: Official statistics describe, on a representative basis, economic, demographic, social and environmental phenomena of public interest. Official statistics are developed, produced and disseminated as a public good by the members of the national statistical system (NSS) in compliance with FPOS and accepted quality frameworks such as UN NQAF, as well as other internationally agreed statistical standards and recommendations. In many countries, official statistics are described or referred to in the statistical programs.

Open data: Digital data that is made available with the technical and legal characteristics necessary for it to be freely used, reused, and redistributed by anyone, anytime, anywhere. There are many similarities between the statistical quality principles of UN NQAF and the criteria for open data used in the International Open Data Charter such as "timeliness and comprehensiveness", "accessibility and usability", "comparability and interoperability".

Other statistics producers: Other statistics producers do not produce official statistics and are normally not members of the NSS. Other statistics producers have to be distinguished from other producers of official statistics, who are members of the NSS. See also **"Statistical agencies"**.

Plan-Do-Check-Act (PDCA) cycle: A systematic way of thinking of quality and performing improvements starting with planning a change, then doing it, monitoring the process and resulting outputs against the objectives, and take actions to improve performance, as necessary. The cycle was made popular by Deming.

Principle, requirement, element to be assured: A principle is a general proposition, or procedure, to which statistical agencies and organizations are committed and that will guide them in meeting their quality related objectives. A requirement is something needed in order to ensure the implementation of the United Nations National Quality Assurance Framework (UN NQAF) in Chapter 3. An element to be assured (provided in the Annex) is a specific aspect of the UN NQAF that identifies possible activities, methods and tools to meet the requirement. In this sense an element to be assured reflects a good practice that is observed to work well in one or several NSOs or other producers of official statistics, and thus is a candidate to be promoted for use in other statistical agencies.

Quality: The degree to which a set of inherent characteristics of an object fulfils requirements (see International Standards Organization, ISO 9000:2015). A simple definition is "fit for use" or "fit for purpose". It is the users' needs that define the quality. Different users may have different needs that must be balanced against each other.

Quality assessment: The part of quality assurance that focuses on assessment of fulfilling quality requirements (a need or expectation that is stated).

Quality assurance: A planned and systematic pattern of all the actions necessary to provide adequate confidence that a product will conform to established requirements.

Quality dimensions: For statistics, the general definition of quality is operationalized by specifying a set of factors or dimensions that characterize the quality of the product. The United Nations National Quality Assurance Framework (UN NQAF) identifies quality dimensions linked to statistical products in principle 14 – 18 covering the following dimensions (some principles cover two dimensions which are closely related):

Relevance: The extent to which the statistics satisfy the needs of the users.

Accuracy: Closeness of estimates to the exact or true values that the statistics were intended to measure.

Reliability: Closeness of the initially estimated value(s) to the subsequent estimated value(s) if preliminary figures are disseminated.

Timeliness: The length of time between the end of a reference period (or date) and dissemination of the statistics.

Punctuality: The time lag between the release date and the target date by which the data or statistics should have been delivered.

Accessibility: The ease and conditions with which statistical information can be obtained.

Clarity: The availability of appropriate documentation in relation to the statistics and to the additional assistance which producers make available to users.

Coherence: The ability to reliably combine statistics and datasets in different ways and for various uses. Consistency is often used synonymously with coherence.

Comparability: The extent to which differences between statistics from different geographical areas, non-geographical domains, or over time, can be attributed to differences between the true values of the statistics.

Quality management: Quality management is the set of systems and frameworks that are in place within an organization to manage the quality of statistical products and processes. In the case of a national statistical office (NSO) and other producers of official statistics quality management also includes managing the statistical system and the institutional environment, as applicable. Quality management includes quality assurance but both terms are often used synonymously; quality management is a more overarching concept while quality assurance implies a greater focus on concrete actions.

Revision: A revision is a change in a value of statistics released to the public. Changes can be due to errors, but normally the term revision is reserved for planned changes in published numbers. Statistics can be revised when more and better source data become available, or due to a change in methodology.

Risk management: The identification, analysis, assessment, control, and avoidance, minimization, or elimination of unacceptable events.

SDMX: Statistical Data and Metadata eXchange is an international initiative that aims at standardizing and modernizing ("industrializing") the mechanisms and processes for the exchange of statistical data and metadata among international organizations and their member countries.

Source data: Data collected (from respondents, from administrative entities and from other data providers) by members of the national statistical system (NSS) to be used in the compilation and production of official statistics.

Statistical agencies: Members of the NSS are referred to as "statistical agencies" encompassing the NSO and "other producers of official statistics". Statistical agencies other than the NSO normally have other main purposes and tasks than production of official statistics and only a section or a small group of people within the institution produces statistics. The quality requirements to processes and output are the same for all official statistics. However, for a ministry or administrative body where only a part of it produces statistics, the requirements linked to the institutional environment only apply to the entity producing official statistics. For example, while the ministry or administrative body is typically not independent, the unit within these ministries/administrative bodies that is responsible for producing statistics should decide on how to produce and when to disseminate its statistics independently.

Statistical purpose: This term is used for tasks aiming at developing, producing and disseminating official statistics. It includes experimenting and testing.

Statistical standards: Standards refer to defining and establishing uniform specifications and characteristics for products and/or services. In the context of this Manual standards refer to a comprehensive set of statistical concepts, definitions, classifications[10] and models, methods and procedures used to achieve uniform treatment of statistical issues within or across processes and across time and space.

*****

[10] See for example the UN Register of Classifications (https://unstats.un.org/unsd/classifications/Family).

Chapter 2. Recommendations on quality assurance for official statistics

Introduction

2.1. The recommendations presented in this chapter establish United Nations (UN) recommendations on statistical quality assurance based on the 10 Fundamental Principles of Official Statistics (FPOS) and related existing guidance (see Table 2.1 and Box 2.1). The recommendations are meant to guide and support the national statistical office (NSO) and other members of the national statistical system (NSS) in assuring the availability and quality of official statistics produced throughout the NSS by a multitude of statistics producers. Accordingly, this chapter stresses the commitment to quality assurance by UN Member States and recommends concrete measures such as the adoption of a national quality assurance framework (NQAF).

2.2. These recommendations can be updated and amended in the future according to changing circumstances while the FPOS are not expected to change. Countries may consider reflecting all recommendations in their national statistical laws [11] and/or regulations according to their national circumstances.

2.A. Scope of the recommendations

2.3. *Who and what is subject to these recommendations*. The following recommendations apply to the NSS comprised of the NSO and other producers of official statistics (other statistical agencies). [12] However, under specific circumstances, as established by countries, the recommendations are proposed to be used by other producers of statistics and providers of data[13] that do not produce official statistics and that are not part of the national statistical system.

2.4. *Members of the extended data ecosystem.* Examples of other producers of statistics and providers of data that frequently are not considered to be part of the NSS are:

a. international and supranational agencies and entities;

b. enterprises that produce data on a regional or global scale such as Gallup (Gallup World Poll) or enterprises that provide transboundary geospatial information obtained for example through earth observation;

c. private or public-private professional organizations or business associations or non-governmental entities;

d. enterprises that compile data from information generated and provided on the internet;

[11] See for example United Nations Economic Commission for Europe, Generic Law on Official Statistics, December 2016, available at: https://ec.europa.eu/eurostat/ramon/statmanuals/files/UNECE_Generic_law_2016_EN.pdf.

[12] It is the responsibility of each country to define the scope of its national statistical system and hereby widen or narrow the scope of producers of statistics to whom these recommendations apply. Please see section 1.C for a definition of the term "national statistical system".

[13] See section 1.C for a definition of the terms "data provider" and "statistics producer".

e. scientific studies and measurements that aspire to provide statistical data;

f. all types of citizen generated data and statistics.[14]

2.5. Specific circumstances of when the recommendations may apply to other statistics producers could be, for example, when statistics of such producers is published with the support of a member of the NSS or when it is used for government decision making or when members of the NSS outsource or sub-contract parts of the statistical production process to public or private entities that are not part of the NSS, such as, for example, universities and research centers.

2.B. Five core recommendations and further recommendations for the implementation of the Fundamental Principles of Official Statistics

2.6. *Five overarching core recommendations*. Recommendation #1, together with recommendations #2 to #5 form the overarching core recommendations that, if implemented, establish the basis for quality assurance for official statistics in a country. The recommendation #1 is directly derived from the existing two General Assembly resolutions on statistics.[15] Recommendations #2 to #5 are largely based on FPOS Principle 1, which states that official statistics should meet the test of practical utility. Practical utility is fitness for use or fitness for purpose which is the definition of data quality.

#1 **It is recommended** that in order to be effective, the fundamental values and principles that govern development, production and dissemination of official statistics have to be guaranteed by legal and institutional frameworks and be respected at all political levels and by all stakeholders in national statistical systems.

#2 **It is recommended** that countries include the requirements of quality assurance in their national statistical legislation and other legislation mandating production of statistics for official use (derived from Principle 1 of FPOS)[16].

#3 **It is recommended** that countries establish a national quality assurance framework for official statistics and that all members of the national statistical system are committed to continually assess, improve and report on the quality of official statistics, as well as on the quality of data and statistics used in the production of official statistics as required.[17] (derived from Principle 1 of FPOS).

[14] This list is only an indicative enumeration and not a classification of other statistics producers or data provides outside of the NSS.

[15] General Assembly resolution A/RES/68/261 on the Fundamental Principles of Official Statistics and General Assembly resolution A/RES/71/313 on the Work of the Statistical Commission pertaining to the 2030 Agenda for Sustainable Development.

[16] See for example United Nations Economic Commission for Europe, Generic Law on Official Statistics, December 2016, available at: https://ec.europa.eu/eurostat/ramon/statmanuals/files/UNECE_Generic_law_2016_EN.pdf

[17] This commitment of members of the NSS should also, as deemed appropriate and required, extend to data and statistics that is disseminated jointly with other statistics producers that are not members of the NSS.

#4 **It is recommended** that the national quality assurance framework for official statistics is being developed in consideration or in alignment with the UN National Quality Assurance Framework or similar existing quality assurance frameworks (derived from Principle 1 and Principle 2 of FPOS).

#5 **It is recommended** that the national quality assurance framework is implemented at the national statistical office and throughout the entire national statistical system. Furthermore, **it is recommended** that the national quality assurance framework is applied to all data and statistics produced outside of the national statistical system that is disseminated with the help and support of a member of the national statistical system or that is used for government decision making, as deemed appropriate and required (derived from Principle 1 of FPOS).

2.7. *Recommendations that aim at the implementation of specific Fundamental Principles of Official Statistics*. The following recommendations provide an interpretation of FPOS to facilitate their implementation and to stress their importance in the context of statistical quality assurance, as FPOS provide the normative basis for official statistics. The recommendations may be incorporated into a country's statistical laws, as appropriate, to assure adherence to FPOS.

2.8. The following recommendations, #6 to #14 are either directly derived from one or two FPOS or a repetition of one of its principles. FPOS and the associated recommendations of this chapter support specific principles contained in the United Nations National Quality Assurance Framework (UN NQAF) and give them an obligatory character (see Chapter 3, which contains references to the applicable FPOS).

#6 According to FPOS 1 and FPOS 2, **it is recommended** that statistics at all levels, including the local level, are being planned, designed, developed, produced and disseminated on an impartial basis, and according to strictly professional considerations.

#7 According to FPOS 3, **it is recommended** that statistics and data are to be presented in a way that facilitates their correct interpretation, which implies that appropriate metadata such as on data sources, methods and procedures used are made available in conjunction with the released data or statistics.

#8 According to FPOS 4, **it is recommended** that all members of the national statistical system comment on erroneous interpretation and misuse of official statistics in their respective subject-matter domain(s) of statistical production and dissemination, as required.

#9 According to FPOS 1 and FPOS 5, **it is recommended** that countries include in their statistical laws (a) the mandate of producers of official statistics to collect needed information to compile statistics directly from respondents if it is not already available in the national statistical system and cannot be obtained from existing data and (b) the entitlement to select data sources based on professional considerations, including "new" sources such as "big data".

#10 According to FPOS 6, **it is recommended** that individual data collected by statistical agencies for statistical compilation, whether they refer to natural or legal persons, are to be strictly confidential and used exclusively for statistical purposes.

#11 According to FPOS 7, **it is recommended** that the laws, regulations and measures under which the national statistical systems operate are to be made public.

#12 According to FPOS 8, **it is recommended** that the work of the national statistical system is properly coordinated to achieve consistency and efficiency, and that, therefore, the statistical law of the country (a) clearly identifies the roles and responsibilities of the individual members within the national statistical system and (b) establishes a body which is responsible for managing and coordinating the system-wide activities, including promotion of the national quality assurance framework.

#13 According to FPOS 9, **it is recommended** that the national statistical office and all other members of the national statistical system, including members at the local level, use international statistical concepts, classifications and methods and, hereby, ensure the consistency of official statistics and efficiency of statistical systems at all levels.

#14 According to FPOS 10, **it is recommended** that countries participate in bilateral and multilateral cooperation in statistics to improve official statistics in all countries.

Table 2.1: Origin of the recommendations on quality assurance for official statistics

Recommendation ← Resulting in			GA RES*	Fundamental Principle of Official Statistics (FPOS)									
				1	2	3	4	5	6	7	8	9	10
Overarching core recommendations	#1	Integrate FPOS in the legal and institutional frameworks	✸										
	#2	Include the requirement for quality assurance in the statistical legislation		✸									
	#3	Establish NQAF; all NSS members to commit to quality assurance		✸									
	#4	Base or align your NQAF with international or regional quality frameworks		✸	✸								
	#5	Implement NQAF comprehensively		✸									
Recommendations that aim at the implementation of specific FPOS	#6	Be impartial and follow professional considerations		✸	✸								
	#7	Present data properly and provide metadata				✸							
	#8	Address erroneous interpretation and misuse					✸						
	#9	Include adequate rights to access data from all sources for statistical purposes						✸					
	#10	Ensure statistical confidentiality							✸				
	#11	Make laws and regulation under which NSS operates public								✸			
	#12	Take measures to ensure proper coordination of NSS									✸		
	#13	Use international concepts, classifications and methods										✸	
	#14	Participate in bilateral and multilateral cooperation											✸

***** General Assembly resolution A/RES/68/261 on the Fundamental Principles of Official Statistics and General Assembly resolution A/RES/71/313 on the Work of the Statistical Commission pertaining to the 2030 Agenda for Sustainable Development.

Box 2.1: The United Nations Fundamental Principles of Official Statistics*

Fundamental Principle 1. Official statistics provide an indispensable element in the information system of a democratic society, serving the Government, the economy and the public with data about the economic, demographic, social and environmental situation. To this end, official statistics that meet the test of practical utility are to be compiled and made available on an impartial basis by official statistical agencies to honor citizens' entitlement to public information.
Fundamental Principle 2. To retain trust in official statistics, the statistical agencies need to decide according to strictly professional considerations, including scientific principles and professional ethics, on the methods and procedures for the collection, processing, storage and presentation of statistical data.
Fundamental Principle 3. To facilitate a correct interpretation of the data, the statistical agencies are to present information according to scientific standards on the sources, methods and procedures of the statistics.
Fundamental Principle 4. The statistical agencies are entitled to comment on erroneous interpretation and misuse of statistics.
Fundamental Principle 5. Data for statistical purposes may be drawn from all types of sources, be they statistical surveys or administrative records. Statistical agencies are to choose the source with regard to quality, timeliness, costs and the burden on respondents.
Fundamental Principle 6. Individual data collected by statistical agencies for statistical compilation, whether they refer to natural or legal persons, are to be strictly confidential and used exclusively for statistical purposes.
Fundamental Principle 7. The laws, regulations and measures under which the statistical systems operate are to be made public.
Fundamental Principle 8. Coordination among statistical agencies within countries is essential to achieve consistency and efficiency in the statistical system.
Fundamental Principle 9. The use by statistical agencies in each country of international concepts, classifications and methods promotes the consistency and efficiency of statistical systems at all official levels.
Fundamental Principle 10. Bilateral and multilateral cooperation in statistics contributes to the improvement of systems of official statistics in all countries.

* The 10 Fundamental Principles of Official Statistics (FPOS) are not to be confused be with the UN NQAF quality principles of this Manual which are presented in Chapter 3. Please see Table 3.1 how the 10 FPOS support the 19 UN NQAF quality principles.

*****

Chapter 3. The UN National Quality Assurance Framework: principles and requirements

Introduction

3.1. The UN National Quality Assurance Framework (UN NQAF) addresses the quality assurance in the development, production and dissemination of official statistics. UN NQAF arranges its quality principles and associated requirements into four levels, ranging from the over-arching institutional and cross-institutional level through the statistical production processes to the outputs (see also figure 4.1):

Level A: Managing the statistical system

Level B: Managing the institutional environment

Level C: Managing statistical processes

Level D: Managing statistical outputs

3.2. Each level contains a concise set of quality principles and requirements to guarantee quality in that aspect of quality assurance. Meeting the requirements will be vital indicators that provisions have been made to assure quality.

3.3. A list of elements to be assured, supporting and assisting the implementation of the principles and requirements and providing more details, is available in the Annex. The elements to be assured can be seen as good practices, meaning that not all elements are equally needed or relevant for all countries. However, they should be followed or assured as long as they are applicable. In this view, the Annex A is an integral part of Chapter 3.

3.4. While striving for compliance with the quality assurance framework, one should be aware that there are trade-offs between the principles.[18] There are for example, trade-offs between accuracy, timeliness and cost-efficiency. The editing of data used for statistics production improves accuracy but increases costs and may affect timeliness negatively. Another example is the trade-off between timeliness and punctuality since ambitious goals for timeliness may lead to rescheduling of release times and hence, lower punctuality. Therefore, targets cannot be set for individual principles in isolation. Consideration of such trade-offs is an important part of statistical professionalism emphasized in the UN Fundamental Principles of Official Statistics (FPOS).

3.5. UN NQAF and its principles and requirements are not mandatory, and countries may choose and follow their own national quality assurance framework (NQAF). However, UN NQAF quality principles and requirements are strongly connected to the FPOS agreed by United Nations (UN) Member States and the recommendations on quality assurance detailed in Chapter 2. Therefore, implementing the principles of UN NQAF or a similar NQAF is required if a country wishes to follow FPOS and the recommendations of this Manual in Chapter 2. Table 3.1 shows how the UN NQAF

[18] Data quality is multi-dimensional and there is no ranking among the individual quality principles. They should be applied in a balanced way depending on the specific situation.

principles are linked to and supported by FPOS. Among particular quality principles supported by the FPOS there is a distinction between FPOS providing strong support (usually one per quality principle) and FPOS providing additional support.

Table 3.1. NQAF quality principles and supporting Fundamental Principles of Official Statistics (FPOS).

UN NQAF quality principle ⟵ support	Fundamental Principle of Official Statistics									
	1	2	3	4	5	6	7	8	9	10
Level A: Managing the statistical system										
1: Coordinating the national statistical system								✸		
2: Managing relationships with data users, data providers and other stakeholders	✸				✸			○		○
3: Managing statistical standards									✸	
Level B: Managing the institutional environment										
4: Assuring professional independence	○	✸					○			
5: Assuring impartiality and objectivity	✸	○	○	○	○		○			
6: Assuring transparency			✸				○			
7: Assuring statistical confidentiality and data security						✸				
8: Assuring the quality commitment		✸								
9: Assuring adequacy of resources	○									
Level C: Managing statistical processes										
10: Assuring methodological soundness		✸			○				○	○
11: Assuring cost-effectiveness					✸				○	
12: Assuring appropriate statistical procedures		✸			○					
13: Managing the respondent burden					✸					
Level D: Managing statistical outputs										
14: Assuring relevance	✸		○		○					
15: Assuring accuracy and reliability	✸				○					
16: Assuring timeliness and punctuality	✸				○					
17: Assuring accessibility and clarity	✸		○							
18: Assuring coherence and comparability	✸		○						○	
19: Managing metadata			✸						○	

Legend:

✸ - FPOS (usually one) providing very strong support

○ - Additional supporting FPOS (subject to different views)

3.6. Some overlap between the quality principles of UN NQAF in terms of their underlying requirements is unavoidable and appropriate since they refer to different levels and must be interpreted in different contexts. Cross-cutting and important issues such as relations with stakeholders, transparency, quality commitment, cost-effectiveness and metadata management are examples which are included in various principles. Table 3.2 shows the most important interlinkages between the 19 UN NQAF principles.

Table 3.2. Main interlinkages between different UN NQAF quality principles.

Level	UN NQAF quality principle	UN NQAF quality principle																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Managing the statistical system	1: Coordinating the national statistical system		✸																	
	2: Managing relationships with stakeholders	✸												✸	✸					
	3: Managing statistical standards																		✸	
Managing the institutional environment	4: Assuring professional independence																			
	5: Assuring impartiality and objectivity						✸		✸								✸			
	6: Assuring transparency					✸												✸		
	7: Assuring stat. confidentiality and data security																			
	8: Assuring the quality commitment					✸														
	9: Assuring adequacy of resources											✸								
Managing statistical processes	10: Assuring methodological soundness												✸							
	11: Assuring cost-effectiveness									✸										
	12: Assuring appropriate statistical procedures										✸									✸
	13: Managing the respondent burden		✸																	
Managing statistical outputs	14: Assuring relevance		✸																	
	15: Assuring accuracy and reliability																			
	16: Assuring timeliness and punctuality					✸														
	17: Assuring accessibility and clarity						✸													✸
	18: Assuring coherence and comparability			✸																
	19: Managing metadata												✸					✸		

Legend:

✸ - Interlinkage between UN NQAF principles

Level A. Managing the statistical system

The national statistical system (NSS) comprises the statistical agencies or units within a country that develop, produce and disseminate official statistics on behalf of the national government, normally with the national statistical office (NSO) as the leading agency. Coordination of this system and managing relations with all stakeholders is a precondition for the quality and efficient production of official statistics. Ensuring the use of common statistical standards throughout the system is an important part of this management.

Principle 1: Coordinating the national statistical system

Coordination of the work of the members of the national statistical system is essential for improving and maintaining the quality of official statistics. Principle 1 is mainly supported by FPOS 8.

Requirement 1.1: A statistical law establishes the responsibilities of the members of the national statistical system including its coordination. Its members are identified in a legal or formal provision.

Requirement 1.2: There are a body and mechanisms for the coordination of the national statistical system for activities at the local, national, regional and international level.

Requirement 1.3: There is a mechanism for considering statistics produced outside the national statistical system, and if appropriate, for these statistics to become official.

Requirement 1.4: There is a national plan or program for the development and production of official statistics.

Principle 2: Managing relationships with data users, data providers and other stakeholders

The statistical agencies should build and sustain good relationships with all their key stakeholders, including users, data providers, funding agencies, senior government officials, relevant community organizations, academia and the media. The statistical agencies should have access to all data necessary to satisfy the information needs of society in an effective and efficient way. Principle 2 is mainly supported by FPOS 1 and 5.

Requirement 2.1: Stakeholders are identified and consulted regarding their interests, needs and obligations.

Requirement 2.2: The statistical agencies have a strategy and institutional arrangements to engage with their users.

Requirement 2.3: The statistical agencies continuously maintain and develop cooperation with funding agencies, academic institutions and international statistical organizations, as appropriate.

Requirement 2.4: The national statistical office and, if appropriate, other statistical agencies have the legal authority or some other formal provision to collect data for the development, production and dissemination of official statistics.

Requirement 2.5: The national statistical office and, if appropriate, other statistical agencies have the legal authority or some other formal provision to obtain administrative data and adequate access to these data from other government agencies for statistical purposes.

Requirement 2.6: The national statistical office and, if appropriate, other statistical agencies have the legal authority or some other formal provision and related agreements to access and use data (including "big data") maintained by private corporations or other non-governmental organizations for statistical purposes on a regular basis, including for testing and experimentation.

Requirement 2.7: The national statistical office cooperates with and provides support and guidance to data providers.

Principle 3: Managing statistical standards

Standards refer to a comprehensive set of statistical concepts, definitions, classifications and models, methods and procedures used to achieve uniform treatment of statistical issues within or across processes and across time and space. The use of standards promotes the consistency and efficiency of statistical systems at all levels. Principle 3 is mainly supported by FPOS 9.

Requirement 3.1: The statistical agencies cooperate in the development and implementation of international, regional and national statistical standards.

Requirement 3.2: The national statistical offices provide support and guidance to all data providers and producers of official statistics in the implementation of statistical standards.

Requirement 3.3: Divergences from the international, regional or national statistical standards are kept to a minimum, documented and explained to all stakeholders.

Level B. Managing the institutional environment

The institutional environment is one of the prerequisites to ensure the quality of statistics. Principles to be assured are professional independence, impartiality and objectivity, transparency, statistical confidentiality, quality commitment and adequacy of resources.

Principle 4: Assuring professional independence

Statistical agencies should develop, produce and disseminate statistics without any political or other interference or pressure from other government agencies or policy, regulatory or administrative departments and bodies, the private sector or any other persons or entities. Such

professional independence and freedom from inappropriate influence ensures the credibility of official statistics. This should apply to national statistical offices as well as to other producers of official statistics. Principle 4 is mainly supported by FPOS 2.

Requirement 4.1: A law or other formal provision explicitly declares that statistical agencies are obligated to develop, produce and disseminate statistics without interference from other government agencies or policy, regulatory or administrative departments and bodies, including from within the statistical agencies, private sector or any other persons or entities.

Requirement 4.2: The appointment of the heads of the national statistical office, and other statistical agencies where appropriate, is based on professional criteria and follow transparent procedures. Reasons for dismissal cannot include reasons affecting professional independence. The heads of the statistical agencies are of the highest professional caliber.

Requirement 4.3: The head of the national statistical office and other statistical agencies where appropriate has sole responsibility over the decisions on statistical methods, standards and procedures, and on the content and timing of statistical releases.

Principle 5: Assuring impartiality and objectivity

Statistical agencies should develop, produce and disseminate statistics respecting scientific independence and in a way that is professional, impartial and unbiased, and in which all users are treated equitably. Principle 5 is mainly supported by FPOS 1.

Requirement 5.1: There is a law or formal provision in force, which is publicly available, and which specifies that statistical agencies should develop, produce and disseminate statistics following professional standards and treat all users in the same way.

Requirement 5.2: The statistical agencies implement a declaration or code of conduct or ethics which governs statistical practices, and compliance with it is followed up.

Requirement 5.3: Data sources and methodologies are chosen on an objective basis.

Requirement 5.4: Statistical releases are clearly distinguished from political/policy statements.

Requirement 5.5: Statistical release dates and times are pre-announced.

Requirement 5.6: In the case that errors are detected, they are corrected as soon as possible, and users are informed about how they affected the released statistics.

Requirement 5.7: The statistical agencies comment publicly on statistical issues, misinterpretation and misuse of official statistics, as appropriate.

Principle 6: Assuring transparency

The statistical agencies' policies and management practices and the terms and conditions under which their statistics are developed (including the legal basis and purposes for which the data are required), produced, and disseminated (and, if applicable, subsequently revised) are documented and available to users, respondents, owners of source data and the public. Principle 6 is mainly supported by FPOS 3.

Requirement 6.1: The terms and conditions for producing and disseminating official statistics are available to the public.

Requirement 6.2: The terms and conditions for the governance and management of statistical agencies are available to the public.

Principle 7: Assuring statistical confidentiality and data security

Statistical agencies should guarantee that the privacy of data providers (persons, households, enterprises and other data providers) will be protected and that the information they provide will be kept confidential, cannot be accessed by unauthorized internal or external users, and will be used for statistical purposes only. Principle 7 is supported by FPOS 6.

Requirement 7.1: Statistical confidentiality is guaranteed by law.

Requirement 7.2: Appropriate standards, guidelines, practices and procedures are in place to ensure statistical confidentiality.

Requirement 7.3: Strict protocols to safeguard data confidentiality apply to users with access to microdata for research or statistical purposes.

Requirement 7.4: Penalties are prescribed for any willful breaches of statistical confidentiality.

Requirement 7.5: Security and integrity of data and their transmission is guaranteed by appropriate policies and practices.

Requirement 7.6: The identification risk of individual respondents is assessed and managed.

Principle 8: Assuring the quality commitment

Statistical agencies should be dedicated to assuring quality in their work, and systematically and regularly identify strengths and weaknesses to continuously improve process and product quality. Principle 8 is supported by FPOS 2.

Requirement 8.1: There is a quality policy or a statement of the statistical agency's commitment to quality, which is publicly available.

Requirement 8.2: The statistical agencies promote a culture of continuous improvement.

Requirement 8.3: There is a specific body responsible for the quality management or the coordination of quality management within the statistical agency, and it receives necessary support to fulfil this role.

Requirement 8.4: The NSS staff receives training on quality management.

Requirement 8.5: Guidelines for implementing quality management are defined and made available to the public.

Requirement 8.6: Indicators on statistical output quality are regularly measured, monitored, published and followed up to improve statistical products and processes.

Requirement 8.7: Statistical products and processes undergo periodic reviews.

Requirement 8.8: Risk analyses addressing the quality of important statistical products and processes are performed.

Principle 9: Assuring adequacy of resources

The financial, human, and technological (IT) resources available to statistical agencies should be adequate both in magnitude and quality, and sufficient to meet their needs regarding the development, production and dissemination of statistics.

Requirement 9.1: Financial, human and technological resources are sufficient to implement the statistical work and development program.

Requirement 9.2: Planning and management principles are aimed at the optimal use of available resources.

Requirement 9.3: The statistical agencies' use of resources is reviewed.

Level C. Managing statistical processes

International standards, guidelines and good practices are fully observed in the statistical processes used by the statistical agencies to develop, produce and disseminate official statistics, while constantly striving for innovation. The credibility of the statistics is enhanced by a reputation for good management and efficiency. The relevant principles to be assured are methodological soundness, cost effectiveness, appropriate statistical procedures and managing the respondent burden.

Principle 10: Assuring methodological soundness

In developing and producing statistics, the statistical agencies should use sound statistical methodologies based on internationally agreed standards, guidelines or best practices. Principle 10 is mainly supported by FPOS 2.

Requirement 10.1: The methodologies applied by the statistical agencies are consistent with international standards, guidelines and good practices and are regularly reviewed and revised as needed.

Requirement 10.2: The statistical agencies recruit qualified staff and have regular programs to enhance their methodological skills.

Requirement 10.3: Statistical agencies are to choose the data source with regard to accuracy and reliability, timeliness, costs, the burden on respondents and other necessary considerations.

Requirement 10.4: The registers and the frames for surveys are frequently evaluated and adjusted.

Requirement 10.5: The statistical agencies cooperate with the scientific community to improve methods and promote innovation in development, production and dissemination of statistics.

Principle 11: Assuring cost-effectiveness

Statistical agencies should assure that resources are effectively and efficiently used. They should be able to explain to what extent set objectives were attained, that the results were achieved at a reasonable cost, and are consistent with the principal purposes of the statistics. Principle 11 is mainly supported by FPOS 5.

Requirement 11.1: Costs of producing all individual statistics are measured and analyzed, and mechanisms are in place to assure cost-effectiveness of statistical activities or processes.

Requirement 11.2: Procedures exist to assess and justify demands for new statistics against their cost.

Requirement 11.3: Procedures exist to assess the continuing need for all statistics, to see if any can be discontinued to free up resources.

Requirement 11.4: Modern information and communication technologies are applied to improve the performance of statistical processes.

Requirement 11.5: Proactive efforts are made to improve the statistical potential of administrative data and other data sources.

Requirement 11.6: The statistical agencies define, promote and implement integrated and standardized production systems.

Principle 12: Assuring appropriate statistical procedures

Effective and efficient statistical procedures underpin quality and should be implemented throughout the statistical production chain. Principle 12 is mainly supported by FPOS 2.

Requirement 12.1: Statistical processes are tested before implementation.

Requirement 12.2: Statistical processes are well established and regularly monitored and revised as required.

Requirement 12.3: Procedures are in place to effectively use administrative and other data sources for statistical purposes.

Requirement 12.4: Revisions of statistics follow standard and transparent procedures.

Requirement 12.5: Metadata and documentation of methods and different statistical processes are managed throughout the processes and shared, as appropriate.

Principle 13: Managing the respondent burden

Individuals, households or businesses who provide the data upon which statistical products are based, are fundamental contributors to the quality of data and information. The requirement to collect data should be balanced against production costs and the burden placed on respondents. Mechanisms to maintain good relationships with providers of data and to proactively manage the respondent burden are essential for improving quality. Principle 13 is supported by FPOS 5.

Requirement 13.1: The range and detail of requested information is limited to what is necessary.

Requirement 13.2: Mechanisms are in place to promote the value and use of statistics to respondents.

Requirement 13.3: Sound methods including IT solutions are used in surveys to reduce or distribute respondent burden.

Requirement 13.4: Data sharing, data linkage and use of administrative and other data sources are promoted to minimize respondent burden.

Level D. Managing statistical outputs

Statistics serve the needs of national governments, research institutions, businesses, the general public and the international community. Output quality is measured by the extent to which the statistics are relevant, accurate and reliable, timely and punctual, readily accessible and clear for the users, and coherent and comparable across geographical regions and over time.

Principle 14: Assuring relevance

Statistical information shall meet the current and/or emerging needs or requirements of its users. Without relevance, there is no quality. However, relevance is subjective and depends upon the varying needs of users. The statistical agency's challenge is to weight and balance the conflicting needs of current and potential users to produce statistics that satisfy the most important and highest priority needs within the given resource constraints. Principle 14 is mainly supported by FPOS 1.

Requirement 14.1: Procedures are in place to identify users and their needs and to consult them about the content of the statistical work program.

Requirement 14.2: Users' needs and requirements are balanced, prioritized and reflected in the work program.

Requirement 14.3: Statistics based on new and existing data sources are being developed in response to society's emerging information needs.

Requirement 14.4: User satisfaction is regularly measured and systematically followed up.

Principle 15: Assuring accuracy and reliability

Statistical agencies should develop, produce and disseminate statistics that accurately and reliably portray reality. The accuracy of statistical information reflects the degree to which the information correctly describes the phenomena it was designed to measure, i.e. the degree of closeness of estimates to true values. Principle 15 is mainly supported by FPOS 1.

Requirement 15.1: Source data, integrated data, intermediate results and statistical outputs are regularly assessed and validated.

Requirement 15.2: Sampling errors are measured, evaluated and documented. Non-sampling errors are described and, when possible, estimated.

Requirement 15.3: Studies and analyses of revisions are carried out and used to improve data sources, statistical processes and outputs.

Principle 16: Assuring timeliness and punctuality

Statistical agencies should minimize the delays in making statistics available. Timeliness refers to how fast – after the reference date or the end of the reference period – the data and statistics are made available to users. Punctuality refers to whether data and statistics are delivered on the promised, advertised or announced dates. Principle 16 is mainly supported by FPOS 1.

Requirement 16.1: Timeliness of the statistical agency's statistics comply with international standards or other relevant timeliness targets.

Requirement 16.2: The relationship with data providers is managed with respect to timeliness and punctuality needs.

Requirement 16.3: Preliminary results can be released when their accuracy and reliability is acceptable.

Requirement 16.4: Punctuality is measured and monitored according to planned release dates, such as those set in a release calendar.

Principle 17: Assuring accessibility and clarity

Statistical agencies should ensure that the statistics they develop, produce and disseminate can be found and obtained without difficulty, are presented clearly and in such a way that they can be understood, and are available and accessible to all users on an impartial and equal basis in various convenient formats in line with open data standards. Provision should be made for allowing access to microdata for research purposes, in accordance with an established policy which ensures statistical confidentiality. Principle 17 is mainly supported by FPOS 1.

Requirement 17.1: Statistics are presented in a form that facilitates proper interpretation and meaningful comparisons.

Requirement 17.2: A data dissemination strategy and policy exist and is made public.

Requirement 17.3: Modern information and communication technology is used for facilitating easy access to statistics.

Requirement 17.4: Access to microdata is allowed for research purposes, subject to specific rules and protocols on statistical confidentiality that are posted on the statistical agency's website.

Requirement 17.5: Mechanisms are in place to promote statistical literacy.

Requirement 17.6: The statistical agencies have a dedicated focal point that provides support and responds to inquiries from users in a timely manner.

Requirement 17.7: Users are kept informed about the quality of statistical outputs.

Principle 18: Assuring coherence and comparability

Statistical agencies should develop, produce and disseminate statistics that are consistent, meaning it should be possible to combine and make joint use of related data including data from different sources. Furthermore, statistics should be comparable over time and between areas. Principle 18 is mainly supported by FPOS 1.

Requirement 18.1: International, regional and national standards are used with regard to definitions, units, variables and classifications.

Requirement 18.2: Procedures or guidelines are in place to ensure and monitor internal, intra-sectoral and cross-sectoral coherence and consistency.

Requirement 18.3: Statistics are kept comparable over a reasonable period of time and between geographical areas.

Principle 19: Managing metadata

Statistical agencies should provide information covering the underlying concepts and definitions, variables and classifications used, the methodology of the data collection and processing, and indications of the quality of the statistical information – in general, sufficient information to enable the user to understand all of the attributes of the statistics, including their limitations. Principle 19 is mainly supported by FPOS 3.

Requirement 19.1: The metadata management system of the statistical agency is well defined and documented.

Requirement 19.2: Metadata are documented, archived and disseminated according to internationally accepted standards.

Requirement 19.3: Staff training and development programs are in place on metadata management and related information and documentation systems.

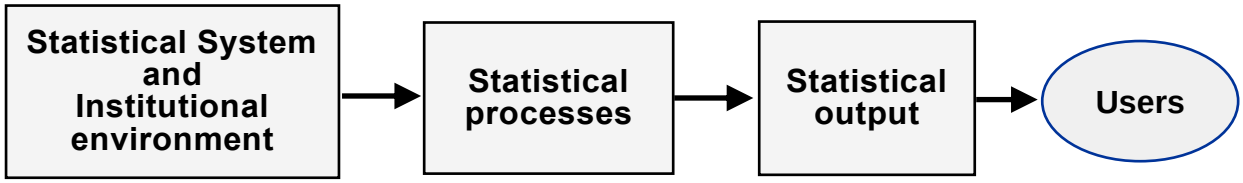
Chapter 4. Assessment tools and risk management

Introduction

4.1. Chapter 4 introduces the concepts of quality management and quality assessment in the context of the statistical production process. It describes in Section 4.A the Generic Statistical Business Process Model (GSBPM), the Generic Activity Model for Statistical Organizations (GAMSO) and Generic Statistical Information Model (GSIM) as important tools that support quality management and assessment. Metadata management is briefly introduced in Section 4.B before methods and tools for quality assessment are being discussed in Section 4.C, the main part of this chapter. The concept of risk management is introduced and its relationship to quality management explained in the final Section 4.D. While some basic explanation of the various quality assessment tools is provided, readers will need to consult the respective references for more detailed information on their use.

4.2. United Nations National Quality Assurance Framework (UN NQAF) was developed based on the existing statistical quality frameworks (see introduction to quality management in Section 1.B). It follows the holistic model of quality management, starting from the statistical system and institutional environment, and covering statistical processes and outputs (see Figure 4.1).

Figure 4.1: Quality management framework of UN NQAF



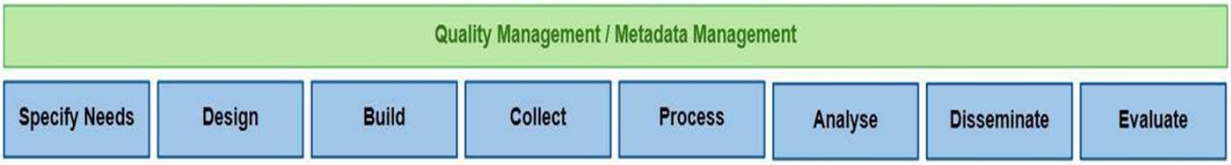
4.3. *Quality assessment as part of quality management*. Statistical quality assessment is an important part of the overall quality management system of a statistical organization. It frequently focuses on the statistical products and the processes leading to their production but can also encompass the statistical system and institutional environment. Methods and tools for statistical quality assessment comprise quality indicators (both for products and processes), quality reports, user surveys, self and external assessments and auditing (internal or external quality reviews), including peer reviews. The assessments may lead to labelling and certification. An efficient and cost-effective use of these methods requires that they are used in combination with each other. For example, quality reports can be the basis for audits and user feedback.

4.A. Quality management and the statistical process and activity model (GSBPM and GAMSO)

4.4. *Quality management and GSBPM*. The improvement in quality of statistical products requires the improvement of statistical processes. The GSBPM describes and defines the set of business processes needed to produce official statistics, and hereby

provides a framework for process quality documentation, assessment and improvement. Quality management is defined in the GSBPM as an over-arching process that includes quality assessment and control mechanisms. It recognizes the importance of evaluation and feedback throughout the statistical business process. Metadata management is recognized as another over-arching process that closely links to quality management. Figure 4.2 illustrates the main structure of the GSBPM (first of totally 3 levels).

Figure 4.2: GSBPM – The statistical production process and quality management[19]



4.5. *Relationship between GAMSO and GSBPM*. While GSBPM focuses on statistical production processes, it does not elaborate in detail on the additional activities (e.g. human resource management, statistical program management) needed to support production. GAMSO[20] describes and defines the activities that take place within a typical organization that produces official statistics. Moreover, it extends and complements GSBPM by adding additional activities needed to support the statistics production, thus proving a broader context of corporate strategies, capabilities and support that are important for statistical quality management.

4.6. *Using GSBPM and GAMSO for quality management*. The GSBPM and the GAMSO establish a common language when referring to statistical business processes and activities that take place within a typical statistical organization. In particular, the GSBPM is intended to apply to all production activities undertaken by producers of official statistics, which result in statistical outputs. It is designed to be independent of the data source, so it can be used for the description and quality assessment of processes based on surveys, censuses, administrative records, and other non-statistical or mixed sources. One needs to understand all relations and interlinkages between different activities and intermediate outputs in order to improve the quality of statistical products and processes. GSBPM also supports the reference metadata management. After identifying the product or process that needs quality improvement, the GSBPM (and GAMSO) work as the navigator for users of a national quality assurance framework (NQAF) to take the most efficient path for assuring data quality at all phases from specify needs to evaluate.[21]

[19] See Generic Statistical Business Process Model GSBPM (Version 5.0, December 2013), available at: https://statswiki.unece.org/display/GSBPM/GSBPM+v5.0. GSBPM is currently being revised.
[20] See https://statswiki.unece.org/display/GAMSO/Generic+Activity+Model+for+Statistical+Organizations
[21] GSBPM and GAMSO are the models relevant for all aspects of quality management. However, there are also other statistical models, such as the Generic Statistical Data Editing Models (GSDEMs) (see https://statswiki.unece.org/display/sde/Statistical+Data+Editing)) that cover very specific aspect of quality management in great technical detail.

4.B. Metadata management

4.7. *Metadata management as tool for quality assurance*. The use and good management of metadata is essential for quality and the efficient operation of statistical processes. Metadata management can be facilitated and guided by the use of standard models such as GSBPM, as already pointed out in the previous paragraph, and GSIM.[22] GSIM is a reference framework of internationally agreed definitions, attributes and relationships that describe the pieces of information that are used in the production of official statistics (information objects). It covers the whole statistical process and includes information on objects used in phases of GSBPM from specifying needs to the evaluation and assessment. GSIM supports and is consistent with the Part A of the Common Metadata Framework[23], which also identifies the sixteen core principles for metadata management recommended for designing and implementing a statistical metadata system. One approach would be to assess the compliance of one's organizations metadata management with these sixteen principles.

4.C. Methods and tools for quality assessment

4.8. This section briefly introduces the methods and tools for quality assessment. In general, the use of quality indicators, the production of quality reports and the conduct of user surveys are considered as the basic level of quality assessment. Self-assessments and audits constitute the next level of quality assessment, while labelling and certification can be looked upon as advanced practices.[24]

Essential tools for quality assessment (basic level of quality assessment)

4.9. *Quality principles*: Before conducting a quality assessment it is necessary to gain a clear understanding of the quality principles, requirements and elements to be assured that are applicable to statistical outputs, statistical processes, the national statistical system (NSS) as a whole and the institutional environment (see Chapter 3 and Annex A for details):

a. UN NQAF defines product quality in terms of the following five quality principles: relevance, accuracy and reliability, timeliness and punctuality, accessibility and clarity, and coherence and comparability.

b. UN NQAF defines process quality in terms of the four quality principles: methodological soundness, cost-effectiveness, appropriate statistical procedures and managing respondent burden.

c. UN NQAF defines quality of the NSS and the institutional environment in terms of nine quality principles: coordination, relationships with stakeholders, statistical standards, professional independence, impartiality and objectivity,

[22] See https://statswiki.unece.org/display/newclick/Clickable+GSIM.

[23] See United Nations Economic Commission for Europe (UNECE), Common Metadata Framework, Part A: Statistical Metadata in a Corporate Context: A guide for managers, Geneva 2009, available at https://unstats.un.org/unsd/EconStatKB/KnowledgebaseArticle10163.aspx.

[24] See Handbook on data quality assurance methods and tools https://unstats.un.org/unsd/dnss/docs-nqaf/Eurostat-HANDBOOK%20ON%20DATA%20QUALITY%20ASSESSMENT%20METHODS%20AND%20TOOLS%20%20I.pdf, The list of tools is not exhaustive. For example, countries may also use so called control panels as a checklist in each of the phases of the GSBPM model.

transparency, statistical confidentiality and data security, quality commitment and adequacy of resources.

4.10. *Quality indicators*. Quality indicators have to be identified (or developed) in order to measure the compliance with the respective quality principles and requirements. They are specific and measurable elements of statistical practice that can be used to characterize the quality of statistics. They measure the quality of statistical products or processes from several aspects, and for example, can give an indication of both the output (e.g. timeliness) and process quality (e.g. response rates which can be used as a proxy for accuracy). Quality indicators allow to describe and compare the quality between different statistics and over time. When quality indicators are used to inform users on the quality of statistics, it is recommended to include qualitative statements which help to interpret quality information and to summarize the main effects on the usability of the statistics. Quality indicators are important for process management and continuous improvement.

4.11. Work on defining and developing the quality indicators can be undertaken by survey managers, data collection specialists and methodologists, and should also consider input from users. Statistical agencies and units may simply draw from existing lists of quality indicators, including a list of quality indicators linked to the different stages of the GSBPM.[25] The statistical agency can also set levels of requirements for the quality indicators in the form of quality targets. The defined targets can then serve as a tool for monitoring quality developments over time.[26]

4.12. *Quality reports*. Communicating about the quality of a statistical process or product can be accomplished through the preparation of reports that explain and review the main characteristics of the process and its products. Because of the multi-dimensional nature of quality, the quality reports typically examine and describe quality according to those components or dimensions (quality principles) the agency has used to define its products' fitness for purpose. The reports are meant to convey the necessary information to enable users to assess the quality. Different user groups should be clearly identified and may be presented with different sub-sets of quality indicators. While a main target group of a quality report is the users of the statistics, quality reports are also an important monitoring tool for statistics producers and managers. In the optimal case, the quality reports are based on specific quality indicators and are presented according to a standard reporting structure to facilitate comparability.[27]

---

[25] See *Quality Indicators for the Generic Statistical Business Process Model (GSBPM) - For Statistics derived from Surveys and Administrative Data Sources (Version 2.0, October 2017)*, UNECE High-Level Group for the Modernisation of Official Statistics. See https://statswiki.unece.org/display/GSBPM/Quality+Indicators.

[26] Target setting is frequently subjective and may require first the identification of a stable level. It also depends on the objective such as maintaining the existing level or achieving improvements. However, some targets are set by government ministries or international organisations, in particular on coverage, periodicity and timeliness, e.g. from International Monetary Fund (IMF), Organisation for Economic Co-operation and Development (OECD) and Statistical office of the European Union (Eurostat). Targets are also often set, implicitly or explicitly, in respect to revisions of data (reliability).

[27] See *the ESS Handbook for Quality Reports - 2014 Edition*, Eurostat. For information on other tools and standards on quality reporting developed by Eurostat, visit https://ec.europa.eu/eurostat/web/quality/quality-reporting.

4.13. *User surveys*. A crucial element of the set of information that is needed for a comprehensive quality assessment is user feedback. The statistical agency should regularly consult its users about their needs and perception of quality, take them into account in the quality assessment exercise, and follow up with them, for example through meetings (e.g. focus group discussions) or in a more formalized way by using user satisfaction surveys. Since the main objective of user surveys is normally to get information on the users' perceptions as a basis for improvement, their results can provide valuable inputs to self-assessment and auditing activities described below. There are different groups of users of statistics and hence different types of user surveys should be carried out. User satisfaction surveys can take different forms (e.g. by either using standardized questionnaires, qualitative interviews or web-based surveys, etc.). The choice will depend on the type of feedback required, and on the resources available.

4.14. *Role of the quality assurance framework as a tool*: NQAF is a framework on which basis quality indicators can be developed. However, as a tool, it is more directly applicable as a template for self-assessments.

Tools for quality assessment on the next level

4.15. *Self- and other assessment and auditing (internal or external quality reviews), including peer reviews.* Based on the information collected by the statistical agency using the tools mentioned above, the quality of the processes and products can be evaluated and eventually labelled. Evaluation can be done in the form of self-assessments, other assessments, audits or peer reviews which are very powerful approaches that allow organizations to check and review their processes and products. They can be undertaken by internal or external experts and the timeframe can vary from days to months, depending on the scope. The objective is always the identification of improvement opportunities in processes and products. Therefore, these approaches constitute an important element of the Plan-Do-Check-Act (PDCA) cycle.

4.16. *Self-assessments.* Self-assessments are comprehensive, systematic and regular reviews of an organization's activities carried out by the organization (i.e. those responsible for the relevant activities) itself. The results are referenced against a model or framework. The choice of the self-assessment tool is a strategic decision and its scope should be clearly defined. For example, the self-assessment could be applicable to the whole institutional environment or simply to the statistical production processes. Oftentimes, self-assessment checklists are developed to be used for the systematic assessment of the quality of the statistical production processes.[28] The NQAF can be used as a basis for self-assessments.

4.17. *Other internal or external assessments*. Assessments can also be conducted by an internal group not responsible for the assessed statistics or by an external party. The International Monetary Fund (IMF), using its Data Quality Assessment Framework (DQAF), has undertaken assessments under the Reports on Observance of Standards and Codes (ROSCs) Data Module. ROSCs are considered an assessment of a country's main statistical products and the underlying national statistical system/institutions that

[28] See for example, DESAP - The European Self Assessment Checklist for Survey Managers, available at https://unstats.un.org/unsd/dnss/docs-nqaf/Eurostat-desap%20G0-LEG-20031010-EN.pdf.

produce/disseminate these products. The Statistical office of the European Union (Eurostat) and some of the United Nations (UN) regional commissions implement assessments of national statistical systems as well.

4.18. *Quality audit*. A quality audit is a systematic, independent and documented process for obtaining evidence and determining the extent to which quality requirements are fulfilled. In contrast to self-assessments, audits are always carried out by a third party either internal or external to the organization. Internal audits are led by a team of internal quality auditors who are not in charge of the process or product under review. External audits are conducted either by stakeholders or other parties that have an interest in the organization, by an external and independent auditing organization, or by a suitably-qualified expert. Audits and reviews are normally proceeded by a self-assessment as well as documentation of the processes and products in question.

4.19. *Peer review*. Peer reviews are a type of external audits carried out by others working in the same field (a peer), in this case typically by an external expert or team of experts in statistics, such as colleagues from another statistical agency or country. Contacts can be established through professional forums and associations. A peer review is often more informal and less structured than another external audit. Normally, peer reviews do not address specific aspects of data quality, but broader organizational and strategic questions. They are typically systematic examinations and assessments of the performance of one organization by another, with the ultimate goal of helping the organization under review to comply with established standards and principles, improve its policy making and adopt best practices. The assessment is conducted on a non-adversarial basis and relies heavily on mutual trust among the organization and assessors involved, as well as in their shared confidence in the process.[29]

Labelling and certification

4.20. *Labelling and certification*. The results of the assessment can be compared to defined standards and requirements. This is often referred to as the labelling or certification layer and helps to enhance trust and credibility in official statistics.

4.21. *Labelling*. Labelling of statistics conveys a message about the extent to which a set of quality standards are met. It can be attached to statistics or a producer of statistics. In the European Statistical System, labelling of European statistics is based on compliance with the European statistics Code of Practice. The attachment of a label needs a procedure to guarantee that the message is appropriate and true. The label as such may be brief, e.g. "official statistics", and in this case, it would need to be accompanied by explanations about its interpretation.

4.22. *Certification*. Certification is an activity which assesses whether a product, service, process or system (e.g. a quality management system) complies with requirements defined by an internationally recognized standard, or other formal criteria. It attaches a kind of "label" because the standard is internationally recognized as a guaranteed level of quality. It is conducted by an external independent certification body which can be located at the

[29] In Europe, there is a system of peer reviews to monitor the compliance of the national statistical systems of the EU Member States with the European statistics Code of Practice, see https://ec.europa.eu/eurostat/web/quality/peer-reviews.

national or international level. The result of a successful certification is that the certification body, such as the International Organization for Standardization (ISO) awards a certificate to the organization. Certification to ISO Standards is an advanced method and tool of process quality management. It requires documentation, quality reports, quality indicators, self-assessment and audit. There are significant benefits, but also costs associated with certification.

4.D. Risk management

4.23. *Risk management and the production of statistics*. Traditionally, risk management has been applied within financial management, security and safety. Over recent years the scope of risk management has been extended to modernization and other development programmes and projects, and finally the production of statistics[30]. Risk management is normally developed in line with recommendations from national authorities and may be mandatory. In this case it is especially important that it is closely coordinated with the quality management activities (see UN NQAF requirement 8.8).

4.24. *Definition of risk*. Risks are linked to objectives and are usually expressed in terms of risk sources and potential events that can affect the achievement of the objectives. The level of risk linked to a source is defined as the product of the likelihood or probability of the event and its consequence or effect on the objective. Objectives can be defined as compliance with the NQAF, or more specifically as compliance with each quality principle, such as assuring statistical confidentiality (Principle 7) or assuring accuracy (Principle 15).

4.25. *Identification of risks in the statistical production process*. An example can illustrate the way of thinking. The risk of errors in some statistics can be linked to risk sources such as the quality of source data, the methodology (e.g. sampling), the production system and the working processes linked to data collection, processing, analysis and dissemination. Accordingly, risk management can be described as quality assurance for the different phases of a statistical production model (i.e. GSBPM) in terms of mitigating risks to quality at those phases. For each risk source the likelihood of deviations/events and their consequences on the final statistics are considered. Possible critical risks are identified and addressed in an action plan to reduce them. Such risk analyses are particularly relevant for statistics where errors can have great impact such as for example the consumer price index, statistics on foreign trade and populations statistics.

4.26. Risk management has many similarities with quality management. The approach is a bit different, but risk and quality management frameworks are complementary and should not operate independently of each other. Risk management is often promoted or even mandatory for public institutions in some countries. The implementation of risk-based thinking is one of the requirements of the ISO 9001:2015. Enterprise risk management is guided by the Committee of Sponsoring Organisations (COSO)

[30] See for example "Guidelines on Risk Management Practices in Statistical Organisations", available in English and Russian, and accompanying training materials, prepared by UNECE group and available at https://statswiki.unece.org/display/GORM.

integrated framework.[31] A coordinated approach to quality and risk management is cost effective and facilitates management involvement and support.

*****

[31] See https://www.coso.org/Pages/default.aspx.

Chapter 5. Development and implementation of a national quality assurance framework

Introduction

5.1. Chapter 5 discusses the process and provides guidance on the development of a national quality assurance framework (NQAF) and steps for its implementation at the national statistical office (NSO) and other producers of official statistics. The subsequent Chapter 6 discusses the role of national statistical system (NSS)-wide bodies for the implementation of NQAF throughout the NSS.

5.2. The emergence of an enlarged data ecosystem with increased needs for data and statistics, new statistics producers and new data sources and data providers requires that NQAF is systematically developed and implemented throughout the entire NSS. This will assure the quality of official statistics and maintain the role of official statistics as provider of trusted information. For example, the NSO and other members of the NSS may find themselves increasingly in the situation of having to use data from new data providers and having to assess statistics produced outside the traditional realm of official statistics, as illustrated by the discussion regarding the use of "big data".[32]

5.3. *How to use Chapter 5 and 6*. Chapter 5 and Chapter 6 describe different aspects of the institutional arrangements and specific actions of the different actors along that path of developing and implementing a NQAF throughout the NSS. These are summarized in Figure 5.1 which also shows the relationship between Chapter 5 and Chapter 6. Readers may find different sections of greater interest to them than other sections:

a. Section 5.A gives a basic introduction to the purpose of quality assurance and highlights core recommendations on quality assurance that newcomers to quality assurance should be aware of; for a more thorough introduction and the full list of recommendations on quality assurance readers should refer to Chapter 1 and Chapter 2.

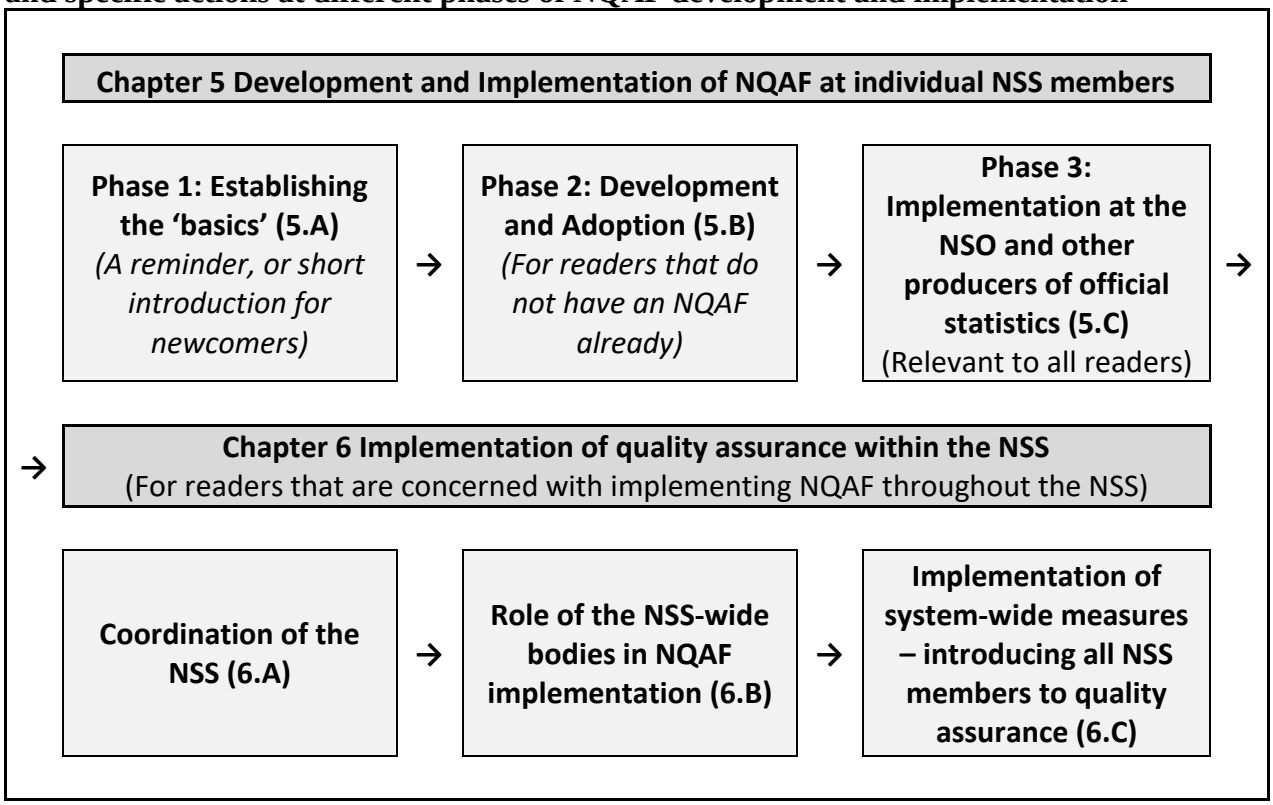
b. Section 5.B describes the institutional arrangements and process of developing NQAF and is directed at staff working at the NSO or at other members of the NSS who are tasked to develop NQAF.

c. Section 5.C describes the institutional arrangements and actions for implementing NQAF in a statistical agency. It is directed at staff at statistical agencies that are working in the quality unit or as a quality focal point or quality manager within their organization and have to implement quality assurance.

d. Staff and senior management at the NSO or at other statistical agencies tasked with supporting the implementation of NQAF throughout the NSS should refer to and review Chapter 6.

[32] See UN Global Working Group (GWG) on Big Data for official statistics: https://unstats.un.org/bigdata/.

Figure 5.1 Relationship between Chapter 5 and Chapter 6 - institutional arrangements and specific actions at different phases of NQAF development and implementation



5.4. The institutional arrangements for the development and implementation of a NQAF vary in countries, as do the overall national circumstances. NSOs and NSSs in countries (or areas) may only have a few staff or thousands of professional statisticians. However, quality assurance is part of the work of any statistician producing official statistics whether he/she has only a few, or thousands of colleagues. Chapters 5 and Chapter 6 do not mean to assume any specific national circumstances, nor prescribe any specific institutional arrangements nor any specific path for NQAF development and implementation. However, for practical reasons Chapters 5 and Chapter 6 assume a path for the development and implementation of quality assurance in the NSS that starts at the NSO and is driven by the NSO.

5.A. Phase 1: Establishing the purpose, scope and responsibility for NQAF

5.5. *The case for NQAF*. The value of official statistics lies in the trust placed by users in the information provided and its quality, which depends on its ability to meet user needs. The NQAF is an instrument to assure trust and quality and for official statistics to stay relevant. This entails not only assuring the quality of statistical outputs, but also assuring the quality of statistical processes and the management of the NSS and institutional environment, which is covered in the principles and requirements of United Nations National Quality Assurance Framework (UN NQAF) in Chapter 3 of this Manual.

5.6. *Global mandate and core recommendations.* In the context of the monitoring of the Sustainable Development Goals (SDGs), Member States stressed the need for quality, accessible, timely and reliable disaggregated data to help with the measurement of progress

(General Assembly resolution A/RES/71/313). According to the core recommendations for quality assurance in Chapter 2,

a. **it is recommended** that countries include the requirements of quality assurance in their national statistical legislation and other legislation mandating production of statistics for official use (core recommendation #2);

b. **it is recommended** that countries establish a national quality assurance framework for official statistics and that all members of the national statistical system are committed to continually assess, improve and report on the quality of official statistics, as well as on the quality of data and statistics used in the production of official statistics as required.[33] (core recommendation #3);

c. **it is recommended** that the national quality assurance framework is implemented at the national statistical office and throughout the entire national statistical system. Furthermore, **it is recommended** that the national quality assurance framework is applied to all data and statistics produced outside of the national statistical system that is disseminated with the help and support of a member of the national statistical system or that is used for government decision making, as deemed appropriate and required (core recommendation #5).

5.7. *Scope of NQAF and role of the NSO*. As indicated in the above core recommendations, the NQAF applies to all members of the NSS and all official statistics, including some producers of statistics that may be considered by countries as being outside the NSS. The NSO is normally at the center of the NSS as its coordinator and as a main statistics producer. In this dual role, it is best placed to develop the NQAF, to support its implementation throughout the NSS and its application to all official statistics and, under specific circumstances and in collaboration with other members of the NSS, to non-official statistics.

5.B. Phase 2: Process of NQAF development and adoption

5.8. *Institutional arrangements for the development and adoption of NQAF*. Subsequently, it is assumed that the NSO is leading the development of NQAF for the entire NSS although specific arrangements in countries may vary.[34] Countries may also decide to initially limit the NQAF implementation to the NSO. The establishment of the necessary institutional arrangements for the development of NQAF may encompass the following:

a. *High-level commitment*. The development and implementation of a NQAF requires the support and commitment of the leadership of the NSO and other members of the NSS that are major producers of official statistics.

b. *Establishment of a quality unit at the NSO responsible for quality assurance*. Typically, the head of the NSO would establish a dedicated quality unit to lead, coordinate and conduct the required conceptual work for the development of a NQAF. Such unit is typically placed in the division or department responsible for cross-divisional and cross-departmental statistical work, coordination and/or statistical methodology.

[33] This commitment of members of the NSS should also, as deemed appropriate and required, extend to data and statistics that is disseminated jointly with other statistics producers that are not members of the NSS.
[34] The further role of the NSO as a central coordination body and other NSS-wide bodies in the implementation of NQAF throughout the NSS is elaborated in Section 6.B.

c. *Establishment of a quality task force (or working group)*. The head of the NSO would establish a quality task force which is given the responsibility to develop a NQAF. The quality task force should be composed of a variety of subject matter experts of the NSO and as appropriate important members of the NSS to ensure coherence of efforts, broad involvement and subject matter expertise from the start. The NSO would typically chair and be the secretariat of the quality task force. Representatives of users of official statistics such as ministries, the media or research institutes may be part of the quality task force as well.

d. *Role of the NSS-wide governance body*. The NSO is normally the coordinator of the NSS but has typically no authority over other members of the NSS that include entities such as the country's central bank or government ministries that are typically above the NSO in the government hierarchy. Therefore, the development and adoption of a NQAF for the individual NSS members will benefit from an NSS-wide governance body that is able to agree on a common NQAF and implementation guidelines. Many NSSs already have such NSS-wide governance body in the form of a statistical council or board, typically consisting of the head of the NSO and representatives of other major statistical agencies. (see Chapter 6 for details).

e. *Role of an NSS-wide advisory body*: A primary task of such advisory body is to ensure that statistical outputs meet user needs, but it may also advice on all other aspects of statistics development, production and dissemination. In this function it may raise quality concerns, assess existing statistics or formulate requirements for additional statistics and analysis. It would typically be composed of government users, the business sector, researchers, non-governmental organizations, media and the general public. In some countries the advisory body may take the form of a or be called user committee, or separate user committees may exist in parallel to the advisory body.

f. *Establishment of a legal framework for quality assurance*: The requirements and process to include or reflect NQAF in the national statistical laws and regulations should be evaluated early on. Adequate steps should be taken to achieve a timely incorporation of NQAF in the national statistical legislation. This is part of the efforts to guarantee the fundamental values and principles that govern the development, production and dissemination of official statistics by legal and institutional frameworks (core recommendation #1), and to include the requirement of quality assurance in the national statistical legislation (core recommendation #2).

5.9. *Activities for the development and adoption of NQAF.* Development of NQAF may be undertaken over a period of a minimum of one year, including review, revision and approval. The process may include the following steps:

a. *Establishment of a timetable for development and implementation*. The quality unit at the NSO (see para. 5.8.b), in collaboration with the quality task force (see para. 5.8.c) should identify an initial timetable for the development and implementation of the NQAF and regularly review and update it as needed.

b. *Review and analysis of national circumstances*. The quality unit at the NSO, in collaboration with the quality task force should compile and review all relevant national documents such as statistical laws, regulations and guidelines, and

national statistical strategies and plans that may be of relevance for the development and implementation of a NQAF for official statistics. Countries should also compile and analyze information about statistical quality frameworks that are already being used within the country and existing practices of quality assurance in general.

c. *Uses and users of NQAF and NQAF implementation plan*. The uses and users of NQAF should be clearly identified. Countries may want to perform a deeper analysis of their needs, for example by conducting a SWOT analysis (Strengths, Weaknesses Opportunities, Threats) of their NSO or NSS. An initial plan for the implementation of NQAF, including the identification of resource requirements should be developed early on, as the NQAF should be developed with the view on its implementation.

d. *Compilation, review and analysis of materials available at the international level*. Countries do not need to start from scratch and can refer to extensive materials relevant for the development of NQAF. The quality unit at the NSO, in collaboration with the quality task force (which may include other members of the NSS) should compile and review the various existing global, regional and thematic quality assurance frameworks and standards (UN NQAF, European statistics CoP [35], International Monetary Fund's Data Quality Assessment Framework (DQAF) [36], Organization for Economic Co-operation and Development (OECD)'s Good Statistical Practice [37], African Charter on Statistics[38], ASEAN Community Statistical System (ASS) Code of Practice[39], Code of good practice in statistics for Latin America and the Caribbean[40]), other relevant guidelines such as the Generic Statistical Business Process Model (GSBPM), as well as practices of other countries.

e. *Decision on the reference framework for NQAF.* After the analysis of all requirements, relevant experiences and materials the quality task force and the NSS members and, if appropriate the NSS-wide governance body, will need to decide whether to adapt or adopt an existing NQAF (or Code of Practice) or whether to develop an own NQAF from a combination of existing NQAFs or by identifying specific quality principles themselves. In some regions, countries are either obliged or chose for themselves to adopt or align their NQAF with the regional quality assurance framework or Code of Practice. However, the NQAFs are not expected to be very different from each other as existing quality assurance frameworks are very similar.

f. *First draft of NQAF and its contents*. Based on the decision on the reference framework the quality task force will develop a first draft of NQAF. NQAF

[35] European Statistics Code of Practice (2005 – 2011 - 2017), https://ec.europa.eu/eurostat/web/quality/european-statistics-code-of-practice
[36] IMF Data Quality Assessment Framework (DQAF 2003 - 2006), https://www.imf.org/external/np/sta/dsbb/2003/eng/dqaf.htm
[37] OECD Good Statistical Practice (2015), http://www.oecd.org/statistics/good-practice-toolkit/ f
[38] African Charter on Statistics (2009), http://www.paris21.org/sites/default/files/AU-English_African_Charter-web.pdf
[39] ASEAN Community Statistical System (ASS) Code of Practice (2012), https://www.asean.org/storage/images/resources/Statistics/2014/Code%20of%20Practice-ADOPTED-CLEAN.pdf
[40] Code of good practice in statistics for Latin America and the Caribbean (2011), http://statinja.gov.jm/StrategicManagerial/CGP.pdf

typically consists of a description and definition of quality concepts and quality principles which may be complemented by initial implementation instructions and guidelines.

g. *Quality requirements, elements to be assured and indicators*. The draft of NQAF may include or will need to be complemented at a later stage with quality requirements, elements to be assured, in order to provide guidance on how the NQAF can be implemented and used in quality assessment and management.

h. *Consultation and review process of the draft NQAF*. The draft NQAF may undergo an internal review and approval process within the organizations participating in the quality task force before being subjected to a wider consultation with all concerned producers of official statistics and other stakeholders in order to raise awareness, create ownership and to ensure that the NQAF fits different circumstance and reflects all relevant quality aspects. The draft NQAF may even be put out for public consultation.

i. *Finalization and adoption*. The draft NQAF should be updated based on the inputs received during the consultation and may undergo a final round of consultations with all stakeholders. The updated version will then typically undergo a final review and approval at the management level of the organizations participating in the quality task force before being submitted for adoption to the NSS-wide governance body. The NQAF may be also adopted at a higher political level or reflected in the national statistical legislation.

j. *Communication and dissemination*. NQAF should be disseminated to all producers of official statistics and presented to the staff at the statistical agencies, emphasizing its benefits. The adoption of NQAF should be announced to all users of statistics.

Box 5.1: Experience of the Statistical Institute of Jamaica in establishing its NQAF

The Statistical Institute of Jamaica (STATIN) developed its quality assurance framework (SQAF) after conducting an extensive review of existing international, regional and national statistical quality assurance frameworks (UN NQAF, International Monetary Fund's Data Quality Assurance Framework (DQAF), European statistics Code of Practice (ES CoP), OECD, Code of Practice of United Nations Economic Commission for Latin America and the Caribbean (UNECLAC) and CARICOM, Statistics Canada, and Statistics South Africa) and related materials such as UN Fundamental Principles of Official Statistics and the International Statistical Institute's (ISI) Declaration on Professional Ethics. The following items relevant to quality management were reviewed: The Statistics (Amendment) Act 1984 which established STATIN as the NSO of Jamaica, STATIN's Five-year Strategic Plan 2012-2017 and STATIN's policies and strategies addressing data confidentiality, access to data, metadata, publication of data, data revision, misuse of information, the Institute's commitment to quality and other relevant items. This established the basis for the adoption and adaptation of relevant guidelines and good practices that are accepted in the global statistical community. In addition to outlining the circumstances and key issues driving the need for quality management, the benefits and challenges of implementing the framework were also taken into account. The development of the NSO's quality assurance framework was undertaken by staff in the Research, Design and Evaluation Division of the Institute.

The quality assurance framework of the Statistical Institute of Jamaica (SQAF) uses definitions articulated in the Statistical Data and Metadata eXchange (SDMX) Glossary (2016) to describe quality concepts. The outlay of the framework draws extensively on the compliance criteria in the UNECLAC's Code of Good Practice in Statistics for Latin America and the Caribbean (2011). This was considered useful for facilitating Global Assessments of the NSO's compliance with the Code of Good Practice in Statistics conducted by the regional body. Additionally, SQAF arranges guidelines for good statistical practice within the levels of the UN NQAF, namely: managing the statistical system (albeit partially), the institutional environment, statistical processes and statistical products, respectively.

The Statistical Institute of Jamaica has a process for the ratification of official documents which involves the Senior Management Committee and the Board of Directors. After review of the original draft of SQAF by the Director of the Research, Design and Evaluation Division which subsumes the Quality Management Unit, recommended amendments were actioned. The subsequent draft was submitted to the Senior Management Committee for review and commentary, and after approval from the Committee it was submitted to the Board of Directors for final approval and adoption. On January 12, 2017, the Board of Directors ratified the quality assurance framework of the NSO, which was later issued on June 12, 2017. It may be accessed by the public on the NSO's website: www.statinja.gov.jm.

5.C. Phase 3: NQAF implementation at the NSO and other producers of official statistics

5.10. *Building on existing efforts.* Countries may wish to build on already existing quality management tools and guidelines when implementing NQAF. The following paragraphs describe possible steps and elements for the implementation of a NQAF. The Figure 5.2 below provides a brief summary and a possible flow sequence of these steps and elements.

Figure 5.2 Possible steps and elements of NQAF implementation

Starting point: NQAF has been developed and adopted	
1	Establish proper institutional arrangements
2	Train staff
3	Communicate internally and externally
4	Develop an implementation strategy and identify implementation actions
5	Analyze business processes and activities (using GSBPM and GAMSO)
6	Decide on methods and tools for quality assessment that are to be used
7	Integrate the implementation steps into the National Strategy for the Development of Statistics (NSDS) and the multi-year statistics plan
8	Ensure ongoing commitment and seek actions with quick/visible pay-off

5.11. *Institutional arrangements for the implementation of NQAF*. Quality management must be institutionalized. However, the specific institutional arrangements and roles of the quality units, task forces, quality managers, quality champions and focal points, quality networks etc., that are involved in quality assurance, are expected to evolve over time. The arrangements in countries may consist of a mix of permanent and temporary structures depending on the implementation stage and the specific objectives. In general, as specific activities become more established, responsibilities may shift from more centralized structures such as quality units and task forces to more decentralized structures consisting of quality focal points and networks. The following best practices can be identified which apply to the NSO but also possibly to other major producers of official statistics:

a. *Quality unit*. The NSO is encouraged to retain a quality unit as a place for quality management or coordination of this within the NSO in order to have sufficient capacity to lead and support the implementation of quality management initiatives throughout the NSO, and to support other NSS members and producers of official statistics. Other major statistics producers within the NSS are encouraged to establish their own internal quality units to support the work on quality within their organization. The quality unit may be headed by the quality manager of the statistical agency.

b. *Internal quality task force*. The NSO is encouraged to establish an internal quality task force consisting of representatives of the quality unit and representatives from each of the other divisions of the NSO who serve as quality champions/focal points in their respective divisions; such internal task force will support NQAF implementation throughout the NSO; the internal quality task force should serve as a forum in which quality related issues in the various aspects of the NSO's operations can be addressed from both the strategic management and operational levels. The internal quality task force should also serve as a mobilization mechanism for quality management initiatives, such as documentation workshops, or specialized training workshops for improving quality, among other things. Other major producers of official statistics are encouraged to establish their own internal task forces.

c. *Quality assurance managers or focal points*. The NSO is encouraged to appoint quality assurance managers or focal points in the various statistical domains and to establish clear terms of reference for their work. In general, the quality manager or focal point will be responsible for establishing the quality assurance plan, defining all the quality activities and quality indicators that will be implemented and computed in the statistical domain under the responsibility of the quality manager. Other major producers of official statistics are encouraged to establish quality mangers or quality focal points as well.

d. *Central coordination body, NSS-wide governance body and NSS-wide advisory body.* The central coordination body of the NSS, a role which is typically assumed by the NSO, the NSS-wide governance body and the NSS-wide advisory body should guide and support the implementation of the NQAF at the NSO and throughout the NSS (see Chapter 6 for details).

5.12. *Training of staff.* Quality managers and focal points and managers of statistical products will need to gain a thorough understanding of the basic concepts, objectives and tools of quality assurance, and the country's NQAF. Chapter 1 of the Manual provides an introduction to the basic concepts of quality assurance, defining quality as

fitness for use or fitness for purpose, putting the needs of user at the center of quality assurance. Chapter 4 of this Manual introduces quality assessment tools.

5.13. *External and internal communication*. The NSO is encouraged to explicitly communicate its commitment to high quality and continuous improvement to its stakeholders in the form of a Declaration on Quality (DOQ).[41] The DOQ states the principles that guide the NSO's approach to managing quality, the standards it follows and the commitments to which the NSO can be held accountable in producing official statistics. The DOQ should be officially launched, be visible on the NSO's website and actively introduced and promoted internally and externally to all stakeholders. Promotional activities may include quality seminars, quality campaigns or an annual quality week. An important instrument of communication is external quality reporting which should address the needs of different user groups.

Box 5.2: Quality commitment at the Italian Institute of Statistics (ISTAT)

Istat quality commitment is publicly available on a dedicated web page of its institutional website (https://www.istat.it/en/organisation-and-activity/quality-commitment). The pillars of the quality strategy are described together with the organizational structure and the activities and the tools.

In order to address the needs on quality information from a variety of different users, different quality reports are disseminated through the Istat website:
- short quality reports for non-expert users, called (Quality at a glance (https://www.istat.it/en/methods-and-tools/tools-for-data-quality/quality-at-a-glance);
- ESS Standard Quality Reports required by Statistical office of the European Union (Eurostat) (http://siqual.istat.it/SIQual/docQualityReport.do?ric=0&language=UK);
- National Standard Quality Reports for users seeking more detailed information on quality (in Italian language only), (https://www.istat.it/it/metodi-e-strumenti/strumenti-per-la-qualit%C3%A0/schede-standard-di-qualit%C3%A0).

5.14. *Development of an implementation strategy and implementation actions.* The NSO and other statistical agencies producing official statistics must decide where and how to start with the implementation of NQAF. They may develop a short-term action plan for quality improvements covering the next data production cycle and prepare of a mid- and long-term strategy and action plan. Generally, quality assurance can be applied both at the institutional level and/or at the process or product level. On the process or product level there are the options (i) to apply all relevant NQAF principles to all processes or products, (ii) to apply selected principles to all processes or product (selection of principles can be based on the GSBPM), or (iii) to apply all relevant principles to selected processes or products. Self-assessments are a useful tool to identify improvement areas.

5.15. Specific actions and activities for quality assurance may entail:

a. Implementation of quality assurance in the various subject area domains by, among other things, formulating subject matter quality assurance frameworks which would include, as appropriate, any subject area specific recommendations. This would include those related to quality assurance that

[41] For example, the European statistics Code of Practice — revised edition 2017 includes a Quality Declaration of the European Statistical System (see https://ec.europa.eu/eurostat/web/products-catalogues/-/KS-02-18-142).

were issued by the respective international and regional organization responsible for international or regional data collection in this area[42]; relevant international agencies may be even invited to organize and conduct a quality assessment.

b. Review of institutional arrangements and legal arrangements, including mandates and authority for data collection, and initiate any changes as required.

c. Review the extent to which compliance with applicable legal requirements and the organization's risk management can be integrated with statistical quality management.

d. Conduct of staff training with the aim to embed quality assurance in every-day activities.

e. Conduct a producer-user dialogue to inform about quality and use its findings and conclusions alongside results from quality assessments and audits. User engagement should be part of the development and execution of the quality assurance program.

5.16. *Best practices in using GSBPM and GAMSO for quality management*. The improvement of the quality of statistics requires the improvement of statistical processes. The precondition for the management (and quality improvement) of statistical processes and activities is their clear identification. The GSBPM describes and defines the set of business processes needed to produce official statistics. The Generic Activity Model for Statistical Organizations (GAMSO) extends and complements the GSBPM by adding three additional activities needed to support statistical production: strategy and leadership, capability development and corporate support (see Chapter 4 for more information on GSBPM and GAMSO). The following best practices can be identified:

a. The NSO and major producers of official statistics are encouraged to use the GSBPM (i) to document and analyze statistical processes and associated metadata in a standard way, (ii) to identify pertinent quality characteristics, (iii) to formulate appropriate quality indicators to monitor statistical processes and (iv) to identify necessary actions to improve and assure the quality of statistical processes and outputs; the integration of different statistical processes and achieving data interoperability may be an important objective in the use of GSBPM.

b. The NSO and major producers of official statistics may use the GAMSO to facilitate the extension of quality assurance to additional activities needed to support statistical production, namely: strategy and leadership, capability management and corporate support.

c. The NSO is encouraged to pioneer the use of GSBPM and GAMSO and then to support other members in the NSS with their usage.

[42] For example, Food and Agriculture Organization (FAO) is responsible for agricultural statistic, United Nations Educational, Scientific and Cultural Organization (UNESCO) for education statistics, and United Nations Environment Programme (UNEP) for environment statistics. For the list of the specialized United Nations (UN) agencies and other international, supranational and regional organizations active in specific statistical domains see United Nations Statistics Division (UNSD) website at https://unstats.un.org/unsd/ccsa/members.cshtml.

Box 5.3: Experience of Italian Institute of Statistics (ISTAT) in implementing its NQAF

At Istat all the statistical processes are mapped to a GSBPM compliant system. For each sub-process the use of generalized software is documented, and activities carried out to prevent, monitor or assess quality are documented and standard quality indicators are computed. For example, for a given process it is documented that "run collection" is carried out by the Computer Assisted Personal Interviewing (CAPI) technique, that the interviewers have taken specific training and are monitored, that the electronic questionnaire has been implemented with the software considered standard at Istat, and response rates (and sometimes control charts for the interviewers) are computed.

At Istat, the process manager can compare the quality of the process with the quality of other similar processes or with indicators from past editions of the same process, by analyzing the quality (phase 8 of GSBPM). An extensive self-assessment and auditing program was carried out in 2010-2016. Istat produced two manuals of quality guidelines (for direct processes, for processes using administrative data). These manuals are both a guide for the statistical activity and a reference to evaluate the compliance to good practices in an auditing and self-assessment program (supported by an auditing questionnaire).

At Istat quality documentation and the standard quality indicators are highly homogeneous. The latter are analyzed yearly at the Institute level and an aggregated quality report is published internally to Istat, with the aim of identifying areas for quality improvement common to groups of statistical processes. For the statistical production, the modernization program introduced in April 2016, which resulted in the creation of a centralized data collection and a reinforcement of the methodological function, has fostered the use of standard methodologies and practices.

5.17. *Methods and tools for quality assessment, statistical and technical standards and standard procedures*. All methods and tools for quality management and assessment such as quality indicators, quality reports, quality assessments and audits etc., as specified in Chapter 4 should be considered. The methods and tools are complemented by statistical concepts, definitions and methods which are set out in manuals and guidelines for the respective subject matter domain, standard procedures for processes and technical standards for IT systems and software specifications. Quality management and assessment entails the ongoing documentation of all processes and the recording of metadata at the input, intermediary and output stages. Existing and internationally recognized data quality assessment instruments should be considered.[43]

5.18. *Overarching activities that impact quality*.

a. The development and regular update of the National Strategy for the Development of Statistics (NSDS) (and/or the multi-year statistics program) should be

[43] Examples are Statistics Canada's Data Quality Toolkit, International Household Survey Network's (IHSN) Quality Assessment Framework Checklist (especially useful for survey projects), DESAP – the European Self-Assessment Checklist for survey managers, International Monetary Fund's Data Quality Assessment Framework (DQAF) for data dissemination standards; London's Office for National Statistics' Guidelines for Measuring Statistical Quality Version 3.1 (especially useful for assessing the quality of administrative data. For further references in respect to quality assurance of data from specific data sources please see Chapter 7.

conducted as an inclusive process involving all stakeholders in order to assure that the outputs of the NSO and NSS meet user needs.

b. To the extent possible, employ legislative and institutional reform to improve the efficiency of the NSO and the NSS.

c. Participate in regional or international activities and initiatives that aim at improving the availability and quality of official statistics. For example, participate in one of the three tiers of the International Monetary Fund (IMF)'s data dissemination standards: The Enhanced General Data Dissemination System (E-GDDS), the Special Data Dissemination Standard (SDDS), or the SDDS Plus.

5.19. *The challenge of ongoing commitment and actions with quick/visible pay-off*: The major challenge for quality assurance is to maintain an ongoing commitment and investment despite the difficulty to demonstrate immediate pay-offs. Therefore, a clear mandate and legal obligation are important to assure ongoing support for quality assurance. Even more important is the understanding that quality assurance is indispensable to maintain the trust in official statistics, hereby securing its very existence. At the same time efforts should be made to demonstrate the usefulness of quality assurance to users. The following are good practices that are of immediate benefit to statistics users:

a. Establish an advance release calendar and adhere to it.

b. Establish and publish some output quality indicators (e.g. on accuracy and timeliness).

c. Provide metadata and quality reports for users in a systematic and easily accessible way.

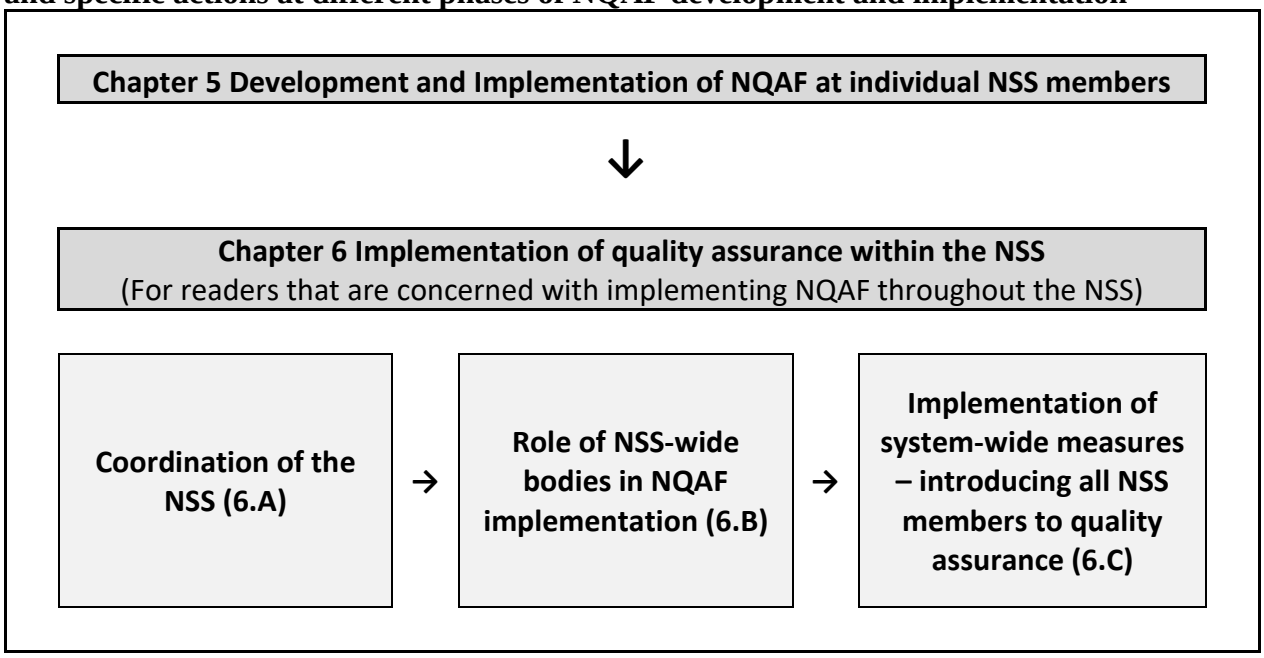
*****

Chapter 6. Implementation of quality assurance within the National Statistical System

Introduction

6.1. Chapter 5 discusses the process and hereby provides guidance on the development of a national quality assurance framework (NQAF) and steps for its implementation at the national statistical office (NSO) and other producers of official statistics. Chapter 6 discusses in Section 6.A the coordination of the national statistical system (NSS) to provide the context for the implementation of quality assurance throughout the NSS. Section 6.B describes the possible role of NSS-wide bodies for the implementation of NQAF. A final Section 6.C discusses the introduction of quality assurance to members of the NSS that have not been engaged in quality assurance before.

Figure 6.1 Relationship between Chapter 5 and Chapter 6 - institutional arrangements and specific actions at different phases of NQAF development and implementation



6.A. Organization and institutional arrangements of National Statistical Systems (NSSs)

6.2. *Need for coordination of the NSS*. The NSS is the ensemble of statistical organizations and units (statistical agencies) within a country that jointly collect, process and disseminate official statistics on behalf of national government (and other levels of government). The NSS consists of the NSO and other producers of official statistics. It is the responsibility of each country to define the scope of its NSS. It typically includes the central bank, governments ministries, government departments and agencies, regional and local governments offices represented by their statistical units. NSS may also include producers of official statistics that are not part of the government. The NSS

can be organized in different ways. However, all NSSs require coordination for the following reasons:[44]

a. Harmonization of concepts, definitions, classifications and sampling frames is necessary to ensure that the outcomes of various data collections are comparable or can at least, be meaningfully related to each other;

b. Agreements about efficient and effective data collection and proper data sharing, including the use of administrative and other data files are required to avoid duplication of efforts and undue burdening of respondents, while respecting the principle of statistical confidentiality and assuring the coverage of the information needs for the country;[45]

c. To strengthen the position of and enhance the credibility of official statistics, coordination of statistical methods and dissemination policies;

d. To represent a country internationally and to facilitate and coordinate international statistical cooperation;

e. To implement mechanisms to allow to the assessment and guarantee of the quality of statistics produced by NSS members.

6.3. *Responsibilities of the central coordination body*. In most countries there is a central coordination body which is responsible for some or all of the above coordination tasks and additional tasks such as capacity building, regulation and Sustainable Development Goal (SDG) monitoring and reporting. The concrete functions and authority of the central coordination body depends on the level of centralization or decentralization of the NSS. Normally, the NSO has a role in and often the responsibility for the coordination. But depending on the national institutional arrangements, there can be several bodies involved in the coordination of different aspects of the NSS supporting and complementing the NSO or a central coordination body such as an NSS-wide governance body and NSS-wide advisory body and/or user committee.

6.4. *Centralized and decentralized NSS*. In a highly centralized NSS, the authority over the statistical policy and the statistical work program and large parts of the statistics production would rest with one single entity, typically the NSO. In a highly decentralized statistical system, the authority on statistical matters and responsibilities for statistics production is dispersed across many government entities, including regional and local offices of government. Statistical systems exist on a continuum between both extremes.[46] Decentralized statistical systems require more coordination than centralized systems.

6.5. *The responsibility of the central coordination body and members of the NSS for quality assurance*. Based on the Fundamental Principles of Official Statistics (FPOS),

a. **it is recommended** that countries establish a national quality assurance framework for official statistics and that all members of the national statistical system are committed to continually assess, improve and report on the quality

[44] See: Handbook of Statistical Organization, Third Edition, the UN publication, Series F No. 88, 2003, paras. 17-18.

[45] In this regard, a user committee composed of users of statistics at the national level may be useful. Italy has such a committee assessing that the statistical information needs are covered in the NSS.

[46] See: Handbook of Statistical Organization, Third Edition, the UN publication, Series F No. 88, 2003, para 31.

of official statistics, as well as on the quality of data and statistics used in the production of official statistics as required.[47] (core recommendation #3);

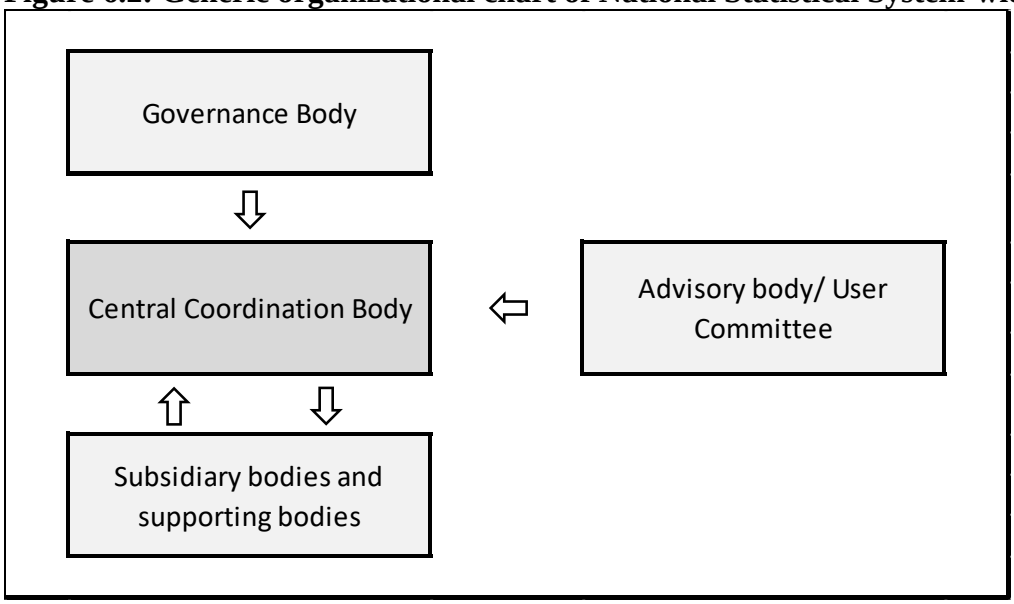
b. **it is recommended** that the national quality assurance framework is implemented at the national statistical office and throughout the entire national statistical system. Furthermore, **it is recommended** that the national quality assurance framework is applied to all data and statistics produced outside of the national statistical system that is disseminated with the help and support of a member of the national statistical system or that is used for government decision making, as deemed appropriate and required (core recommendation #5).

6.B. The role of National Statistical System-wide bodies in the implementation of NQAF

6.6. *National statistical system-wide bodies involved in quality assurance.* NSS-wide bodies involved in the implementation of NQAF may include in addition to the central coordination body an NSS-wide governance body, an NSS-wide advisory and other NSS-wide subsidiary and supporting bodies such as quality task forces (or working groups) (see Figure 6.2). NSSs have different arrangements among these bodies. In some countries, the NSO is not only the central coordination body but also the NSS-wide governance body, with the responsibility to set statistical policies and standards. In other countries there is national statistical board (see Box 6.1) or steering committee or special unit in the executive branch of the government that takes on the function of an NSS-wide governance body and is setting statistical policies and standards. Often, national statistical legislation creates an NSS-wide advisory body consisting of various stakeholders and users to assist in statistical policy making. In some countries, the NSS-wide advisory body may take the form of a or be called user committee, or a separate user committee may exist in parallel to the advisory body. Furthermore, work in specific statistical domains and on specific issues and tasks is often conducted and coordinated in working groups and task forces consisting of experts of different members of the NSS.

[47] This commitment of members of the NSS should also, as deemed appropriate and required, extend to data and statistics that is disseminated jointly with other statistics producers that are not members of the NSS.

Figure 6.2: Generic organizational chart of National Statistical System-wide bodies[48]



Box 6.1: The role of a national statistical board

In some countries the national legislation gives the authority to issue statistical policy directives to a national statistics board. Examples are the Board of the UK Statistics Authority and the Board of the Philippine Statistics Authority. Such a body typically includes the NSO, other NSS members, certain government agencies, statistical research institutions, among others. The NSO may serve as its secretariat is responsible for certain tasks and chairs some task forces or working groups. Members of the NSS will implement the statistical policies and standards in the areas of their statistical work.

In the United Kingdom, the Statistics and Registration Service Act 2007 established a statistics board - the UK Statistics Authority, an independent body at arm's length from government. It has a statutory objective of promoting and safeguarding the production and publication of official statistics that serve the public good, including the responsibility to prepare, adopt and publish a Code of Practice for Statistics. It has a regulatory arm, the Office for Statistics Regulation, and an executive office, the Office for National Statistics – the largest producer of official statistics in the UK.

The Philippine Statistical Act of 2013 established the Philippine Statistics Authority (PSA) and created the PSA Board, composed of representatives of the government, the National Statistician, representatives of the statistical community and the private sector. Section 5 of the law states that "the PSA Board shall be the highest policy-making body on statistical matters".

6.7. *Importance of appropriate national legislation*. The effectiveness of these NSS-wide bodies depends on the clarity of the national legislation or other formal provisions which need to address the following questions:

[48] This figure shows a generic organizational structure of NSS-wide bodies that can be involved in quality assurance for the purpose of illustrating important NSS-wide functions. The figure depicts a set of bodies that may exist in different forms and configurations in countries. However, the figure does not presume that such organizational structure is in place in many countries nor does it advocate that such particular structure should be in place. It only illustrates important NSS-wide functions, that may or may not be reflected in separate organization units.

a. which body has the authority to coordinate the functioning of NSS by issuing policy directives and statistical standards that are mandatory for all members of NSS,

b. the scope of activities which this authority covers,

c. the membership of the NSS and
d. the mechanisms to ensure the implementation of the statistical policy directives.

6.8. Coordination in general, including the coordination of activities concerning quality assurance, becomes difficult if clarity on some of these conditions is not sufficient. Therefore, the process of adoption and implementation of the NQAF should be preceded by a review of the adequacy of the statistical laws or legal framework and its functioning in practice. If necessary, proposals should be made to amend the statistical laws and the legal framework. The clarity of the legislation is a necessary condition but may not be sufficient as the concrete coordination arrangements also depend on a country institutional setup or other circumstances present in a country.

6.9. *Role of the central coordination body in quality assurance*. Depending on the specific national circumstances, the central coordination body would be responsible for the following activities in the implementation of NQAF:

a. Oversee the development of NQAF in consultation with all stakeholders (see Chapter 5 for details);

b. Ensure the adoption and endorsement of the NQAF and the mandate for quality assurance at the policy level by including it in respective national legislation or provisions (see Chapter 5 for details);

c. Review the core recommendations on quality assurance in official statistics contained in Chapter 2 and take the necessary steps for their implementation;

d. Promote NQAF and support its implementation by members of the NSS;

e. Align and coordinate the use of the NQAF with the use of other quality frameworks that are already applied;

f. Ensure that a template for quality reporting and assessment is being established;

g. Establish advisory and additional supporting bodies such as working groups and task forces to address specific quality issues and quality assurance in specific statistical domains;

h. Promote and support training on quality assurance;

i. Establish appropriate responsibilities and mechanisms for the quality assurance of SDG indicator data and statistics;

j. Establish appropriate responsibility and mechanisms for assuring the quality of data and statistics from other and new data sources, new data providers and new statistics producers;

k. Undertake activities and establish mechanisms to assure the quality of data and statistics produced by entities outside the NSS when they are intended for use in production of official statistics.

6.10. *Role of the NSS-wide governance body in quality assurance.* The central coordination body may be guided and supported in the NSS-wide implementation of NQAF by a NSS-wide governance body which may be composed of members of NSS, representatives of the government, the scientific community and members of the wider user community. The NSS-wide governance body will be very important in a highly decentralized NSS, when the central coordination body may not have sufficient authority or resources to carry out all work related to the development and implementation of NQAF or sufficient expertise and experience in the collection and processing of data in many domains of official statistics. The governance body will set system-wide policies, standards and guidelines for quality assurance and establish the roles and responsibilities of the members of the NSS for the implementation of NQAF. Its decisions may also lead to the mobilization of the required resources. It would also monitor implementation.

6.11. *Role of the NSS-wide advisory body in quality assurance.* The central coordination body may be assisted by an NSS-wide advisory body. It may be composed of various stakeholders and users including representatives of the government, the business sector, the scientific community, the media and the general user community. It may advise the central coordination body on its needs and concerns and on emerging issues concerning the quality of data and statistics. In some countries the advisory body may take the form of a or be called user committee, or a separate user committee may exist in parallel to the advisory body.

6.12. *Role of NSS-wide subsidiary and supporting bodies in quality assurance*. NSS-wide subsidiary supporting bodies can take the form of inter-agency committees, task forces and working groups with experts of key members of NSS focusing on specific statistical domains and/or cross-cutting statistical and quality topics, such as the use of administrative data or data from other sources. While there may be multiple task forces or working groups on quality assurance, it is a good practice to establish one NSS-wide quality task force (or working group) that provides overall support for the development and implementation of the NQAF. Typically, the quality unit within the central coordination body would provide the secretariat for the system-wide subsidiary and supporting bodies.

6.13. *Specific tasks of NSS-wide subsidiary and supporting bodies.* Subsidiary and supporting bodies like a quality task force should assist the central coordination body as delegated and required by:

a. Collecting proposals regarding content, structure and level of detail of NQAF, organizing the system-wide discussion on this matter and consolidating the proposed amendments into a draft NQAF (see Chapter 5 for details on the development of NQAF);

b. Raising awareness of the importance of NQAF for official statistics among the NSS members and users of official statistics; promoting NQAF as a common NSS instrument;

c. Conducting the consultation process on the good practices in the implementation of NQAF including: (i) how to better implement NQAF in different situations of the individual NSS members, (ii) how to implement NQAF in a phased approach;

d. Advising on the use of the quality indicators and other assessment tools reflecting the specificity of the statistical processes and outputs of particular NSS members;

e. Developing a training program and materials;

f. Setting up focus groups on several key challenges which most of the NSS members will face such as quality assurance of administrative data sources, policy regarding incorporation of new data sources and data made available by new data providers from outside the NSS, standardization of metadata etc.;

g. Guiding the NSS members on how to draft proposals for amending legal acts and administrative regulations to include quality assurance;

h. Cooperating with the task force or working group on the SDG indicators in developing an action plan on quality assurance (see Chapter 8);

i. Developing proposals for a coordinated policy on quality assurance with respect to the use of data supplied by providers;

j. Developing guidelines on the structure of the quality reports to be prepared by the NSS members and agreeing on a schedule of the quality report submission;

k. Coordinating user outreach, including user-producer dialogues (e.g., country wide events on the quality of official statistics) among others.

Box 6.2: Coordination in the Italian National Statistical System (Sistan)

The Italian National Statistical System (Sistan) was established by Italian legislative decree n. 322 in 1989 and includes the National Statistical Institute (Istat), the statistical offices of the Governmental public administrations and other public institutions, the territorial offices of the Government, Regions and autonomous provinces, of the Chambers of Commerce, Municipalities and statistical offices of other public and private institutions of public interest (more than 3400 offices). Statistics that are relevant for the country are included in the Statistical Annual Program, which is approved by decree of the Italian President.

The governance of the NSS is assigned to the «Comitato di indirizzo e coordinamento dell'informazione statistica» (Comstat), which consists of 15 members from across Sistan, coordinated by the Istat President. Comstat is in charge of the National Statistical Plan, binding directives for the statistical offices of the NSS (e.g. exchange of personal data, adoption of the Italian Statistical Code), assistance in the delivery of guidelines and establishment of task forces and working groups.

The supervision of the NSS is assigned to the «Commissione per la garanzia della qualità dell'informazione statistica» (Cogis) which is an independent body composed of 5 members proposed by the Prime Minister and elected by decree of the Italian President. They are members from academic world, outstanding personalities in the research or public administrations. Cogis is in charge of the supervision on impartiality, completeness and quality of the statistical information produced in the NSS, the compliance with the European Union (EU) and other international regulations, directives and recommendations. It also contributes to guarantee the compliance with the legislation on statistical disclosure and personal data protection. Finally, it provides an opinion on the National Statistical Program.

Istat exercises the role of coordination in planning of statistical production, execution of statistical processes, data transmission and communication, dissemination, quality reporting and quality coordination throughout a set of coordinated activities.

Quality coordination is assured by (i) Monitoring of the Italian Code, formally adopted by the Comstat (corresponding to the European statistics Code of Practice (ES CoP) but limited to Principles) by periodical surveys and extensive peer reviews (in 2010-2015), (ii) Delivery and sharing of Guidelines for the quality the statistics produced in the Sistan, (iii) Quality training and (iv) Statistical auditing of a subset of relevant European statistics. A program to foster the production of quality reporting will be launched in 2019.

6.C. Implementation of system-wide measures – introducing all NSS members to quality assurance[49]

6.14. *Different circumstances of members of the NSS*. The quality of official statistics depends on the implementation of NQAF by the individual statistical agencies of the NSS. However, for many members of the NSS the production of official statistics is not their primary purpose. For example, for government ministries the production of statistics is a by-product of and input to their policy-making task. Therefore, it has been suggested that members of the NSS that do not have much experience in quality assurance implement NQAF in phases.

6.15. *Introducing quality assurance to all members of the NSS*. Members of the NSS without much prior experience in quality assurance of statistics may be introduced to quality assurance by the NSO or other members of the NSS. This may be done as part of a general NSS-wide implementation plan, or a plan for specific subject domains such as the area of the SDG indicators. Members of the NSS may also decide on their own to implement NQAF. The following list contains elements that should be reviewed, discussed and highlighted to members of the NSS that are not familiar with quality assurance (members of the NSS that are already beyond this introductory phase should refer to Section 5.C):

a. Emphasize the obligations of all members of the NSS to assure the quality of the statistics produced by them (see core recommendations in Chapter 2).
b. Adopt the country's NQAF as the basis for quality management.
c. Identify the quality assurance focal point at the statistical agency.
d. Conduct staff training on NQAF.
e. Introduce the essential tools for quality assurance as specified in Chapter 4 (quality indicators, quality variables, quality reports and user surveys) and discuss their use.
f. Prepare a short-term plan focusing on the most urgent actions which can be implemented within the available resources and result in improvement of the quality of statistical outputs visible to the users such as the following:
    i. Establish an advance release calendar (if a system wide one does not exist).

[49] The implementation of NQAF is covered in Chapter 5.

ii. Establish and publish some output quality indicators (e.g. on accuracy and timeliness)
iii. Provide metadata and simple quality reports for users in a systematic and easily accessible way.50

g. Inform management and develop a plan for the next phase.

6.16. As described in the previous section, the NSS-wide coordination body and various subsidiary and supporting bodies are expected to provide support for the implementation of NQAF at statistical agencies.

6.17. The central coordination body may decide how to support other statistics producers that are not part of the NSS for assuring the quality of the statistics produced by them.

*****

[50] These are the same actions that have been identified in para. 5.18 to as "quick wins" for demonstrating the usefulness of quality assurance.

Chapter 7. Quality assurance for statistics compiled from different data sources

Introduction

7.1. Chapter 7 addresses quality assurance when different data sources are used for the production of statistics. It distinguishes between statistical data sources, administrative data sources and other data sources. United Nations National Quality Assurance Framework (UN NQAF) in Chapter 3 applies to all data and statistics regardless of the source but the challenges to obtain compliance can be different depending on the data source. This chapter aims to highlight certain aspects of quality assurance that are specific, or are of special importance, to statistics that are produced (completely or partially) using specific data sources.

7.2. Section 7.A provides definitions of the different data sources and highlights the role of the Generic Statistical Business Process Model (GSBPM) for quality assurance. Sections 7.B – 7.E discuss the potential benefits and challenges when using statistical, administrative, other or multiple data sources. Table 7.1 in Section 7.F gives examples of specific elements to be assured when different data sources are being used in order to mitigate the challenges that have been identified. Section 7.G provides selected references regarding the use of different data sources.

7.A. Use of different data sources

7.3. *Statistics producers, data providers and use of different data sources in the production of statistics*. Three types of statistics producers at the national level can be distinguished: the national statistical office (NSO), other producers of official statistics and other statistics producers outside of the national statistical system. Data providers are entities that own or hold the data used in the production of statistics (source data). All types of statistics producers can use any type or combination of data sources, be it statistical, administrative, or other data sources.

7.4. *Definition of different data sources for the production of statistics*.[51] For the purposes of this Manual it is suggested to distinguish data sources by their purpose and by the entity responsible for data compilation. The following definition and classification of data sources is proposed for the purposes of this Manual while it is acknowledged that

[51] The Organisation for Economic Co-operation and Development (OECD) Glossary defines data source as "a specific data set, metadata set, database, or metadata repository from where data or metadata are available." The term "data source" is currently not defined in the NQAF Glossary (available at https://unstats.un.org/unsd/dnss/docs-nqaf/NQAF%20GLOSSARY.pdf). The Statistical Data and Metadata eXchange (SDMX) Glossary (available at: https://sdmx.org/?sdmx_news=new-sdmx-glossary-available) defines the term "data source" within its context as "Location or service from where data or metadata can be obtained" with "location" being understood as "a resolvable URL". It groups data sources in three categories depending on the kind of access to data.

others may want to define and distinguish data sources differently according to their respective needs.[52,53]

a. Statistical data sources are data collections created primarily for official statistical purposes by government agencies or other entities working on behalf of government. Statistical data sources include statistical sample surveys, censuses and statistical registers. There are different types of censuses such as population and housing censuses, business censuses, agriculture censuses etc. Sample surveys and statistical registers can cover different units, for example individuals, households and businesses. Statistical registers can themselves be derived from different sources. For example, statistical business registers are often based on administrative data sources.

b. Administrative data sources are datasets created primarily for administrative purposes by government agencies or other entities working on the behalf of the government. Administrative data sources include administrative registers of persons and legal entities and records of ministries, departments and specialized agencies such as tax returns, social services records, customs data etc. or data of regional or local administrations. In contrast to statistical data sources, administrative data sources are not created as response to the need for statistical data but as a part of government functions such as the provision of services and taxation. In some cases, statistical agencies participate in the design and/or collection of administrative data. In addition, statistical agencies may be involved at different stages of the production process of administrative data with the aim to ensure that the data will be useable for statistical purposes.

c. Other data sources are all datasets that are not created primarily for official statistical or administrative purposes but rather for commercial or other private purposes. Other sources include datasets by providers of communication, media and e-commerce services, providers of services based on earth observation and remote sensing and private insurance companies, but also traditional sample surveys conducted by companies for their own purposes such as market research. In general, other data sources include data sources associated with the term "big data" unless already included, in some instances, in statistical or administrative data sources.[54]

[52] For example, administrative data sources may be referred to as secondary data sources, as opposed to statistical data sources which are considered primary data sources (data collected for statistical purposes). See, UNECE, Using Administrative and Secondary Sources for Official Statistics - A Handbook of Principles and Practices, New York and Geneva, 2011, pp. 1-2.

[53] The term "data source" means different things for the producers of statistics and for the users of statistics. For statistics producers it is the source of the data used for the production of statistics. For statistics users it may refer to the place where they obtain their statistics or data. From such user perspective a primary data source is the entity that produces the statistics while a secondary data source is the entity that re-disseminates statistics that are produced by someone else.

[54]The Global Working Group (GWG) on Big Data appears to distinguish between Big Data, administrative data and traditional statistical data sources (see https://unstats.un.org/bigdata/). In the terms of reference of the GWG on Big Data (E/CN.3/2015/4), it is explained that the group should address the use of "new sources" especially as to overcome the lack of timeliness (and availability) of data for the monitoring of the Millennium Development Goals.

7.5. *Other data sources and new data sources*. Often the term "new data sources" is used when referring to other data sources, and both terms may be perceived as largely synonymous at the time of the drafting of this Manual. However, this use of the term "new data sources" is misleading in multiple ways. New data sources can emerge from all three categories of data sources, be it statistical, administrative or other data sources. Furthermore, some of these data sources have been used in some countries since many years already; also, the notion of what is considered as new changes over time.

7.6. *List of other data sources.* The following list of other data sources is only provided for illustrative purposes and attempts to reflect major other data sources. It does not aim to provide an exhaustive list nor a classification of such sources.[55]

a. Cross-country sample surveys by supra-national organizations or international enterprises;

b. Data compiled and maintained by private professional organizations or business associations or non-profit institutions in general;

c. Data and records compiled and maintained and/or owned by enterprises that cover large parts of the population of statistical units, in particular e-commerce. media and telecommunication providers but also other enterprises that provide services directly to individuals or businesses such as insurance companies, banks, airlines etc.;

d. Earth observation and remote sensing;

e. Thematic mapping and monitoring systems (e.g., field-monitoring stations for water quality, air pollution etc.);

f. Research/scientific and pilot studies;

g. Citizen generated data.

7.7. *Data sources, the statistical production process and quality assurance*. The statistical production process consists of several phases. The GSBPM distinguishes between the following phases: specify needs, design, build, collect, process, analyze, disseminate and evaluate.[56] The GSBPM provides a universal basis for the identification of pertinent quality characteristics and the formulation of quality indicators by analyzing the statistical production process. Hereby, the use of the GSBPM, if properly applied and interpreted can pinpoint quality issues in the use of specific data sources.[57] In addition, the selection of the appropriate data source itself is part of the statistical production process. However, overarching processes such as statistical infrastructure and management and support functions also need to be considered when identifying the quality principles and indicators that are most relevant for statistics compiled from a particular data source, or when selecting the data source.

[55] For a list of data sources see for example UNECE, Using Administrative and Secondary Sources for Official Statistics - A Handbook of Principles and Practices, New York and Geneva, 2011, pp. 3-4.

[56] Generic Statistical Business Process Model GSBPM (Version 5.0, December 2013), available at: https://statswiki.unece.org/display/GSBPM/GSBPM+v5.0.

[57] It must be noted that for some sources such as "big data" the statistical paradigm is different. The design phase of GSBPM, especially design collection and design frame and sample, is being substituted by the study on how to extract, interpret, transform and store the data as to make them manageable and structured according to the statistical needs into units and variables.

7.8. As also indicated in Chapter 4, the GSBPM can help countries to understand where to start and how to implement the national quality assurance framework (NQAF) by analyzing the existing statistical production processes. Box 7.1 is based on the work at the United Nations Economic Commission for Europe (UNECE) on quality indicators for the GSBPM and shows elements to be assured (indicators) related to the selection of the data source during the specify needs phase, the first phase of the statistical production process.[58] Box 7.1 also shows the link of the indicator to the UN NQAF principle that is being addressed.

Box 7.1: Elements to be assured related to the selection of the data source during the specify needs phase

Sub-processes 1.1 Identify needs, 1.2 Consult and confirm needs and 1.3 – Establish output objectives:
- To what extent does the data source satisfy information demand? (Principle 14 – Relevance)
Sub-process 1.4 Identify concepts:
- Metadata for administrative and other sources to determine if relevant variables are available? (Principle 14 – Relevance and Principle 18 – Coherence and comparability)
Sub-process 1.5 Check data availability:
- To what extent have legal constraints regarding data collection, acquisition and use been assessed and any necessary changes been proposed? (Principle 7 – Statistical confidentiality and data security)
- To what extent do current data sources meet user requirements, taking into consideration the conditions under which they would be available and any restrictions on their use? - (Principle 14 – Relevance)
- If current data sources do not fully meet user requirements, to what extent has a strategy been proposed to fully meet user requirements? (Principle 14 – Relevance)
- Existence of an advance notification plan about the forthcoming changes to the data source. Is a contingency plan for changes to the data or data source in place? (Principle 14 – Relevance)
- Completeness of data source(s), such as: Percentage of units not belonging to the target population; Percentage of units missing from the target population; Coverage of the data; Absence of values for key variables; Missing values in the source; Total percentage of empty cells (Principle 15 – Accuracy and Reliability)
Sub-process 1.6 Prepare business case
- Has the data source been evaluated in terms of its cost effectiveness? (Principle 11- Cost-effectiveness)

7.B. Potential benefits and challenges in the use of statistical data sources

7.9. *Potential benefit pertaining to statistical products compiled from statistical data sources*. The main advantage of statistical data sources is that they allow data to be obtained according to the specified needs and pre-defined statistical concepts.

7.10. *Challenges in the use of statistical data sources*. Statistical data sources impose challenges that directly affect the quality of the statistics produced from such sources. The major quality considerations that concern statistics produced from statistical sources are:

[58] See United Nations Economic Commission for Europe (UNECE), Quality Indicators for the Generic Statistical Business Process Model (GSBPM) - For Statistics derived from Surveys and Administrative Data Sources, Version 2.0, October 2017. See https://statswiki.unece.org/display/GSBPM/Quality+Indicators

a. High cost of production (Principle 11 - Cost-effectiveness);

b. Availability of resources (Principle 9 - Adequacy of resources);

c. Low frequency of conducting sample surveys and censuses (Principle 14 - Relevance);[59]

d. Respondent burden and willingness of respondents to provide information (Principle 13 – Respondent burden);

e. Sampling and non-sampling errors (Principle 15 - Accuracy and reliability);

f. Need for complex sampling designs (Principle 10 - Methodological soundness);

g. The need for careful planning, implementation of instruments, training and supervision of staff and rigorous evaluation (Principal 12 – Appropriate statistical procedures).

7.11. Since each of the quality issues may arise at different phases of the production process, the use of the GSBPM for understanding the processes.

7.C. Potential benefits and challenges in the use of administrative data sources

7.12. *Potential benefits pertaining to statistical products compiled from administrative data sources*. The use of administrative data offers many potential advantages such as cost-effectiveness, reduction of respondent-burden, improved timeliness, and improved relevance, accuracy and reliability due to its ability to obtain highly disaggregated data. In many statistical domains administrative data are indispensable for the production of statistics.

7.13. *Challenges in the use of administrative data sources*. There are multiple concerns and limitation in the use of administrative data sources, which should be addressed to better realize the potential benefits. The main concerns and limitations of administrative data sources in the context of quality assurance (quality threats) include:

a. Insufficient cooperation among the providers/holders of data, frequent lack of clarity on the roles and responsibilities of different stakeholders, and legal challenges to obtain access (Principle 1 – Coordinating the national statistical system, and Principle 2 - Managing relationships with data users, data providers and other stakeholders);

b. Incoherent use or lack of use of statistical standard concepts, definitions and classifications (Principal 3 – Managing statistical standards);

c. Lack of explicit quality commitment of holders (producers) of administrative data (Principle 8 – Quality commitment);

d. The concepts that are underlying administrative data sources are not reflecting the statistical concepts that are used to measure the phenomena (Principle 14 – Assuring relevance);

[59] This will not apply to population censuses based on information from civil registers as already performed in some countries and planned in the European Union. However, it requires a fully functioning and complete civil registration system which most developing countries do not have.

e. Methodological and technical difficulties in managing access to administrative data sources, performing record linkage and integrating data across multiple administrative data sources, transmitting the data and integrating them with data from statistical sources (Principle 12 – Appropriate statistical procedures);

f. Preserving security and preserving confidentiality of individual data when disseminating detailed statistics may be a challenging task (Principle 7 – Statistical confidentiality and data security);

g. Interference and bias in the statistical production process and lack of information about how the data has been produced (Principle 4 – Professional independence, Principal 5 – Impartiality and objectivity and Principle 6 - Transparency);

h. Under or over-coverage of the target population; mis-alignment with the statistical reference period; inherent and unquantified bias as a result of the original purpose of the administrative dataset (Principle 15 – Assuring accuracy and reliability);

i. Inability to quantify uncertainty when there are only non-sampling errors (Principle 15 – assuring accuracy and reliability).

7.D. Potential benefits and challenges in the use of other data sources

7.14. *Potential benefit pertaining to statistical products compiled from other data sources.* The use of other data sources is an opportunity to rethink the elements that constitute the institutional environment and statistical processes and outputs. For example, the use of other data sources can offer the opportunity to overcome resource limitations, to allow much more frequent and timely reporting, provide more objective information and, most importantly, to be able to generate data on phenomena and its aspects (dis-aggregations) that are difficult or impossible to capture with traditional statistical and administrative data sources. This leads to improved relevance.

7.15. *Challenges in the use of other data sources*. The full realization of the potential benefits of other sources is only possible if the identified concerns and quality limitations (quality threats) are being addressed. Many of these concerns and limitations relate to the fact that entities outside the national statistical system (NSS) own, hold or have the responsibility for the other data sources. The major quality issues associated with the statistics compiled from other sources of data include:

a. The limited access to other data sources and legal challenges regarding its access (as it can also be the case for administrative sources) requires arrangements with the data providers (e.g. government agencies, private sector and research institutions); lack of knowledge about the existence of such data; and sustainability of the source over time (Principle 2 - Managing relationships with data users, data providers and other stakeholders);

b. Incoherent use or lack of use of statistical standard concepts, definitions and classifications (Principal 3 – Managing statistical standards) that put the accuracy, reliability, coherence and comparability of the resulting statistics in question;

c. Providers of data (which may be the owner or holder of the data) are not subject to and do not adhere to the Fundamental Principles of Official Statistics (FPOS) and associated statistical quality principles such as professional independence (Principal 4) and quality commitment (Principle 8);

d. Utilizing data for statistical purpose may potentially put the confidentiality and privacy of data providers at risk depending how detailed data is being published (Principle 7 – Statistical confidentiality and data security);

e. Data of sources such as those from mobile phones or Twitter feeds are not representative of the entire population and may cause serious selection bias when used for statistical purposes (Principle 10 – Methodological soundness; Principle 12 – Appropriate statistical procedures and Principle 15 - Accuracy and reliability);

f. Interference and bias in the statistical production process and a lack of information about how the data are being produced (Principle 4 – Professional independence, Principal 5 – Impartiality and objectivity and Principle 6 - Transparency);

g. The data collection is not designed for statistical purposes and may not provide the information required by users (Principle 14 Relevance) or may not correctly describe the phenomena that are to be measured (Principle 15 – Accuracy and reliability);

h. The technical access and use of the data, in particular large amounts of data can be very challenging and requires significant IT resources and expertise (Principle 12 – Appropriate statistical procedures);

i. Under- or over-coverage of the target population, population changes over time; mis-alignment of the reference period compared to what is desired; inherent bias as a result of the original purpose of the dataset (Principle 15 – Assuring accuracy and reliability and Principle 18 – Coherence and comparability);

j. Inability to quantify uncertainty when there is only non-sampling error (Principle 15 – assuring accuracy and reliability).

7.16. *Conclusions of the UN Statistical Commission on the use of new data sources*. The interest in the use of other data sources (including the data sources covered by the term "big data") for the compilation of official statistics has been growing over the years. With the adoption of the Sustainable Development Agenda 2030 and in view of the global and national data requirement to measure progress towards Sustainable Development Goals (SDGs), the use of other "new" data sources was identified as one of the top priorities for national statistical systems. Considering both the benefits and concerns/limitations of the use of the new data sources in official statistics the Commission promotes their use and, at the same time, emphasizes "the importance of ensuring the quality of data derived from new sources and new data providers, including those outside the official statistical system". Specifically, the Commission:

a. Confirmed "that the use of big data and other new data sources is essential for the modernization of national statistical institutions, so that they remain relevant in a fast-moving data landscape",

b. Supported the collaboration between the NSS members and providers of the new data sources "including work to formulate standards and guidelines for data governance and information management", and

c. "Emphasized the need to carefully address societal challenges of trust, ethics, privacy, confidentiality and security of data".[60]

7.17. Other data sources should be used for the purposes of compiling official statistics if the quality of the statistical process and outputs are sufficiently assured. Quality assurance activities may be undertaken by the NSO (and other NSS members) on their own and/or as part of the partnership agreements with data providers.

7.E. Potential benefits and challenges in the use of multiple data sources

7.18. *Use of multiple data sources.* The use of multiple data sources is increasingly common in the compilation of official statistics, especially for the monitoring of the SDGs. The use of one single source may not allow to achieve the required dis-aggregation of data. However, disaggregated data may be obtained through the integration with data from a different source. [61] For example, combining data sources may provide a higher coverage of the target population and consequently the compilation of statistics with the required disaggregation level. Moreover, the integration of data sources can provide a better understanding of investigated phenomena due to the availability of more information. Data integration can include:

a. Combining data from multiple sources as part of the creation of integrated statistics such as national accounts for which the quality depends on the quality of the basic statistics that are being used for its compilation and the quality of the integration and estimation processes;[62]

b. Data pooling, for example, by merging sample survey data from different collection cycles in one data set (pool of data) with the aim of increasing the effective number of observations of a phenomenon; this allows to obtain more accurate estimates of the target population and, potentially, of the estimates pertaining to small domains;[63]

c. Statistical matching (data fusion) and record linkage routines link micro data from different sources;[64]

---

[60] See E/2018/24, decision 49/107.

[61] Please see in particular ESSnet on quality of multisource statistics – KOMUSO, available at: https://ec.europa.eu/eurostat/cros/content/essnet-quality-multisource-statistics-komuso_en

[62] There are extensive methodologies for the quality assurance and verification of the headline figures of national accounts such as Gross Domestic Product (GDP) and Gross National Income (GNI) due to their widespread use for policy making and administrative purposes such as the determination of countries' financial contributions to regional and international organizations. Please see "Monitoring GNI for own resource purposes", available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Monitoring_GNI_for_own_resource_purposes.

[63] See, for example, Considerations before Pooling Data from Two Different Cycles of the General Social Survey; available at: http://www23.statcan.gc.ca/imdb-bmdi/document/8011_D1_T9_V1-eng.pdf

[64] (i) If the units of observation in the survey samples are exactly matched using units' identifiers such as social security numbers or name and address that are error free it is called "merging" or "exact matching". (ii) Record linkage refers to integration procedures where units' identifiers are not error free, or, in absence of identifiers, key variables (name surname, birthday, gender, etc.) are used to link units. (iii) Statistical matching (also called data

d. Prioritizing, when two or more sources contain data for the same variable, with potentially different values.

7.19. Major challenges for the integration of data from multiple sources are:

a. Assuring methodological soundness (Principle 10) as related to different coverage and the use of different concepts and definitions etc.;

b. Assuring appropriate statistical procedures (Principle 12) as related to having appropriate procedures, skills and knowledge to be able to link and integrate data;

c. Assuring confidentiality and data security (Principle 7);

d. Assuring coherence and comparability over time (Principle 18); the quality of the entire integration process should be assessed by calculating proper indicators.[65]

7.F. Examples of elements to be assured for different types of data sources

7.20. The table below lists examples of specific elements to be assured when statistical, administrative, other or multiple data sources are being used. These elements can help mitigate the challenges that have been identified for each of the data sources.

Table 7.1 Examples of some specific elements to be assured when different data sources are being used.

UN NQAF Principle	Data Source	Requirements / Elements to be assured*	Explanation
Managing the statistical system			
Principle 1: Coordinating the national statistical system	Statistical	There is a body that ensures coordination of sample surveys and their methodological soundness throughout the NSS (1.2)	Sample surveys should be coordinated and integrated for cost-effectiveness and methodological soundness
	Administrative	Administrative records are systematically linked with records from other relevant administrative data systems, as permitted by applicable laws (1.2)	The linking of administrative data will allow the best possible use of the already available information

fusion) typically aims to achieve a complete data file using data from different sources that contain the same units of observation but with different identifiers or do not contain the same units at all. Statistical matching or data fusion want to investigate relationship between variables that are not jointly observed. This can be done by creating synthetic records (statistical matching or data fusion at micro level) or by estimating parameter of a model such as a regression (statistical matching or data fusion at macro level). Traditionally, statistical matching is done with respect to the variables common to all data files used in the production of a particular statistical output.

[65] Please see example of the Record Linkage Project Process Model, Statistics Canada, 2017; available at:http://www.statcan.gc.ca/pub/12-605-x/12-605-x2017001-eng.htm.

UN NQAF Principle	Data Source	Requirements / Elements to be assured*	Explanation
	Administrative Other	There is a unit that discusses and provides support for the use of administrative data sources and other data sources within the NSS (1.2)	The use of administrative and other data sources poses unique challenges that should be addressed by sharing experiences and best practices
Principle 2: Managing relationships with data users, data providers and other stakeholders	Administrative Other	Laws and regulations are in place to allow the required access to administrative and other data sources (2.5 and 2.6)	Limited access is a frequent obstacle for the use of administrative data sources and other data sources
	Other	Partnership agreements with data providers are in place (2.6)	The use of other data sources benefits from a partnership with the data provider.
Principle 3: Managing statistical standards	Statistical Administrative Other Multiple	The national statistical agency monitors the use of statistical standards (3.2)	The use of standard concepts, definitions and classifications facilitates the use and integration of data
Managing the institutional environment			
Principle 5: Assuring impartiality and objectivity	Other	Data sources and methodologies are chosen on an objective basis (5.3)	Data from other sources should only be used if they are selected and compiled according to professional standards
Principle 6: Assuring transparency	Other	The terms and conditions under which other data sources are being used are made public (6.1)	Users must have the possibility to understand what other data sources are being used and how they are being used
Principle 7: Assuring statistical confidentiality and data security	Other Multiple	Special procedures exist for keeping linked data secure (7.2, 7.3 and 7.5)	The use of data from multiple sources frequently requires establishing record-linkage

UN NQAF Principle	Data Source	Requirements / Elements to be assured*	Explanation
Managing statistical processes			
Principle 10: Assuring methodological soundness	Statistical	The sample survey designs are evaluated according to all relevant methodological considerations, e.g. to what extent the sample survey frame matches the target population, sampling error etc., and tested (10.1 and 10.4)	Sample survey designs must follow proper methodology to ensure output quality and cost-effectiveness
	Administrative Other	A methodology for the use of administrative data and data of other sources is established (10.1 and 10.3)	The use of date from administrative and other data sources should follow an established methodology
	Multiple	A methodology for linking data of other sources is established (10.1 and 10.3)	The linking of data from multiple sources should follow an established methodology
Principle 11: Assuring cost-effectiveness	Statistical	Different data sources are evaluated in terms of cost effectiveness (11.2 and 11.5)	Censuses and sample surveys are very expensive (therefore, some countries are moving to register-based censuses if they have a civil register)
	Multiple	A data integration unit integrates data centrally (11.6)	Data integration should be done only by experienced and competent staff.
Principle 12: Assuring appropriate statistical procedures	Statistical	Censuses and sample survey data are geocoded (12.2)	Geocoding of censuses and sample survey data facilitates data integration and allows disaggregation by location
	Administrative Other	Procedures for coding, editing, imputing, etc. are documented (12.2)	The steps needed to use administrative data and other data sources for statistical purposes need to be documented
	Multiple	Procedures for linking data from different sources are established and are documented and available (12.2)	Changes in the procedures of linking data from multiple sources may threaten consistency of results over time
Principle 13: Managing the respondent burden	Statistical	There is a communication plan to explain the purpose of the sample survey and census (13.2)	The quality of the sample survey and census results depends on the willingness of the respondents to accurately reply to the questions

UN NQAF Principle	Data Source	Requirements / Elements to be assured*	Explanation
Managing statistical outputs			
Principle 14: Assuring relevance	Statistical Administrative Other Multiple	Statistics based on new data sources are being developed in response to society's emerging information needs (14.3)	Taking new user needs into account is crucial for the use of all data sources
Principle 15: Assuring accuracy and reliability	Statistical	Sampling errors are measured, evaluated and systematically documented (15.1 and 15.2)	Accuracy and reliability of sample survey results rely on the appropriate sample survey design
	Administrative Other Multiple	Non-sampling errors are described and estimated when possible (15.1 and 15.2)	Non-sampling errors could contribute significantly to uncertainty in statistical products, and are difficult to quantify
Principle 18: Assuring coherence and comparability	Administrative Other	Results are compared with other available information and over time (18.2)	The use of administrative data and other data sources requires additional attention to assess coherence and comparability as they are not compiled primarily for statistical purposes
Principle 19: Managing metadata	Statistical Administrative Other Multiple	Metadata are provided and cover all relevant aspects of the use of different data sources (19.2)	Statistics must always be accompanied by metadata to allow the user to evaluate the statistics that are being provided

* A reference to the concerned UN NQAF requirements (or elements to be assured under UN NQAF requirements) is indicated in brackets (see Chapter 3 and Annex for details).

7.G. Selected references

7.21. This section provides selected references to quality assurance when specific data sources are being used.

7.22. *Selected references on quality assurance for statistics obtained from statistical sources*:

a. Principles and Recommendations for Population and Housing Censuses, Rev.3, pp. 66-77, available at: https://unstats.un.org/unsd/demographic-social/Standards-and-Methods/files/Principles_and_Recommendations/Population-and-Housing-Censuses/Series_M67rev3-E.pdf.

b. EU legislation on the 2011 Population and Housing Censuses - Explanatory Notes, pp. 21-37, available at: http://ec.europa.eu/eurostat/en/web/products-manuals-and-guidelines/-/KS-RA-11-006.

c. Statistics Canada: Survey Methods and Practices (12-587-X), Appendix B - Quality Control and Quality Assurance, pp. 309-319, available at: http://www5.statcan.gc.ca/olc-cel/olc.action?ObjId=12-587-X&ObjType=2&lang=en&limit=0

7.23. *Selected references on quality assurance for statistics produced using administrative data sources*:

a. Using Administrative and Secondary Sources for Official Statistics - A Handbook of Principles and Practices (2011), pp. 37-42; https://statswiki.unece.org/display/adso/Publications+on+administrative+and+secondary+sources

b. *Quality Assessment of Imputations in Administrative Data (2015), available at:* https://www.degruyter.com/downloadpdf/j/jos.2015.31.issue-2/jos-2015-0015/jos-2015-0015.pdf and https://ec.europa.eu/eurostat/cros/content/lr23-quality-assessment-imputations-administrative-data_en

c. Data Quality Statement Questions General Purpose: Administrative Data, Australian Bureau of Statistics

d. Use of administrative data in Canada (Statistics Canada), available at: https://www.statcan.gc.ca/pub/12-539-x/2009001/administrative-administratives-eng.htm

e. USA: Data Quality Assessment Tool for Administrative Data (USA), https://www.bls.gov/osmr/datatool.pdf

f. Checklist for the Quality Evaluation of Administrative Data Sources (Netherlands), available at: http://ec.europa.eu/eurostat/documents/64157/4374310/45-Checklist-quality-evaluation-administrative-data-sources-2009.pdf/24ffb3dd-5509-4f7e-9683-4477be82ee60

g. Register-Based Statistics in the Nordic Countries: Review of Best Practices with Focus on Population and social Statistics. United Nations Economic Commission for Europe (2007)

h. Guidelines on Statistical Business Registers. United nations Economic Commission for Europe (2015)

i. Quality Assessment for Register-based Statistics - Results for the Austrian Census 2011: https://ec.europa.eu/eurostat/cros/content/lr22-quality-assessment-register-based-statistics-results-austrian-census-2011_en

j. UK Statistics Authority: Quality Assurance of Administrative Data, available at: https://www.statisticsauthority.gov.uk/osr/monitoring/administrative-data-and-official-statistics/

k. UK Statistics Authority: Administrative Data Quality Assurance Toolkit, available at: https://www.statisticsauthority.gov.uk/wp-content/uploads/2015/12/images-qualityassurancetoolki_tcm97-44368.pdf

l. Guidelines for the quality of statistical processes that use administrative data Version 1.1 August 2016, Istat, https://www.istat.it/en/files/2013/04/Linee-Guida-v1.1-Versione-inglese.pdf

m. Statistical challenges of administrative and transaction data, David J. Hand, available at: https://rss.onlinelibrary.wiley.com/doi/epdf/10.1111/rssa.12315

7.24. *Selected references on the use of new data sources*. There are, at this time no specific references on quality assurance for the use of new data sources. Enclosed are some references regarding the use of new data in general:

a. United Nations Global Working Group on Big Data portal: https://unstats.un.org/bigdata/

b. Uses of Big Data for Official Statistics: Privacy, Incentives, Statistical Challenges, and Other Issues, https://unstats.un.org/unsd/trade/events/2014/beijing/Steve%20Landefeld%20-%20Uses%20of%20Big%20Data%20for%20official%20statistics.pdf

c. Access to new data sources for statistics (OECD), https://www.oecd-ilibrary.org/docserver/9a1fa77f-en.pdf?expires=1523719206&id=id&accname=guest&checksum=630A5227A37379F916A6C11B8465BCDC

d. The European Statistical System (ESS) Vision 2020, https://circabc.europa.eu/sd/a/5d9b6106-ca64-4802-9dcf-c9a0f43b477f/ESS_Vision_2020_ESSC_May2014.pdf

e. New data sources for statistics: experiences at Statistics Netherlands, https://www.cbs.nl/-/media/imported/documents/2011/09/2011-x10-09.pdf

f. An assessment of big data for official statistics in the Caribbean: Challenges and opportunities, https://repositorio.cepal.org/bitstream/handle/11362/39853/1/S1501378_en.pdf

7.25. *Selected references on data integration*: Good practices in assuring quality of data obtained by the integration process from different sources are described in several documents:

a. ESSnet on quality of multisource statistics – KOMUSO, available at: https://ec.europa.eu/eurostat/cros/content/essnet-quality-multisource-statistics-komuso_en

b. Report on WP1 State of the art on statistical methodologies for data integration; available at: https://www.istat.it/en/files/2013/12/FinalReport_WP1.pdf and Measuring the quality of multisource statistics, available at: https://ec.europa.eu/eurostat/cros/system/files/Vaju-etal%20Measuring%20quality%20multisource_abstract_unblinded.pdf

c. Record Linkage Project Process Model, Statistics Canada, 2017; available at: http://www.statcan.gc.ca/pub/12-605-x/12-605-x2017001-eng.htm

d. Insights on Data Integration Methodologies (Eurostat, 2009) http://ec.europa.eu/eurostat/documents/3888793/5845197/KS-RA-09-005-EN.PDF/4cef0f2d-45a0-46b7-bfd6-196a55fca801?version=1.0and https://ec.europa.eu/eurostat/cros/content/wp3-framework-quality-evaluation-statistical-output-based-multiple-sources_en

e. USA: Innovations in Federal Statistics: Combining Data Sources While Protecting Privacy (2017), https://www.nap.edu/read/24652/chapter/1

f. USA: Improving Federal Statistics for Policy and Social Science Research Using Multiple Data Sources and State-of-the-Art Estimation Methods, http://sites.nationalacademies.org/dbasse/cnstat/dbasse_170268.

*****

Chapter 8. Quality assurance of SDG indicator data and statistics

Introduction

8.1. Chapter 8 provides information and guidance on assuring the quality of the Sustainable Development Goal indicator data and statistics (SDG indicators).[66] Section 8.A discusses the challenge of assuring quality of data and statistics for the SDG indicators. Section 8.B provides an overview of the roles of the different entities participating in this task. Sections 8.C to 8.F introduce the requirements and elements to be assured that are of special importance to the quality assurance of SDG indicators. [67] These requirements and elements are presented as action items and according to the four levels of the UN National Quality Assurance Framework (UN NQAF). A rationale for their importance is provided and the responsible entities are being identified. Many suggested activities for assuring the quality of the SDG indicators would need to be taken on by a central coordination body such as the national statistical office (NSO) in cooperation with additional supporting bodies such as an SDG indicator working group (SDG-WG). Other activities apply to the individual members of the national statistical system (NSS), but under certain circumstances may also apply to other statistics producers outside the NSS.

8.A. The challenge of assuring quality of data and statistics for the SDG indicators

8.2. *The global indicator framework*. In September 2015, the United Nations General Assembly adopted the 2030 Agenda for Sustainable Development. Its 17 sustainable development goals (SDGs) and 169 targets are expected to guide the actions of the international community up to 2030. The Member States stated that "Quality, accessible, timely and reliable disaggregated data will be needed to help with the measurement of progress and to ensure that no one is left behind."[68] Subsequently, in July 2017, the General Assembly adopted resolution 71/313 containing in its Annex the list of 232 global indicators, which were identified by the Inter-agency and Expert Group on the SDG indicators (IAEG-SDGs) and agreed by Member States at the United Nations Statistical Commission (UNSC) to monitor and review the progress towards achieving the 2030 agenda.[69] With this in mind, the UNSC requested to update the UN NQAF and emphasized "the importance of ensuring the quality of data derived from new sources and new data providers, including those outside the official statistical system"[70].

[66] The Manual distinguishes data providers and statistics producers with the term "statistics" referring to an output of a statistics production process and the term "data" referring to an input to the statistics production process (see Section 1.C). The term "SDG indicator data and statistics" (or in short "SDG indicators") as used in this chapter does not follow this distinction and refers to the output of a statistical production process.

[67] The information provided in this chapter and in particular Sections 8.C to 8.F benefited from the experiences gained during technical assistance activities by the United Nations Statistics Division of the Department of Economic and Social Affairs supporting the establishment of SDG monitoring in countries.

[68] See: the UN General Assembly resolution 70/1 "Transforming our world: the 2030 Agenda for Sustainable Development", para. 48.

[69] The IAEG-SDGs is composed of Member States and includes regional and international agencies as observers. See https://unstats.un.org/sdgs/iaeg-sdgs/.

[70] See E/2017/24 or E/CN.3/2017/35, decision 48/106.

8.3. *The special challenge of assuring the quality of the SDG indicator data and statistics*. The following factors characterize the special challenge of assuring the quality of the indicator data and statistics for the monitoring of the SDGs:

a. The production of the SDG indicators is a task that may involve all members of the NSS as well as new or non-traditional statistics producers and data providers;

b. The set of identified global SDG indicators is large and diverse ranging from basic presence or absence indicators (e.g. presence or absence of a certain regulation) to indicators involving complex statistical calculations;[71]

c. While some indicators are already calculated, others will require collecting additional data including from administrative and other data sources;

d. Countries are establishing their own national indicator frameworks according to their national circumstances and priorities; these localized frameworks are expected to be based on the global SDG indicators, containing some (or many) but not all global indicators and additional national indicators. Furthermore, countries will utilize different types of proxy indicators, which provide indirect or partial measures of the phenomena which the global indicators cover;

e. The global SDG indicators when adopted in 2017 were at different stages of methodological development with many global indicators considered as being without internationally agreed methodology.[72] There was also an initial lack of compilation guidance aside from the general challenge for countries to understand and compile data for indicators that are new and have not been compiled before;[73]

f. The disaggregation of the global SDG indicators is a major challenge for countries. However, as by the end of 2018, there has been a lack of methodological guidance on how to disaggregate certain indicators. Also, given that countries have different needs, there is a lack of guidance on which dis-aggregations should be provided on a priority basis across countries in support of global and regional reporting beyond what is reflected in the indicator titles and target names.

8.4. *Recommendations for quality assurance*. The Chapters 5 and 6 discuss the institutional arrangements, organizational aspect, and the responsibilities for quality assurance within the NSS. This chapter builds on these two chapters and identifies specific quality assurance actions that should be taken by the central coordination body, other NSS-wide bodies and by individual producers of SDG indicators in assuring their quality. The actions of the members of the NSS are to be based on the Fundamental Principles of Official Statistics (FPOS). The following core recommendations for quality assurance in Chapter 2 are of particular importance in assuring the quality of the SDG indicator data and statistics:

---

[71] Some countries may view some of the qualitative indicators as being outside of the scope of official statistics, and hence not subject to statistical quality assurance. However, users would generally expect that information on all SDG indicators is being provided together and is of similar quality.

[72] See discussion on the tier classification of the global SDG indicators available at the website of the IAEG-SDGs available at: https://unstats.un.org/sdgs/iaeg-sdgs/.

[73] For guidance on the compilation of the global SDG indicators please see: E-Handbook on Sustainable Development Goals Indicators, available at: https://unstats.un.org/wiki/display/SDGeHandbook/Home.

a. **it is recommended** that countries include the requirements of quality assurance in their national statistical legislation and other legislation mandating production of statistics for official use (core recommendation #2);

b. **it is recommended** that countries establish a national quality assurance framework for official statistics and that all members of the national statistical system are committed to continually assess, improve and report on the quality of official statistics, as well as on the quality of data and statistics used in the production of official statistics as required.[74] (core recommendation #3);

c. **it is recommended** that the national quality assurance framework is implemented at the national statistical office and throughout the entire national statistical system. Furthermore, **it is recommended** that the national quality assurance framework is applied to all data and statistics produced outside of the national statistical system that is disseminated with the help and support of a member of the national statistical system or that is used for government decision making, as deemed appropriate and required (core recommendation #5).

8.5. *Quality assurance in the global statistical system*. Quality assurance for the SDG indicators at the national level cannot be viewed in isolation. The national data and statistics are submitted to and compiled by designated global custodian agencies that have the responsibility to calculate regional and global aggregates and to provide international comparable national data in their specific statistical domains. Frequently, the custodian agencies support countries in the compilation of national data, including quality assurance. See Chapter 9 for further details regarding quality assurance in the global statistical system.

8.6. *UN NQAF and assuring quality of the SDG indicators*. The UN NQAF presented in Chapter 3 and Annex A provides a set of principles, requirements and elements to be assured for quality assurance of official statistics at four levels: Managing the statistical system, managing the institutional environment, managing statistical processes, and managing statistical outputs. Quality assurance for individual producers of official statistics typically starts and focuses on quality of statistical outputs. This also applies to SDG indicator data and statistics. However, the quality of the SDG indicators also depends on carrying out proper statistical processes, on an adequate institutional environment and on an efficient management of the statistical system. Therefore, all UN NQAF principles and requirements are necessary for quality assurance of the SDG indicators.

8.7. *Using the GSBPM*. The General Statistical Business Process Modell (GSBPM) described in Chapter 4 provides a basis to systematically examine, identify and address pertinent quality aspects for the development, production and dissemination of SDG indicators.[75] All phases of the GSBPM, i.e. specify needs, design, build, collect, process, analyze, disseminate and evaluate, apply to any statistical production process including the production of the SDG indicators.

[74] This commitment of members of the NSS should also, as deemed appropriate and required, extend to data and statistics that is disseminated jointly with other statistics producers that are not members of the NSS.

[75] Generic Statistical Business Process Model GSBPM (Version 5.0, December 2013), available at: https://statswiki.unece.org/display/GSBPM/GSBPM+v5.0.

8.B. The roles of coordination bodies and individual producers of SDG indicator data and statistics in assuring quality of the SDG indicators

8.8. *The NSO as the central coordination body*. Specific arrangements may vary, but typically the NSO is the central coordination body of the NSS and the entity responsible for the overall dissemination and reporting of the SDG indicators. In this function, the NSO is expected to play a key role, and to have an overarching responsibility in the assurance of quality for the SDG indicators. In addition, the NSO is typically responsible for the compilation of the largest share of the SDG indicators that are included in the national SDG indicator framework and intended for use by the government policy makers and other users.

8.9. *Roles of other NSS-wide bodies.* Depending on the specific national arrangements, quality assurance for the SDG indicators may be supported by an NSS-wide governance body, an NSS-wide advisory body and subsidiary or supporting bodies such as an SDG indicator working group (SDG-WG) or an NSS-wide data quality task force (see Chapter 6 for further details). The NSS-wide governance and NSS-wide advisory body may encompass members from within the NSS, data users and other stakeholders and may issue directives to ensure coordination throughout the NSS and that user needs are articulated and being met. SDG-WG should consist of members of the NSS and is typically chaired by the NSO. The SDG-WG would discuss all issues related to the production of SDG indicator data and statistics, including quality assurance.

8.10. *The roles of the individual producers of the SDG indicator data and statistics*. The individual producers of the SDG indicators such as government ministries, departments and agencies, and other public and private entities are required to produce high quality data and statistics according to their respective mandates reflected in the laws and regulations of the country or other formal arrangements. Most of the producers of SDG indicators will be members of the NSS while some producers may not be members of the NSS. All producers of SDG indicators are responsible for assuring the quality of their indicators by properly managing their statistical production processes and outputs. However, some may be newcomers to statistical quality assurance and may not have the capacity and ability to assure the quality of the SDG indicators under their responsibility alone. In these cases, appropriate capacities need to be built and adequate technical support will need to be provided by the coordination body, other NSS-wide bodies and members of the NSS.

8.11. Sections 8.C to 8.F list a set of requirements and elements to be assured for SDG indicators organized by the different levels of quality assurance according to the UN NQAF and provide justification or rationale for their inclusion. In addition, it is specified who should be responsible for the implementation of the respective requirement or element to be assured, either the central coordinating body (typically the NSO), the SDG-WG and/or individual producers of SDG indicators. In some cases, the responsibility is restricted to NSS members.

8.C. Managing the NSS as part of assuring the quality of the SDG indicators

8.12. The development, production and dissemination of SDG indicators is a task that involves most if not all members of the NSS. In some countries, statistics producers outside of the NSS may participate. Assuring quality at the level of managing the NSS is necessary in view of the methodological complexity of the task and the need to ensure efficient coordination of the data (and metadata) flows between providers of source data and the producers of the SDG indicators. Quality assurance at this level must consider the coordination of the NSS (Principle 1), the managing of relationships with data users, data providers and other stakeholders (Principle 2) and the managing of statistical standards (Principle 3). Table 8.1 below identifies essential requirements or elements to be assured with respect to this level of quality assurance. The table also includes the rationale for their inclusion as well as a brief explanation of who is or should generally be responsible for their implementation.

Table 8.1: Requirements and elements to be assured at the level of managing the statistical system in the case of the SDG indicators

Requirements / elements to be assured*	Rationale for inclusion and description of the responsibilities
Principle 1: Coordinating the NSS	
Establish an NSS-wide coordination body and NSS-wide supporting body, such as the SDG-WG, with the responsibility for coordinating the development, production and dissemination of the SDG indicators (and related metadata) and for ensuring their quality. (Requirements 1.2 and 1.3)	Rationale: The establishment of an SDG coordination body and a SDG-WG is necessary as the production of the SDG indicators requires ongoing collective efforts and coordination with all producers of SDG indicators and concerned data providers. Responsibility: The central coordination body (typically the NSO) should initiate the establishment of the SDG-WG; all producers of SDG indicators should actively participate in the work.
As appropriate, review the national statistical law and initiate its update as required to: 1) establish and enhance the coordination role of the NSO, also in the production and quality assurance of the SDG indicators; 2) establish a mechanism for the assessment of data quality; 3) improve transparency of, and public access to the SDG indicators and related metadata (1.1)	Rationale: Effective institutional arrangements are necessary for the development, production and dissemination of SDG indicators, including quality assurance to be able to respond to current and emerging data and statistical needs. Responsibility: The central coordination body (NSO), assisted by a high-level advisory body should participate in the development of draft amendments to the statistics law, as appropriate; the individual NSS members should be consulted and should provide input and comments to ensure that the amendments address the specific needs.

Requirements / elements to be assured*	Rationale for inclusion and description of the responsibilities
As appropriate, review the legal and/or regulatory framework underpinning data collection activities of the NSS members and draft proposals for amendments, as necessary, to facilitate access to administrative and other data needed for the compilation of the SDG indicators (1.1, 1.3 and 2.4 - 2.6).	Rationale: The data collection by the individual NSS members is regulated by applicable legislation and/or government regulation; they may need to be amended to allow for the compilation and sharing of data required for the production of the SDG indicators. Responsibility: Individual NSS members.
Review and update the National Strategy for the Development of Statistics (NSDS) (1.4 and 9.1)	Rationale: The NSDS needs to be reviewed and updated to reflect the additional requirements for the monitoring of the SDGs. Responsibility: The central coordination body (NSO) should initiate the review and update of the NSDS; all NSS members should actively participate in the work as required.
Organize efficient data flows for SDG indicator related data and metadata exchange between the NSS members, by amending existing Memoranda of Understanding with the providers of source data (e.g. specify data items, formats of data files, schedule of submission etc.) (1.2)	Rationale: Efficient data flows are required for timely production of the SDG indicators. Responsibility: The central coordination body (NSO) and SDG-WG and all producers of SDG indicators.
Principle 2: Managing relationships with data users, data providers and other stakeholders	
Create frequent and periodic opportunities for dialogue on the SDG indicators with different user groups including policy makers, Non-Governmental Organizations (NGOs), research institutions and the general public. (2.2)	Rationale: SDG indicators must be fit for purpose; therefore, the consultations and dialogue with users to better understand their needs for monitoring the SDGs is the basic requirement for assuring quality of the SDG indicators. Responsibility: The central coordination body (NSO) and SDG-WG should initiate a comprehensive dialogue with users; the individual producers of SDG indicators are responsible for consultations with their specific user groups.
Establish NSS-wide guidelines for the engagement with international SDG indicator custodian agencies. (2.3)	Rationale: International SDG custodian agencies rely on national data and should use the right national data produced by the NSS. Responsibility: The central coordination body (NSO), the SDG-WG and individual producers of SDG indicators (as well as the international custodian agencies) should participate in this effort.

Requirements / elements to be assured*	Rationale for inclusion and description of the responsibilities
Develop a policy and identify good practices for public-private cooperation in data collection and use of data from private data providers for the production of SDG indicators; establish the necessary institutional arrangements for such cooperation. (1.2, 1.3 and 2.3 - 2.6)	Rationale: The SDG indicator compilation may require the use of data from multiple data providers, including from private data providers. Responsibility: The central coordination body (NSO), the SDG-WG and individual NSS members should participate in this effort.
Establish regular contacts with the media to better disseminate SDG indicator related information and obtain user-feedback (2.2 and 14)	Rationale: The general public must be informed about the country's progress and the media plays an important role in that respect, often providing valuable user-feedback. Responsibility: The central coordination body (NSO) and the SDG-WG should provide leadership and coordination for this task; individual producers of SDG indicators should undertake such efforts.
Principle 3: Managing statistical standards	
Promote, monitor and support a uniform application of the international and national statistical standards (basic statistical concepts and classifications, etc.) by all producers of SDG indicators. (3.1 – 3.3)	Rationale: Standards need to be applied to ensure comparability and to allow the combined use and the merging of data. Responsibility: The central coordination body (NSO) should lead this work with support of the SDG-WG; the individual producers of SDG indicator should assure their compliance.
Review the application of international standards in the production of the SDG indicators, identify the reasons for non-compliance and develop action plans to improve compliance. (3.1 – 3.3 and 18.1)	Rationale: Nationally produced global indicator data and statistics should be internationally comparable. Responsibility: The central coordination body (NSO) and the SDG-WG should steer these efforts; the individual producers of SDG indicators should review their compliance and explain the reasons for non-compliance.
Organize a system-wide staff training on statistical standards and good practices in the production of SDG indicators. (3.2)	Rationale: Adequate training will increase the capacity of the NSS to produce the SDG indicators. Responsibility: The central coordination body (NSO) and SDG-WG should organize and conduct such training, while producers of SDG indicators should participate.

* A reference to the concerned UN NQAF requirements (or elements to be assured under a UN NQAF requirements) is indicated in brackets (see Chapter 3 and Annex for details).

8.D. Managing the institutional environment as part of assuring the quality of the SDG indicators

8.13. Managing the statistical environment for the production of SDG indicators entails securing a quality commitment from all producers of SDG indicators and assuring that sufficient resources are available for their production (Principles 8 and 9). The implementation of activities aiming to assure professional independence (Principle 4) and impartiality and objectivity (Principle 5) by all members of NSS who are involved in the production of SDG indicators will improve the trust of the users in the SDG indicator data and statistics. The importance of assuring transparency in the SDG indicator production (Principle 6) and statistical confidentiality and data security (Principle 7) of the individual data should be emphasized as those principles are important for securing trust of users and cooperation among NSS members. Essential requirements or elements to be assured with respect to this level of the UN NQAF, a rationale for their inclusion as well as a brief explanation of the responsibilities for their implementation are provided in table 8.2 below.

Table 8.2: Requirements and elements to be assured at the level of managing the statistical environment in the case of the SDG indicators

Requirement / element to be assured*	Rationale for inclusion and description of the responsibilities
Principle 4 and 5: Assure professional independence and impartiality and objectivity	
Review and evaluate the policies of producers of SDG indicators regarding the assurance of professional independence, impartiality and objectivity, and amend them as necessary using guidelines provided by the International Statistical Institute's Declaration on Professional Ethics, and advice from the national statistical association. (5.2)	Rationale: Users must be able to trust in the quality of SDG indicators; trust will assure wide usage. Responsibility: The central coordination body (NSO) and SDG-WG need to work with the individual producers of SDG indicators to review and evaluate compliance with these principles.
Adopt a code of conduct based on international standards (such as FPOS) and inform the public about the adherence to the code of conduct in the development, production and dissemination of SDG indicators. (5.2)	Rationale: The adoption and compliance with a code of conduct helps to gain public trust in the quality of SDG indicators and ensure their wide use. Responsibility: The central coordination body (NSO) and SDG-WG will support the individual producers of SDG indicators in the adoption of the code; individual producers of SDG indicators must comply with the code of conduct.

Requirement / element to be assured*	Rationale for inclusion and description of the responsibilities
Prepare a release schedule of the SDGs indicators and make it available to all users. SDG indicators are made available to all users at the same time (5.5)	Rationale: All users should be treated equally as required by FPOS. Responsibility: The central coordination body (NSO) and SDG-WG should develop and publish a release calendar in consultation and cooperation with the individual SDG indicator producers.
Principle 6: Assuring transparency	
Disclose the terms and conditions under which source data for the SDG indicator production were obtained, and which methods were used in the SDG indicator production (including methods of estimation of missing data and data modelling). (6.1)	Rationale: Users should be able to evaluate how SDG indicators were produced. Responsibility: The individual SDG indicator producers should disclose the terms and conditions under which source data are obtained and should disclose the methods applied in the SDG indicator production.
Principle 7: Assuring statistical confidentiality and data security	
Take appropriate measures and publicly guarantee the privacy of the information provided by individual respondents. (7.2)	Rationale: The information provided by the respondents must be protected to assure their willingness to provide correct information. Responsibility: The central coordination body (NSO) and SDG-WG should develop appropriate measures to assure confidentiality and data security and assist SDG indicator producers in their application.
Principle 8: Assuring the quality commitment	
Declare and explain the commitment to quality of the SDG indicators internally and externally. (8.1)	Rationale: Staff at producers of SDG indicators must be aware of the quality commitment of their organization and users must be allowed to hold SDG indicator producers accountable; this will increase trust and usage of the SDG data. Responsibility: All SDG indicator producers should express their quality commitment.
Designate a SDG indicator quality focal point or unit within each SDG indicator producer. (8.3)	Rationale: There should be a focal point or unit which is tasked with assuring the quality of the SDG indicators. Responsibility: All SDG indicator producers should have a quality focal point or unit.

Requirement / element to be assured*	Rationale for inclusion and description of the responsibilities
Develop and update, on a regular basis, guidelines for quality assurance of SDG indicators. (8.5)	Rationale: Quality guidelines specify actions to put the quality commitment into practice. Responsibility: The SDG-WG should develop guidelines for quality assurance and all SDG indicator producers should apply them.
Identify appropriate quality indicators to assess the production process of the SDG indicators. (8.6)	Rationale: Quality indicators are needed for quality assessment. Responsibility: The central coordination body (NSO) and SDG-WG should prepare the set of applicable quality indicators in cooperation with producers of SDG indicators.
Issue a common quality report on all the SDG indicators produced in a country and conduct a user-producer dialog on its content. (8.6)	Rationale: Quality reports raise the confidence of users in the quality of the SDG indicators and provide a benchmark for further improvements. Responsibility: The central coordination body (NSO) and SDG-WG in cooperation with individual SDG indicator producers should prepare such a report.
Principle 9: Assuring adequacy of resources	
Assess adequacy of currently available resources to compile the SDG indicators included in the national indicator framework. (9.1)	Rationale: The production of SDG indicators requires adequate resources. Responsibility: The central coordination body (NSO) and SDG-WG should provide a consolidated assessment report covering the entire NSS; the individual SDG indicators producers should assess the resources they can use for compiling the SDG indicators for which they are responsible.
Prepare a consolidated report on the statistical capacity of the country to produce the SDG indicators; the report should list the SDG indicators which cannot be produced without additional resources; submit the report to the government and development partners. (9.3)	Rationale: The need for additional resources must be communicated to policy makers and development partners. Responsibility: The central coordination body (NSO) and SDG-WG should prepare a consolidated report with input from NSS members.

* A reference to the concerned UN NQAF requirements (or elements to be assured under UN NQAF requirements) is indicated in brackets (see Chapter 3 and Annex for details).

8.E. Managing the statistical processes as part of assuring quality of the SDG indicators

8.14. The management of statistical processes is at the core of the production of the SDG indicators. The production of the SDG indicators that are not currently compiled by NSS members or not compiled with sufficient periodicity may require revision of existing statistical processes or, in some cases, setting up new processes. An opportunity and challenge for the production of SDG indicators is the use of administrative data sources and other data sources such as big data and geospatial data. Assuring methodological soundness (Principle 10) and appropriate statistical procedures (Principle 12) directly impact international comparability of the SDG indicators and their comparability over time. Assuring cost-effectiveness in the development, production and dissemination of the SDG indicators (Principle 11) and managing the respondent burden (Principle 13) are important challenges given the immense requirements of SDG monitoring. Essential requirements or elements to be assured with respect to this level of the UN NQAF and a rationale for their inclusion as well as a brief explanation of the responsibilities for their implementation are provided in table 8.3 below.

Table 8.3: Requirements and elements to be assured at the level of managing the statistical processes in the case of the SDG indicators

Requirement / element to be assured*	Rationale for inclusion and description of the responsibilities
Principle 10: Assuring methodological soundness	
Review and evaluate the methodology used for the production of the SDG indicators. (10.1 and 10.3)	Rationale: The methodology used for the production affects the output quality of the SDG indicators. Responsibility: The central coordination body (NSO) and SDG-WG should conduct this activity together with the individual producers of SDG indicators.
Principle 11: Assuring cost-effectiveness	
Assess whether existing data sources and existing data can be used for the production of SDG indicators. (11.2 and 11.5)	Rationale: The use of existing data sources or existing data is normally more cost effective than the collection of new data. Responsibility: The central coordination body (NSO), the SDG-WG and producers of SDG indicators should conduct this activity before committing to carrying out any new data collection.
Use administrative data sources and other data sources and develop data integration and data modelling techniques for the production of SDG indicators where feasible and cost-effective. (11.5)	Rationale: The use of administrative and other data sources is often more cost-effective that the use of statistical sources such as sample surveys and censuses. Responsibility: All producers of SDG indicators with support of the central coordination body (NSO) and the SDG-WG.

Requirement / element to be assured*	Rationale for inclusion and description of the responsibilities
Use the GSBPM to analyze the statistical production processes of the SDG indicators. (8.7 and 11.6)	Rationale: The GSBPM allows a systematic analysis of the statistical production process and to identify quality issues and appropriate quality indicators. Responsibility: The central coordination body (NSO) and the SDG-WG would typically introduce the use of the GSBPM to members of the NSS.
Principle 13: Managing the respondent burden	
Assess the respondent burden when collecting data for SDG indicators and their dis-aggregations. (13.1)	Rationale: Minimizing the respondent burden is an integral part of the statistical operations and contributes to the quality of the obtained information. Responsibility: All producers of SDG indicators with support of the central coordination body (NSO) and SDG-WG.

* A reference to the concerned UN NQAF requirements (or elements to be assured under UN NQAF requirements) is indicated in brackets (see Chapter 3 and Annex for details).

8.F. Managing statistical outputs as part of assuring the quality of the SDG indicators

8.15. SDG indicators are statistical outputs obtained at the end of a statistical production process to which all UN NQAF principles regarding statistical outputs apply. However, some quality requirements may need higher attention than others. For example, assessing the relevance (Principle 14) of additional national SDG indicators is a critical step for assuring their usefulness. Assuring the accuracy and reliability (Principle 15) of SDG indicators can be challenging in the case of complex statistical production processes and the use of administrative, other or multiple data sources. Principle 18 on assuring coherence and comparability is essential for the comparability of global SDG indicators. Essential requirements or elements to be assured with respect to this level of the UN NQAF and a rational for their inclusion as well as a brief explanation of the responsibilities for their implementation are provided in table 8.4 below.

Table 8.4: Requirements and elements to be assured at the level of managing statistical outputs in the case of the SDG indicators

Requirement / element to be assured*	Rationale for inclusion and description of the responsibilities
Principle 14: Assuring relevance	
Discuss and agree on the national SDG indicator framework in an inclusive consultation process with all national and international stakeholders. Clearly identify in the national SDG indicator framework the global indicators, additional national indicators and indirect measures (proxies) of the global indicators as well as the required level of disaggregation. (14.1 and 14.2)	Rationale: The national indicator framework needs to satisfy user needs, taking into account the needs for global, regional and national monitoring. Responsibility: The central coordination body (NSO) and the SDG-WG would typically lead this activity.
Principle 15: Assuring accuracy and reliability	
Employ internationally recognized statistical methods and techniques in the production of the SDG indicators. (10.1 and 15.1-15.2)	Rationale: Established methods and techniques have been shown to be accurate and reliable. Responsibility: The individual SDG indicator producers should conduct this activity with support of the central coordination body (NSO) and the SDG-WG.
Establish an SDG indicator revision policy which also entails the explanation of revisions to users. Involve the international SDG indicator custodian agency where appropriate. (15.3)	Rationale: The availability of a sound revision policy is proof of the commitment to quality and contributes to user confidence. International custodian agencies depend on and provide support for the production of many SDG indicators in developing countries. Responsibility: The central coordination body (NSO), and the SDG-WG may issue guidelines on the SDG indicators revision policy and monitor its implementation; the individual SDG indicator producers are responsible for the implementation of the revision policy for their indicators.
Principle 16: Assuring timeliness and punctuality	
Consider the trade-offs between timeliness and quality dimensions (e.g. accuracy, cost and respondent burden) during development and production of the SDG indicators; include information about trade-offs in the SDG indicator metadata. (16.1)	Rationale: Dealing with trade-offs is a part of the planning of the statistical production process; users should be informed about them to understand the limitations of the SDG indicators. Responsibility: The central coordination body (NSO), the SDG-WG and the individual SDG indicator producers should conduct this activity.

Requirement / element to be assured*	Rationale for inclusion and description of the responsibilities
Automate the SDG indicators production process and related data flows so that the SDG indicators becomes available as soon as possible after all source data becomes available. (16.1)	Rationale: Any delay in the SDG indicator production at the final stage of the statistical process should be avoided. Responsibility: The central coordination body (NSO) and the individual SDG indicator producers conduct this activity.
Publish an SDG indicator release calendar; it must be in line with the global reporting schedule, as applicable. (5.5 and 16.1)	Rationale: Users should be informed when SDG indicators are planned to become available. Responsibility: The central coordination body (NSO), the SDG-WG and the individual SDG indicator producers should jointly conduct this activity.
Principle 17: Assuring accessibility and clarity	
Establish a national SDG indicator reporting and dissemination platform allowing user-friendly access to all data and metadata. (17.1, 17.3 and 17.6) The national SDG indicators reporting and dissemination platform should provide data access that facilitates data integration and re-dissemination.	Rationale: A national reporting and dissemination platform is required to give timely and full data access to all users. Responsibility: The central coordination body (NSO) is typically responsible for the database establishment and maintenance, while SDG indicator producers need to provide the SDG indicators in accordance with agreed formats and schedules.
Principle 18: Assuring coherence and comparability	
Review and monitor the use of international and national standard concepts, definitions and classifications in the development and production of the global SDG indicators and identify any divergences. (3.3, 10.1 and 18.1)	Rationale: The use of international standard concepts, definitions and classifications is necessary to achieve international comparability. Responsibility: The central coordination body (NSO) and the SDG-WG should conduct this activity together with the individual SDG indicator producers.
Inform about the compliance with international standards in the SDG indicator metadata and quality reports. (3.3 and 18.1)	Rationale: The information about the compliance with international standards will increase the confidence of users and will allow users to understand any differences to national data published by international agencies. Responsibility: The central coordination body (NSO), the SDG-WG and the individual SDG indicators producers conduct this activity.

Requirement / element to be assured*	Rationale for inclusion and description of the responsibilities
Principle 19: Managing metadata	
Produce SDG indicator metadata, periodically update them and make them available to users. The metadata should include information about concepts, definitions, classifications, data sources, production methods including statistical methodology used. (17.1 and 19.2)	Rationale: SDG indicator metadata are indispensable in the interpretation of the data by users. Responsibility: The central coordination body (NSO), the SDG-WG and the individual SDG indicators producers conduct this activity.
Establish a metadata management system for the SDG indicators. (19.1)	Rationale: Metadata must be systematically maintained. Responsibility: The central coordination body (NSO), the SDG-WG and the individual SDG indicators producers conduct this activity.

* A reference to the concerned UN NQAF requirements (or elements to be assured under UN NQAF requirements) is indicated in brackets (see Chapter 3 and Annex for details).

8.G. Reference publications and good practices

8.16. This section provides references to a few reference materials.

a. SDG Indicators metadata repository, available at: https://unstats.un.org/sdgs/metadata/

b. ISI Declaration On Professional Ethics, available at : https://www.isi-web.org/index.php/news-from-isi/296-declarationprofessionalethics-2010uk

c. Towards a harmonised methodology for statistical indicators. Part 1: Indicator typologies and terminologies, Eurostat (2014), http://ec.europa.eu/eurostat/documents/3859598/5937481/KS-GQ-14-011-EN.PDF/82855e3b-bb6e-498a-a177-07e7884e9bcb

d. Defining Proxy Indicators For Rural Development Programmes https://enrd.ec.europa.eu/sites/enrd/files/assets/pdf/evaluation/WP-ProxyIndicators20140117_en.pdf

****

Chapter 9. Quality assurance in the global statistical system

Introduction

9.1. The chapter describes the purpose of the global statistical system and identifies the commitments and obligations of countries and international and regional organizations to jointly assure the quality of data and statistics published at the global level. This joint work is ongoing in the different statistical domains and their specialized fora. However, the monitoring of the Sustainable Development Goals (SDGs) gives this task a new urgency as the global and regional monitoring is to be based on national data and statistics and because of the wide scope of the SDG indicators whose production involves most of the national statistical system (NSS) members or the entire NSS.

9.2. The target audience of this chapter are statisticians in countries and regional and international organizations. The information on international organizations' commitments and obligations with respect to the use of national data and statistics provided in this chapter allows countries to hold international organizations accountable. At the same time the chapter stresses the role of international and regional organizations which are a very important and special type of user of national data as they are both the provider and major user of global and regional statistics. Therefore, the needs of regional and international organizations are an important factor when considering the relevance of the statistics produced by countries. An additional recommendation emphasizes that these commitments and obligations provide the framework to address disagreements and any differences in data and statistics that are being published at different levels.

9.A. The case for quality assurance in the global statistical system

9.3. *Purpose of the international statistical system*. The purpose of the international statistical system is to support and facilitate the availability of internationally comparable national data in the different statistical domains, to produce global and regional aggregates, and to make such data available in line with the Fundamental Principles of Official Statistics (FPOS) [76] and the Principles Governing International Statistical Activities (PGISA). [77] Accordingly, based on the existing agreement, NSSs submit data to the entities designated for global data collection in specific statistical domains (custodian agencies). Regional and sub-regional entities are frequently involved in the international data compilation. Agreements for data sharing among regional and international agencies exist to avoid duplication of data collection which is a major concern to countries.

9.4. *Role of international and regional organizations.* International and regional organizations through their Member States play a central role in developing and promoting internationally accepted statistical standards and methodologies and provide leadership in addressing emerging statistical needs. The international and regional organizations receive official data and statistics from NSS and are tasked with ensuring the quality and comparability of the national data. They provide guidance and technical

[76] See Box 2.1 or http://unstats.un.org/unsd/dnss/gp/fundprinciples.aspx.
[77] See Box 9.2 or https://unstats.un.org/unsd/ccsa/principles_stat_activities/.

assistance to countries for data compilation in their areas, according to international standards to improve data availability and to facilitate international comparability. International and regional organizations should use and publish data as provided by countries. However, at times international and regional agencies may adjust national data to make them internationally comparable or estimate missing data to fill data gaps and to allow for the calculation of regional or global aggregates. In those cases, quality standards should be followed, and countries should be fully involved in the estimation process and informed about the adjustments and calculation methods.[78] For detailed guidance on the cooperation between countries and international and regional organizations please refer to Box 9.4 Criteria for the implementation of the Guidelines on Data Flows and Global Data Reporting for Sustainable Development Goal.

9.B. The system of commitments and obligations for quality assurance of global data and statistics

9.5. *Towards an international system of quality assurance*. Quality assurance of global statistics in different statistical domains including the SDG indicators takes place at the national, regional and global levels. Quality assurance procedures at the different levels are linked to each other as regional and international agencies rely on the compilation of high-quality data and statistics at the national level, while countries rely on regional and international organizations to produce internationally comparable data and statistics for all countries, which are available at regional and global levels. FPOS and PGISA, adopted and adapted by countries and organizations according to their specific circumstances, contain the commitment of countries and regional and international organizations to data quality. These commitments are complemented and reinforced by a set of United Nations (UN) resolutions and specific guidelines issued by the UN Statistical Commission on the compilation of SDG indicator data and statistics at the regional and international level, and the quality assurance frameworks and recommendations implemented in countries and at international and regional organizations. Hence, quality assurance in the global statistical system can be understood to be a system of commitments and obligations of countries, regional and international organizations to provide high-quality data to users. While stressing the obligations of all partners, the quality of the statistical outputs disseminated by regional and international organizations largely depends on the availability and quality of national data.

9.6. *FPOS and PGISA are specifically relevant for quality assurance in the global statistical system*. Several FPOS establish the obligations of countries to participate and collaborate in the international statistical system (see Box 9.1). Similarly, several PGISA establish specific obligations regarding the use of national data for global statistics and the cooperation with national statistical systems in compiling internationally comparable national data and global and regional aggregates (see Box 9.2).

[78] Economic and Social Council (ECOSOC) resolution 2006/6; General Assembly resolution 71/313.

Box. 9.1 FPOS regarding participation of countries in the international statistical system[79]

Fundamental Principle 9: The use by statistical agencies in each country of international concepts, classifications and methods promotes the consistency and efficiency of statistical systems at all official levels. (This principle is reflected in the core recommendation #13 of this Manual.)
Fundamental Principle 10: Bilateral and multilateral cooperation in statistics contributes to the improvement of systems of official statistics in all countries. (This principle is reflected in the core recommendation #14 of this Manual.)

Box. 9.2 PGISA regarding the use of national data

Principle 2 Governing International Statistical Activities: To maintain the trust in international statistics, their production is to be impartial and strictly based on the highest professional standards
Principle 4 Governing International Statistical Activities: Concepts, definitions, classifications, sources, methods and procedures employed in the production of international statistics are chosen to meet professional scientific standards and are made transparent for the users
Principle 5 Governing International Statistical Activities: Sources and methods for data collection are appropriately chosen to ensure timeliness and other aspects of quality, to be cost-efficient and to minimise the reporting burden for data providers
Principle 8 Governing International Statistical Activities: Standards for national and international statistics are to be developed on the basis of sound professional criteria, while also meeting the test of practical utility and feasibility
Principle 9 Governing International Statistical Activities: Coordination of international statistical programmes is essential to strengthen the quality, coherence and governance
Principle 10 Governing International Statistical Activities: Bilateral and multilateral cooperation in statistics contribute to the professional growth of the statisticians involved and to the improvement of statistics in the organisations and in countries

9.7. *UN NQAF in Chapter 3.* The following requirements of the United Nations National Quality Assurance Framework (UN NQAF) are particularly relevant to the cooperation within the international statistical system to secure its functioning and international comparability:

a. Requirement 1.2: There are a body and mechanisms for the coordination of the national statistical system for activities at the local, national, regional and international level.

b. Requirement 2.3: The statistical agencies continuously maintain and develop cooperation with funding agencies, academic institutions and international statistical organizations, as appropriate.

[79] See chapter 2, Box 2.1 for the full list of FPOS.

c. Requirement 3.3: Divergences from the international, regional or national statistical standards are kept to a minimum, documented and explained to all stakeholders.

d. Requirement 10.1: The methodologies applied by the statistical agencies are consistent with international standards, guidelines and good practices and are regularly reviewed and revised as needed.

e. Requirement 14.2: Users' needs and requirements are balanced, prioritized and reflected in the work program.

f. Requirement 16.1: Timeliness of the statistical agency's statistics comply with international standards or other relevant timeliness targets.

g. Requirement 18.1: International, regional and national standards are used with regard to definitions, units, variables and classifications.

h. Requirement 18.3: Statistics are kept comparable over a reasonable period of time and between geographical areas.

i. Requirement 19.2: Metadata are documented, archived and disseminated according to internationally accepted standards.

9.8. *UN System generic quality assurance framework.* Chief Statisticians of the UN System have agreed on a generic quality assurance framework and many international organizations have established their own quality assurance frameworks based on PGISA which provide the basis for quality assurance.[80]

9.9. *UN resolutions on the international compilation of data and statistics for development indicators*. The General Assembly resolution 71/313 of 10 July 2017 and Economic and Social Council (ECOSOC) resolution 2006/6 of 24 July 2006 spell out requirements for the global monitoring of the SDG indicators and the previously used Millennium Development Goal (MDG) indicators. Specifically, Member States

a. stressed that official statistics and data from national statistical systems constitute the basis needed for the global indicator framework;

b. requested the Secretary-General to enhance data reporting channels and ensure the harmonization and consistency of data and statistics for the indicators used to follow up and review the Sustainable Development Goals and targets;

c. urged international organizations to base the global review on data produced by national statistical systems and, if specific country data are not available for reliable estimation, to consult with concerned countries to produce and validate modelled estimates before publication, urges that communication and coordination among international organizations be enhanced in order to avoid duplicate reports, ensure consistency of data and reduce response burdens on countries, and urges international organizations to provide the methodologies used to harmonize country data for international comparability and produce estimates through transparent mechanisms;

[80] See https://unstats.un.org/unsd/unsystem/documents/UNSQAF-2018.pdf.

d. stressed that all activities of the global statistical system must be conducted in full adherence to the Fundamental Principles of Official Statistics and Economic and Social Council resolution 2006/6.

9.10. *Criteria for the implementation of the Guidelines on Data Flows and Global Data Reporting for Sustainable Development Goals*. Building on the above resolutions and guidance provided by the UN Statistical Commission the Inter-agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs) identified criteria for the implementation of the Guidelines on Data Flows and Global Data Reporting for Sustainable Development Goals which spell out the commitments of the international and supranational statistical agencies and Member States and the role of the national statistical office (NSO) (see Box 9.4).[81]

9.C. Addressing disagreement and differences

9.11. *Recommendation on addressing differences*. Guided by the above commitments and obligations countries and international and regional organizations can rely on each other's support and work. However, there are occasions when disputes arise over country data published by international or regional organizations in particular when these data are different from the data published by the country itself. **It is recommended** to address disputes between countries and regional and international organizations regarding country data published by international or regional organizations based on professional considerations as established in FPOS and PGISA, the explicit guidance provided by Member States and the Statistical Commission and the quality assurance frameworks adopted by countries and international organizations.

9.12. *Reasons for differences and reminder to provide metadata*. Differences between country data published by international organizations and by countries can occur for multiple reasons, such as the use of different sources, non-synchronic update schedules or adjustments to make national data internationally comparable etc. The first step in resolving and explaining these differences is to review the available metadata which should describe the concepts, definitions and methods used in the compilation of the data. International and regional organizations as well as countries are requested to provide adequate metadata at all levels of reporting.

9.13. *Need for greater coordination and transparency*. A major source of differences between country data published by international organizations and by countries is that different national agencies can produce statistics on the same subject and provide these data to international organizations. The forthcoming document "Criteria for the implementation of the Guidelines on Data Flows and Global Data Reporting for Sustainable Development Goals" aim to address this issue, which results from a lack of coordination and transparency, both at the national and international level.

[81] The zero draft was presented to the 8th meeting of the IAEG-SDGs on 5-8 November 2018.

Box 9.3: Principles Governing International Statistical Activities (PGISA)[82]

1) High quality international statistics, accessible for all, are a fundamental element of global information systems

Good practices include:

- Having regular consultations with key users both inside and outside the organisation to ascertain that their needs are met
- Periodic review of statistical programmes to ensure their relevance
- Defining a strategy and data quality policy for the use of Open Data[1] and Big Data[2] - as it applies to international statistics
- Providing equal access to detailed statistics for all users; in particular, ensuring that new statistical releases are made accessible to all users at the same time while pre-release access to specific users should be limited, controlled and made transparent Ensuring free and open public access to key statistics
- Using a variety of communication channels and ICT tools to publicise data products, make users aware of them and reach different audiences (e.g. press releases, articles, social media, apps stores, alert messaging and notification or traditional communication channels like new publications etc.)
- Developing different modalities for data access and data dissemination, including various formats for data and metadata downloads

1 "Open data" is understood to mean data that are made available to the public free of charge, without registration or restrictive licenses, for any purpose whatsoever (including commercial purposes), in electronic, machine-readable formats that are easy to find, download and use.

2 Big Data is understood to be data sources with a high volume, velocity and variety of data.

2) To maintain the trust in international statistics, their production is to be impartial and strictly based on the highest professional standards

Good practices include:

- Adopting, advocating, publicly committing to and applying professional codes of conduct, such as the ISI Declaration on Professional Ethics
- Using strictly professional considerations for decisions on methodology, terminology, data dissemination and presentation
- Using the best national data sources in compiling International Statistics, be they official or non-official sources, following the Recommended Practices on the Use of Non-Official Sources in International Statistics
- Making a clear distinction, in statistical publications, between statistical and analytical comments on the one hand and policy-prescriptive and advocacy comments on the other
- Ensuring that all statistics published by the organisation are endorsed by the established internal statistics governance mechanism
- Having a published policy ensuring that statistical functions must be impartial, based on professional standards, and independent from political influence

[82] https://unstats.un.org/unsd/accsub-public/principles_stat_activities.htm

3) The public has a right to be informed about the mandates for the statistical work of the organisations

Good practices include:

- Making decisions about statistical work programmes publicly available through various media channels
- Making documents for and reports of statistical meetings, statistical capacity building initiatives, and technical assistance projects publicly available through various media channels
- Making publicly available the statistical work plan and budget reviewed and formally endorsed by the organisation's governing bodies

4) Concepts, definitions, classifications, sources, methods and procedures employed in the production of international statistics are chosen to meet professional scientific standards and are made transparent for the users

Good practices include:

- Adopting a quality assurance framework for the organisation
- Striving continuously to improve the quality and transparency of statistics by introducing methodological and systems innovations
- Enhancing the professional competency of staff by encouraging them to attend training courses, to publish scientific papers and to participate in seminars and conferences
- Documenting and publishing concepts, definitions, classifications and metadata used by the organisation
- Documenting how data are collected, processed and disseminated by the organisation (including information about editing mechanisms applied to country data3 and aggregation methods to calculate regional and global estimates)
- Giving credit, in the dissemination of international statistics, to the original source and using agreed quotation standards when reusing statistics originally collected by others

3 "Country data" refer to data collected from countries, territories or any other relevant area and the term "country" is used as short form.

5) Sources and methods for data collection are appropriately chosen to ensure timeliness and other aspects of quality, to be cost-efficient and to minimise the reporting burden for data providers

Good practices include:

- Facilitating the provision of data from traditional and emerging sources by countries/constituencies by offering different data collection modalities
- Working systematically towards minimising the time lag between the reference period and the publication date of international statistics
- Reviewing periodically statistical procedures in order to minimise the burden on data providers
- Sharing collected data with other organisations and collecting data jointly where appropriate
- Publishing data collection plans, questionnaires, data release calendars and a list of organisational focal points for each data domain
- Having mechanisms in place to consult countries to address discrepancies between national and international statistics
- Having mechanisms in place to promote the use of the most suitable methods and sources by national statistical offices and other national organisations

6) Individual data collected about natural persons and legal entities, or about small aggregates that are subject to national confidentiality rules, are to be kept strictly confidential and are to be used exclusively for statistical purposes or for purposes mandated by legislation

Good practices include:

- Putting measures in place to prevent the direct or indirect disclosure of data on persons, households, businesses and other individual respondents
- Developing and implementing a framework describing methods and procedures to provide sets of anonymous micro-data and associated data documentation for further analysis by bona fide researchers, maintaining the requirements of confidentiality

7) Erroneous interpretation and misuse of statistics are to be immediately appropriately addressed

Good practices include:

- Responding appropriately to perceived erroneous interpretation and misuse of statistics
- Enhancing the appropriate use of statistics by increasing statistical literacy for important user groups where needed, e.g. through the development of educational material
- Establishing various communication channels (help desk function, user forum, social media, etc.) to report misuse and answer user requests for clarification

8) Standards for national and international statistics are to be developed on the basis of sound professional criteria, while also meeting the test of practical utility and feasibility

Good practices include:

- Systematically involving national statistical organisations, departments and other official statisticians in the development of international statistical standards, including good practices and guidelines for implementation
- Ensuring that decisions on such standards are free from conflicts of interest and from political influence
- Advising countries/constituencies on good practices in the implementation of international standards
- Monitoring the implementation of agreed standards

9) Coordination of international statistical programmes is essential to strengthen the quality, coherence and governance

Good practices include:

- Designating clear responsibilities within the organisation to coordinate and implement statistical programmes, and represent the organisation in international statistical meetings
- Participating in international statistical meetings and bilateral and multilateral consultations whenever necessary
- Working systematically towards achieving international agreements about common concepts, classifications, standards and methods
- Working systematically towards achieving international agreements about which sources should be considered as authoritative for each important set of statistics
- Coordinating technical cooperation and capacity building activities with national and international partners to avoid duplication of effort and to encourage complementarities and synergies
- Establishing internal coordination mechanisms, which facilitate the discussion of responsibilities, methodologies, concepts, and common standards

10) Bilateral and multilateral cooperation in statistics contribute to the professional growth of the statisticians involved and to the improvement of statistics in the organisations and in countries

Good practices include:

- Cooperating and sharing knowledge among international organisations and with countries and regions to further develop national and regional statistical systems
- Ensuring that technical cooperation projects are demand-driven based on user requirements and encourage full participation of the main stakeholders
- Ensuring that technical cooperation projects take into consideration local circumstances and the stage of national statistical development
- Empowering national statistical systems and governments institutional capacity development
- Advocating the implementation of the Fundamental Principles of Official Statistics in countries/constituencies and promoting a review of progress over time
- Involving relevant national statistical institutions when undertaking new surveys

Box 9.4: Criteria for the implementation of the Guidelines on Data Flows and Global Data Reporting for Sustainable Development Goal

The Member States at the Inter-agency and Expert Group on SDG indicators (IAEG-SDGs) and international organizations at the Committee on the Coordination of Statistical Activities (CCSA) have been working together to identify the Criteria for the implementation of the Guidelines on Data Flows and Global Data Reporting for Sustainable Development Goals to ensure that global SDG monitoring follows the FPOS and PGISA.

Forthcoming:

…

Note: The Statistical Commission at its 50th session is invited to express its views and adopt the criteria for the implementation of the Guidelines on Data Flows and Global Data Reporting for the Sustainable Development Goals as contained in annex I of the Report of the IAEG-SDGs. See: https://unstats.un.org/unsd/statcom/50th-session/documents/2019-2-IAEG-SDG-E.pdf.

*****

Annex A. Detailed checklist of elements to be assured

A.1. The detailed checklist is a supporting document aimed at assisting the implementation of the United Nations National Quality Assurance Framework (UN NQAF) in Chapter 3. It identifies possible activities, methods and tools that can provide guidance and evidence for the implementation of the UN NQAF principles and requirements. It should be noted that not all elements from the checklist are equally needed or relevant for all countries. However, they should be followed or assured as long as they are applicable.

A.2. The checklist comprises elements to be implemented or secured on both system/institutional and process/product level. The order of listing from general to more specific elements indicates the levels, but the responsibilities are normally clear from their content and the context given by the requirements they refer to.

Level A. Managing the statistical system

Detailed checklist for Principle 1: Coordinating the national statistical system

Requirement 1.1: A statistical law establishes the responsibilities of the members of the national statistical system including its coordination. Its members are identified in a legal or formal provision.

- The coordination role of the national statistical office or other body is defined in a statistical law.
- The criteria for official statistics and membership in the NSS are specified in a statistical law.
- Members of the national statistical system are identified in additional regulations or provisions.
- Responsibilities for NSS members comprise quality assurance and the specification of their contribution to official statistics.

Requirement 1.2: There are a body and mechanisms for the coordination of the national statistical system for activities at the local, national, regional and international level.

- The national statistical office and other statistical agencies have documented agreements on how to ensure coordination and quality of official statistics (including the exchange of data and statistical products within the national statistical system).
- The coordination body can be a statistical council headed by the national statistical office with the following objectives: system-wide planning, implementing, and evaluating the development, production and dissemination of official statistics and ensuring their quality.
- The coordination body has the following responsibilities:

- To set, monitor and review guidelines for the development, production and dissemination of official statistics.
- To establish and maintain engagement with advisory bodies, academic institutions and other regional and international bodies as appropriate.
- To coordinate data collection to improve cost effectiveness and reduce respondent burden, in particular coordinating sample surveys.
- To monitor the use of agreed standards, concepts, classifications and methods throughout the NSS.
- To promote and enhance data sharing within the NSS and data exchange with members of the extended data ecosystem.
- To promote sharing of technical knowledge and good statistical practices.
- To offer training in the production of official statistics.
- To offer training in good practices applicable for Sustainable Development Goals (SDGs).

- Processes for evaluation of the quality of the statistics are developed and applied within the NSS.

Requirement 1.3: There is a mechanism for considering statistics produced outside the national statistical system, and if appropriate, for these statistics to become official.

- The body coordinating the national statistical system such as a statistical council considers statistics produced outside this system as well. Examples of such statistics are some of the Sustainable Development Goal (SDG) indicators.
- The coordination body or a task force composed by members of various statistical agencies can be given the responsibility for the evaluation of the quality of relevant statistics outside the NSS (e.g. some Sustainable Development Goal (SDG) indicators).
- There is a unit such as a task force that discusses and provides support for the use of other data sources within the national statistical system.

Requirement 1.4: There is a national plan or program for the development and production of official statistics.

- The national plan for the development of official statistics undergoes consultation among statistics producers, users and data providers.
- The national plan for the development of official statistics is approved and endorsed by a statistics council for adoption and implementation in the national statistical system.
- The programs and activities in the national plan for the development of official statistics are monitored on a regular basis.

Detailed checklist for Principle 2: Managing relationships with data users, data providers and other stakeholders

Requirement 2.1: Stakeholders are identified and consulted regarding their interests, needs and obligations.

- The statistical agencies clearly identify all of its stakeholders.
- There are processes in place to consult stakeholders on their needs and concerns on a regular basis.
- Stakeholders are kept informed on actions taken to address their needs and concerns.

Requirement 2.2: The statistical agencies have a strategy and institutional arrangements to engage with their users.

- Agreements with the main users of the statistics are in place (e.g. with respect to what will be supplied by the agency, the product quality of the statistics, the dissemination format etc.).
- There is a mechanism for users to engage with statistical agencies on their own terms, such as through a press office or government liaison office (e.g. anyone can make a telephone call and speak to someone at the statistical agency about a particular dataset or statistic).
- There are subject-specific user committees.
- There are processes in place for consulting users when new statistics are developed, or existing statistics are reviewed.
- There are processes and arrangements (such as a user committee) in place for users to advise statistical agencies about their emerging needs and priorities.

See also checklist for Principle 14 on relevance.

Requirement 2.3: The statistical agencies continuously maintain and develop cooperation with funding agencies, academic institutions and international statistical organizations, as appropriate.

- The statistical agency's work plans and budgets can be shared with the funding agency to ensure mutual understanding of funding requirements and trade-offs.
- Statistical agencies maintain and develop cooperation with the scientific community to improve methodology and to promote use of better tools.
- Statistical agencies are engaged in international statistical cooperation (with United Nations (UN), regional statistical coordinating bodies and statistical agencies in other countries), normally with the national statistical office as the focal point.

See also Principle 1 on coordinating the national statistical system.

Requirement 2.4: The national statistical office and, if appropriate, other statistical agencies have the legal authority or some other formal provision to collect data for the development, production and dissemination of official statistics.

- The statistical law provides appropriate provisions to guarantee the national statistical office (NSO) and if appropriate other statistical agencies the right to collect data for statistical purposes.
- Based on the legislation, the statistical agencies should be able to compel response such as fines to ensure participation in specific statistical surveys including censuses.

Requirement 2.5: The national statistical office and, if appropriate, other statistical agencies have the legal authority or some other formal provision to obtain administrative data and adequate access to these data from other government agencies for statistical purposes.

- The statistical law provides appropriate provisions to guarantee the national statistical office (NSO) and if appropriate other statistical agencies the right to timely obtain or access administrative data.
- Where statistical agencies do not have a legal right to obtain administrative data, memoranda of understandings are in place that provide such access.
- The statistical agencies' access to administrative data are free of charge.
- Agreements with owners of administrative data are in place to operationalize the legal or other provisions, including a quality report describing technical conditions, accuracy, completeness, timeliness, punctuality, and integrability of the data[83].
- The statistical agencies shall be involved in the design, development and possible discontinuation of administrative data, in order to make them suitable for statistical purposes.

Requirement 2.6: The national statistical office and, if appropriate, other statistical agencies have the legal authority or some other formal provision and related agreements to access and use data (including "big data") maintained by private corporations or other non-governmental organizations for statistical purposes on a regular basis, including for testing and experimentation.

- The statistical law guarantees that private corporations or other non-governmental organizations have to share the data they maintain with the national statistical office (NSO) and if appropriate other statistical agencies for statistical purposes in a timely manner and clearly defines which entities are subject to these regulations (e.g. all corporations that provide services to individuals and legal entities residing in the country).

[83] See for example Report on methods preferred for the quality indicators of administrative data sources available at: http://www.pietdaas.nl/beta/pubs/pubs/BLUE-ETS_WP4_Del2.pdf.

- The statistical law foresees adequate sanctions to ensure access to privately-held data where appropriate (such as fines for not granting such an access).
- Where statistical agencies do not have a legal right to obtain access to data maintained by corporations or other non-governmental organizations, memoranda of understandings are in place that provide such access.
- The statistical agencies consider the relevance and the scope of data requested.
- The access and use of privately-held data follow standard procedures agreed between the statistical agencies and owners of the data.

Requirement 2.7: The national statistical office cooperates with and provides support and guidance to data providers.

- The national statistical office has a practice of regularly consulting data providers.
- The national statistical office maintains cooperation with the providers of administrative data and records maintained by corporation, business and other organizations to strengthen the statistical value and usage of these sources.
- Statistical agencies are informed and involved in design, development and possible discontinuation of administrative data to ensure their use for statistical purposes.
- There are agreements on the submission of data to the national statistical office regulating the terms of data deliveries.
- Quality reports for administrative data are developed in cooperation with the national statistical office (NSO) and the data owner.
- Holders of administrative data, businesses and other organizations receive feedback on the quality of the data provided allowing for further improvements.
- Partnership agreements with data providers are in place.

Detailed checklist for Principle 3: Managing statistical standards

Requirement 3.1: The statistical agencies cooperate in the development and implementation of international, regional and national statistical standards.

- The national statistical office actively works with other statistical agencies and international statistical organizations in developing, reviewing, promoting and implementing statistical standards.
- The national statistical office has an organizational unit responsible for taking the lead in the development of statistical standards and for supporting statistical programs/domains in its efforts to develop standards.
- Statistical standards include a statement regarding the degree to which their application is compulsory.
- All relevant staff in statistical agencies are aware of statistical standards and any changes made to them.
- There is a list of all standard classifications available in all statistical agencies.

- The process for originating, developing and approving statistical standards involves data providers.
- Concordances to previous statistical standards exist when new standards are implemented.
- The potential impact on the statistics of changes in the standards is investigated in advance.
- The agencies use conceptual frameworks, such as the System of National Accounts, that provide a basis for consolidating statistical information about certain sectors or geographical entities.
- Periodic reports are prepared to the extent to which statistical standards are used.
- Statistical standards are communicated to all potential data users and to the public.
- Statistical standards are regularly reviewed.

Requirement 3.2: The national statistical offices provide support and guidance to all data providers and producers of official statistics in the implementation of statistical standards.

- The statistical agencies monitor the extent to which statistical standards are used by data providers and producers of official statistics.
- Statistical standards are made available to all data providers and producers of official statistics.
- Plans and timelines for the development and application of new standards are communicated in advance.
- The national statistical offices assist others to implement statistical standards as appropriate.

Requirement 3.3: Divergences from the international, regional or national statistical standards are kept to a minimum, documented and explained to all stakeholders.

- Concordance tables to international, regional and national standard classifications are available.
- The adopted concepts, definitions and classifications are mapped with the standards, and the mapping table is available.

Level B. Managing the institutional environment

Detailed checklist for Principle 4: Assuring professional independence

Requirement 4.1: A law or other formal provision explicitly declares that statistical agencies are obligated to develop, produce and disseminate statistics without interference from other government agencies or policy, regulatory or administrative departments and bodies, including from within the statistical agencies, private sector or any other persons or entities.

- If there is no law nor formal provision declaring the necessity of professional independence, there are traditions or cultures of professionalism, historical precedents or conventions which are clearly recognized as essential to the credibility of the statistical results of the statistical agencies.

Requirement 4.2: The appointment of the heads of the national statistical office, and other statistical agencies where appropriate, is based on professional criteria and follow transparent procedures. Reasons for dismissal cannot include reasons affecting professional independence. The heads of the statistical agencies are of the highest professional caliber.

- National legislation provides clear and detailed description of the procedure for appointment and dismissal of the head of the national statistical office.
- The rules applied for appointing, assigning position and responsibilities and dismissing the heads of the statistical agencies are based on professional competence, transparent and free from political considerations.
- The processes are in place to ensure that the heads of the statistical agencies are of the highest professional calibre and have sufficiently high hierarchical standing to ensure senior level access to policy authorities and administrative public bodies.
- The basis of which the head of statistical agency's incumbency can be terminated are specified in the legal framework. These cannot include reasons affecting professional or scientific independence.

Requirement 4.3: The head of the national statistical office and other statistical agencies where appropriate has sole responsibility over the decisions on statistical methods, standards and procedures, and on the content and timing of statistical releases.

- The reporting system from the head of the national statistical office (NSO) to the owner ministry does not affect the professional independence on how to produce statistics.

Detailed checklist for Principle 5: Assuring impartiality and objectivity

Requirement 5.1: There is a law or formal provision in force, which is publicly available, and which specifies that statistical agencies should develop, produce and disseminate statistics following professional standards and treat all users in the same way.

- If no law nor formal provision on impartiality exists, cultures and traditions of impartiality exist which assure the impartiality and objectivity of the statistics produced by the statistical agencies.

Requirement 5.2: The statistical agencies implement a declaration or code of conduct or ethics which governs statistical practices, and compliance with it is followed up.

- Guidelines for assuring impartiality and objectivity exist, are available for the public, and the implementation of the guidelines is followed up.

Requirement 5.3: Data sources and methodologies are chosen on an objective basis.

- Sources, concepts, methods, processes and data dissemination paths are chosen on the basis of statistical considerations, national and international principles and best practices.

Requirement 5.4: Statistical releases are clearly distinguished from political/policy statements.

- Statistical releases and statements made to the media are objective.
- Appropriate internal and external communication strategies exist that include recognizable logos, designs or formats for statistical agencies' products to identify them as not being associated with the political or policy bodies.

Requirement 5.5: Statistical release dates and times are pre-announced.

- A publicly available and easily accessible release calendar containing information on the releases planned in the upcoming 12-month period exists.
- Statistics are released at a fixed date and time, with time specification as appropriate.
- Changes in the release calendar are announced in advance and their reason is explained.
- In cases where privileged pre-release access is given, it is controlled.

Requirement 5.6: In the case that errors are detected, they are corrected as soon as possible, and users are informed about how they affected the released statistics.

- There is a formal policy as how to deal with errors, how to react when they are discovered and how they are corrected. The error treatment policy is publicly available.

Requirement 5.7: The statistical agencies comment publicly on statistical issues, misinterpretation and misuse of official statistics, as appropriate.

- There is a formal policy or well-established custom entitling statistical agencies to comment publicly on statistical issues, criticisms, misinterpretations and misuses of official statistics.
- The statistical agencies respond, as appropriate, to negative media reporting to ensure fair reporting of its position.

Detailed checklist for Principle 6: Assuring transparency

Requirement 6.1: The terms and conditions for producing and disseminating official statistics are available to the public.

- There is a standard procedure for ensuring that respondents understand the legal basis for a survey and the confidentiality provisions for the data that are collected.
- Information on methodology, source data and statistics techniques used is publicly available.
- The documentation on statistical standards are available to the public.
- Advance notice of major changes in methodology, source data, or statistical techniques is given.
- The dissemination policy is shared with the public.
- If privilege pre-release access to statistics is allowed, this is publicly disclosed.
- Any exceptions to the general confidentiality provisions, including those for scientific purposes, are publicly available.

Requirement 6.2: The terms and conditions for the governance and management of statistical agencies are available to the public.

- The procedures to be followed for the appointment and dismissal of heads of the statistical agencies and the hiring and release of staff are publicly available.
- The procedures for the reporting to and dialogue with the supervisory / owner body of the statistical agency (e.g. ministry) are well defined, established and known to the public.

- Procedures are in place for regularly publishing the statistical work programs and for issuing periodic reports to describe progress made.

Detailed checklist for Principle 7: Assuring statistical confidentiality and data security

Requirement 7.1: Statistical confidentiality is guaranteed by law.

- There is a law or some other clear formal provision in force that guarantees the proper management, with regard to privacy and security, of information received from data providers.
- If and where the statistical law provides exceptions to the general confidentiality provisions, clear policies and procedure are in place, and they are made public to operationalize the exceptions.

Requirement 7.2: Appropriate standards, guidelines, practices and procedures are in place to ensure statistical confidentiality.

- Guidelines and instructions are provided to statistical agency staff on the protection of statistical confidentiality throughout the statistical business processes.
- Regular and continuous training programs for all staff is held to educate the concept of confidentiality in the statistics and privacy practices.
- The organizational structure for the development and implementation of data confidentiality procedures is commensurate to the needs.
- The staff sign confidentiality commitment on appointment, which is valid also after staff leave the agency.

Requirement 7.3: Strict protocols to safeguard data confidentiality apply to users with access to microdata for research or statistical purposes.

- Clear conditions for granting researcher access to confidential data for scientific purposes are set in the statistical law.
- Confidentiality rules, disclosure control and microdata access procedures apply throughout the statistical business process.
- The statistical agencies monitor the use of microdata sets to identify any circumstances in which data confidentiality may be breached, for example, through file matching, and they take immediate corrective action to redress this situation.

Requirement 7.4: Penalties are prescribed for any willful breaches of statistical confidentiality.

- There are legal or other provisions in place on administrative, penal and disciplinary sanctions for violation of statistical confidentiality.

- Provisions and sanctions are available to the public.

Requirement 7.5: Security and integrity of data and their transmission is guaranteed by appropriate policies and practices.

- An IT security policy is in place and known to the staff.
- Following the IT policy, appropriate physical security measures and processes are in place to check that data security is ensured, in accordance with best practices and international standards.
- Appropriate physical and information technology security procedures are in place to ensure the protection of statistical databases.
- Regular security audits of the data security system are carried out.
- All access to data repositories and transmission channels are monitored.
- While data are being transferred, risk of a breach is assessed and appropriate procedures are applied to eliminate or minimize this risk.

Requirement 7.6: The identification risk of individual respondents is assessed and managed.

- The consideration of the level of risk that is acceptable should be balanced with consideration of the level of utility retained in the data
- Appropriate processes are in place to assess the risk of disclosure of sensitive information and the risk that individual respondents can be identified from the public release of statistics or of microdata, and procedures are applied in line with the data dissemination policy to minimize this risk.
- Where there is a risk of identification of individuals from the public release of statistics or microdata, and this risk is considered to be above a maximum acceptable level, then the data or microdata are not disseminated.
- All procedures that are taken to adequately reduce the risk of identification are properly documented and made available as part of the metadata related to the statistical dataset.
- Users are made aware that procedures to reduce the risk of identification have been implemented and that this could lead to a loss of information.

Detailed checklist for Principle 8: Assuring the quality commitment

Requirement 8.1: There is a quality policy or a statement of the statistical agency's commitment to quality, which is publicly available.

- The statistical agency's policy, declaration or message about its commitment to quality in statistics clearly conveys and promotes the shared concern for quality of all of its staff and includes information about trade-offs affecting the statistical work program, and this policy is made public.

- The statistical agency has quality guidelines that are made available to external users, at least in a summary version.

Requirement 8.2: The statistical agencies promote a culture of continuous improvement.

- A culture of continuous improvement is promoted that systematically fosters the documentation of methodology and processes, the exchange of good statistical practices and monitoring, assessment and improvement of the quality of statistical operations.
- Procedures are in place to ensure that the required documentation on quality is regularly updated.
- A quality assurance plan or similar mechanism is in place to describe the working standards, the formal obligations (such as laws and internal rules) and quality control actions to prevent, monitor and evaluate errors and to control different points at each stage of the statistical process.
- Work plans, schedules and standard forms or templates are used for facilitating the updating of the documentation on quality in a consistent way.
- Statistical agencies use general quality systems or frameworks (in addition to an national quality assurance framework (NQAF)) such as Total Quality Management (TQM), International Organization for Standardization (ISO) 9000, quality initiatives of the European Statistical System and other regional statistical bodies.

Requirement 8.3: There is a specific body responsible for the quality management or the coordination of quality management within the statistical agency, and it receives necessary support to fulfil this role.

- A quality manager, quality committee, unit or group of coaches or advisers is assigned responsibility for quality management.
- Expert group meetings on relevant quality subjects are held regularly.

Requirement 8.4: The NSS staff receives training on quality management.

- Staff training and development programs are in place to ensure staff are aware of the statistical agency's quality policy and have an understanding as to how quality may be achieved.
- A staff awareness "campaign" is undertaken to emphasize the statistical agency's commitment to quality.

Requirement 8.5: Guidelines for implementing quality management are defined and made available to the public.

- Guidelines for implementing quality management are defined which:

    - describe the entire statistical process and identify relevant documentation for each stage of production;
    - describe the methods for monitoring the quality of each stage of the statistical production process;
    - identify the indicators (quality measures) for evaluating the quality of the main stages of production, including indicators for source data.
- Guidelines, methodological manuals and handbooks on recommended practices are made available to the public.
- Mechanisms are in place to assure the quality of data collection (including the use of administrative data and other sources) and data editing.

Requirement 8.6: Indicators on statistical output quality are regularly measured, monitored, published and followed up to improve statistical products and processes.

- Quality reports which are serving both producer and user perspectives are prepared, published as appropriate, and monitored regularly.
- Examples of quality indicators to be measured and monitored:
    - References in media, hits on website, results from user satisfaction surveys (relevance)
    - Standard deviations and other measures of accuracy, response rates (accuracy)
    - Revisions (reliability)
    - Timeliness
    - Punctuality

Requirement 8.7: Statistical products and processes undergo periodic reviews.

- Periodic quality reviews of key products and processes to assess adherence to internal guidelines and international standards are performed.
- Both internal and external experts can participate in the review teams.
- The statistical agency's internal reviewers are trained in auditing methods and tools.
- Improvement actions arising from the result of quality reviews are defined and scheduled for implementation.
- Top management is informed of the results of reviews to follow up improvement actions.
- Benchmarking of key statistical processes with other statistical agencies are carried out to identify good practices.
- Procedures are in place to monitor and manage the quality of different stages of the statistical production according to the Generic Statistical Business Process Model (GSBPM).
- Trade-offs within quality are systematically examined (e.g. trade-offs between accuracy, timeliness and costs).
- External experts (also from international organizations) conduct quality reviews, e.g. reviews of key statistical domains (for example International Monetary Fund's

Reports on the Observance of Standards and Codes (ROSCs)) or other reviews such as peer reviews, external audits, and rolling reviews.

Requirement 8.8: Risk analyses addressing the quality of important statistical products and processes are performed.

- Risk and quality management are closely coordinated (e.g. by institutional arrangements and regular meetings if responsibilities for these activities are placed differently).
- Risks linked to core recommendations and principles in national quality assurance framework (NQAF) (e.g. for lack of independence and confidentiality breaches) are analyzed and measures taken if needed to improve compliance.
- Risk analyses addressing the quality of different stages of the statistical production are conducted according to the Generic Statistical Business Process Model (GSBPM).
- Risk analyses addressing the quality of important statistical products such as population statistics and censuses, national accounts and Consumer Price Index (CPI) are performed (e.g. risk of poor accuracy expressed by errors, poor timeliness and lacking comparability).

Detailed checklist for Principle 9: Assuring adequacy of resources

Requirement 9.1: Financial, human and technological resources are sufficient to implement the statistical work and development program.

- Resource allocation is reviewed on a regular basis.
- A resource mobilization strategy such as a National Strategy for the Development of Statistics (NSDS) are in place.
- The annual working plan is feasible given the available resources.
- Costs (human and financial) of each stage of the production processed are measured.

Requirement 9.2: Planning and management principles are aimed at the optimal use of available resources.

- Information technology is pursued to increase efficiency.
- Standardization of statistical production and dissemination is pursued as a way to increase efficiency and savings.
- The statistical program uses data from existing sources, where appropriate.
- Data processing operations are combined to increase efficiency.

Requirement 9.3: The statistical agencies' use of resources is reviewed.

- Indicators of human and financial resources are monitored centrally and regularly reported to management.
- Human resources are evaluated annually in line with office-wide guidelines. The evaluation covers allocation, performance and training needs of staff.

Level C. Managing statistical processes

Detailed checklist for Principle 10: Assuring methodological soundness

Requirement 10.1: The methodologies applied by the statistical agencies are consistent with international standards, guidelines and good practices and are regularly reviewed and revised as needed.

- Organizational structures developing methodologies and supporting in the methodological work exist and are commensurate to the needs.
- There are management processes in place that allow the management of the statistical agency to be assured that sound methodological approaches have been adopted in producing the statistical outputs.
- The methodologies of surveys and the use of administrative data and other sources of data are evaluated periodically to guarantee high quality statistical outputs.
- There are mechanisms allowing statistical agency to review the methodology, and to advise on the methodology used by an independent body that may carry out the statistical production process on behalf of the agency.
- There is cooperation with the scientific community to improve methodology and the effectiveness of the methods implemented, and to promote better tools.

Requirement 10.2: The statistical agencies recruit qualified staff and have regular programs to enhance their methodological skills.

- Staff of the statistical agency are recruited with the relevant discipline and have the appropriate qualifications.
- Appropriate qualifications requirements are specified for all posts.
- Training and development programs are in place to ensure the staff acquires and continuously update their methodological knowledge.
- Staff skills are updated concerning new data sources, tools and fields of work.
- Attendance of staff at relevant training courses and/or to national or international conferences is encouraged.

Requirement 10.3: Statistical agencies are to choose the data source with regard to accuracy and reliability, timeliness, costs, the burden on respondents and other necessary considerations.

- There is explicit consideration of alternative sources of data, including the availability of existing survey data, administrative data, "big data" or other sources of data, to minimize the respondent burden.
- Quality has to be assessed when using administrative data[84] or other data sources. Ideally, when using administrative data, it should be assured that:
    - the population is consistent with the statistical output requirements;
    - the classifications are appropriate;
    - the underlying concepts are appropriate;
    - the records are complete and up to date;
    - the geographical coverage is complete and the measurement units are appropriately defined/identified.
- When using other data sources (such as big data), methodological challenges in particular linked to the statistical population and the veracity and volatility of such data have to be considered.

Requirement 10.4: The registers and the frames for surveys are frequently evaluated and adjusted.

- Systematic approach is in place for updating the survey frame to ensure accurate coverage of target population and absence of duplication of data.
- For all surveys the appropriate statistical population frames are updated regularly.
- Information gathered during the conduct of surveys is used to assess and improve the quality of the frame, especially its coverage and the quality of the contact variables and the auxiliary information (variables used in the sampling design).

Requirement 10.5: The statistical agencies cooperate with the scientific community to improve methods and promote innovation in development, production and dissemination of statistics.

- Collaboration with the scientific community is in place, for example through conferences, workshops, task forces, and training/courses, to discuss methodological, IT and innovation developments, e.g. in exploiting new data sources.
- There are agreements with academic institutions on cooperation and exchange of qualified personnel.
- Staff collaborate on methodological issues with colleagues at international level.
- Regular participation and presentations at relevant national and international conferences is encouraged for exchange of knowledge and experiences.

[84] See for example Report on methods preferred for the quality indicators of administrative data sources available at: http://www.pietdaas.nl/beta/pubs/pubs/BLUE-ETS_WP4_Del2.pdf.

- National and international conferences, seminars, workshops, or similar events with the participation of the scientific community are organized by the statistical agencies.

Detailed checklist for Principle 11: Assuring cost-effectiveness

Requirement 11.1: Costs of producing all individual statistics are measured and analyzed, and mechanisms are in place to assure cost-effectiveness of statistical activities or processes.

- There is a system for registering cost and time used for all statistical products and processes if appropriate.
- The costs of producing the statistics are well documented at each phases of statistics processes and regularly reviewed to assess their effectiveness.
- Cost–benefit analyses are carried out to determine the appropriate trade-offs in terms of data quality.
- The need for each variable to be collected is justified.
- There is an ongoing review process that considers whether a particular program is still operating in the most cost-effective way to meet its stated requirements.
- The cost-effectiveness of every statistical survey is assessed.

Requirement 11.2: Procedures exist to assess and justify demands for new statistics against their cost.

- Demands for new statistics are regularly registered, assessed with respect to methodology and costs and discussed by management, based on inputs from users and cooperation with other stakeholders.
- Before contemplating a new data collection, there are mechanisms to review whether already available data sources can be utilized with minimal impact on their purpose and quality.
- A cost-benefit analysis is conducted.

Requirement 11.3: Procedures exist to assess the continuing need for all statistics, to see if any can be discontinued to free up resources.

- There are regular discussions by management on the usefulness of all statistics, based also on inputs from users such as the results of user satisfaction surveys.

Requirement 11.4: Modern information and communication technologies are applied to improve the performance of statistical processes.

- Centralized IT and methodological units provide possibilities for pooling resources and investments and the identification of innovation/modernization potential.

- An appropriate IT architecture and strategy exists and is regularly reviewed and updated when needed.
- IT infrastructure is reviewed regularly.
- Routine clerical operations (e.g. data capture, coding, data editing) are automated where possible and are regularly reviewed.

Requirement 11.5: Proactive efforts are made to improve the statistical potential of administrative data and other data sources.

- Appropriate arrangements (e.g. service level agreements or national legislation) are signed with owners of administrative data and other data sources collections regarding access to the data, flow of data and metadata and communications, and regularly updated.
- An assessment of possible administrative data sources is carried out prior to launching any new survey regarding accessing and processing data in terms of its cost effectiveness.
- Data linking and integration methods are pro-actively pursued subject to data security considerations.
- Changes in administrative data legislation are monitored and their impact on the statistical production assessed.
- Quality reports for administrative data used for official statistics are established by the responsible statistical agency in cooperation with the data owners.

Requirement 11.6: The statistical agencies define, promote and implement integrated and standardized production systems.

- The statistical agencies have strategies of re-engineering of the production methods of statistics, going from a production system often based on numerous parallel processes to more integrated production models.
- The statistical agencies promote, share and implement standardized solutions that increase effectiveness and efficiency.
- Statistical business architecture of the statistical agency is based on standards like Generic Statistical Business Process Model (GSBPM), Generic Activity Model for Statistical Organizations (GAMSO), Common Statistical Production Architecture (CSPA), Statistical Data and Metadata eXchange (SDMX).
- A statement explaining steps taken to move gradually towards or to comply with standardization is part of the related product/process metadata.

Detailed checklist for Principle 12: Assuring appropriate statistical procedures

Requirement 12.1: Statistical processes are tested before implementation.

- The testing strategy is included in the design phase of the statistical business process model.
- In the case of statistical surveys, questionnaires are tested using appropriate methods (e.g. questionnaire pre-test, pilot in real situation, in depth - interviews, focus groups, interviewer support, etc.).
- Data capture and data collection tools/instruments (e.g. electronic questionnaire, acquisition web site) are tested and adjusted (if required and possible) prior to the actual field operation or data collection process.
- Data treatment and data processing procedures are tested and adjusted (if required and possible) prior to the actual application of procedures on the collected data.
- During building and enhancing process components, functional testing like volume testing and stress testing are executed.
- Administrative and other data sources collection systems/interfaces are tested before incorporating into statistical processing.
- Testing of formats and timetable for acquiring administrative and other data sources are performed and considered in final implementation.
- Conversion of administrative or other units into statistical units, whenever necessary, is tested before incorporating into production.
- In the case of integrating data from one or more sources, the quality of the linkage procedures is tested.
- Test results are considered in the process of implementing the final stages and signed off.

Requirement 12.2: Statistical processes are well established and regularly monitored and revised as required.

- The statistical agencies have documented procedures and provides guidelines, recommendation and appropriate methodologies for all steps of the statistics production.
- A policy for archiving data and statistics is in place.
- Statistical procedures employ internationally recognized statistical techniques.
- For all data sources, data are reviewed and validated to identify potential problems, errors and discrepancies such as outliers, missing data, and miscoding. These activities may occur alongside collection activities, particularly for computer assisted data collection modes such as web collection.
- In the case of survey, the updated frames are used, and the sampling design is based on the sound methodology.
- Edit and imputation methods are applied in statistical surveys and based on sound methodology.

- Analysis of the effect of editing and imputation is undertaken as part of assessing quality of the data collection.
- Data collection instruments are designed to minimize coding cost and time.
- The questionnaire design allows for automated data capture.
- In the case of using administrative or other data sources, statistical processing including appropriate validation rules, dealing with missing data, building statistical units, deriving new variables and specific procedures for quality checks, is implemented by statistical agencies.
- Each database (including from administrative and other data sources) has unique codes/keys/identifiers which makes the data linkage possible.
- Data linkage is based on good quality linkage keys (such as personal or business ID numbers) and the performance of the procedure is possible assessed in terms of false links, false non-links and differences in the distributions between linked and non-linked units.
- Proper follow-up procedures are planned and implemented in the case of non-response, also for handling inconsistencies.
- The format of the database is compatible with different statistical software that is usually used for compilation and data analysis.
- When coding is done through an automated process, a team of well-trained coders is assigned to handle un-coded cases.
- When statistical modelling is used in production (e.g. in seasonal adjustment), the validity of model assumptions is carefully considered and the impact on final estimates evaluated.

Requirement 12.3: Procedures are in place to effectively use administrative and other data sources for statistical purposes.

- Statistical agencies provide tools and guidelines to assess the quality of the administrative and other data sources.
- Applications for the collection, processing and analyzing administrative and other data sources to be used for statistical purpose are developed and implemented.
- Holders of administrative and other data sources inform the statistical agencies of any changes made in the process of data production.
- Metadata related to administrative or other data sources is available to the statistical agencies. This includes concepts and definitions, classifications, target population and methodological aspects.
- Documentation exists describing the differences between administrative and statistical processes in terms of definitions, concepts, coverage, etc.

See also principle 11 on cost-effectiveness.

Requirement 12.4: Revisions of statistics follow standard and transparent procedures.

- A revision policy stating that principles and procedures follow international standards exists.
- Guidelines and principles for revisions exist.
- Revisions of the published statistics are accompanied by metadata that provide necessary explanations and follow metadata standards.
- Indicators expressing the amount and types of revisions are computed and evaluated for improvement.

Requirement 12.5: Metadata and documentation of methods and different statistical processes are managed throughout the processes and shared, as appropriate.

- There is a policy on metadata documentation and standards on updating metadata.
- Work on preparing statistics and their related metadata should be done in parallel.
- A system is in place for documentation and archiving all the documents produced during the implementation process. It is accessible for current and later use in order to monitor and evaluate the process, identify lessons learned and utilize for the statistical practices in the future.
- Metadata is captured throughout the statistical business process and stored in metadata management systems.
- Documentation of methods and processes is sufficient enough to recreate the whole production chain from the beginning.
- Guidelines for metadata on data, processes, methodological specifications and quality are available to process managers.

Detailed checklist for Principle 13: Managing the respondent burden

Requirement 13.1: The range and detail of requested information is limited to what is necessary.

- A determination is made as to whether the required data can be produced with less respondent burden by modifying an existing survey rather than instituting a new survey (including the possibility of using a sub-sample of an existing survey).
- Use of any data items that are the same or similar to those collected in another survey is limited to what is considered necessary for verification and possible data linkage purposes.
- There is explicit consideration of alternative data sources, including the availability and suitability of existing survey and administrative or other data sources.
- The burden on respondents is measured and considered in the quality reports.

Requirement 13.2: Mechanisms are in place to promote the value and use of statistics to respondents.

- Information packages that demonstrate the value of official statistics are provided to respondents.
- Respondents are provided with the final reports or result of the census or sample survey in which they participated.
- Initiatives with community groups, schools, business advocates and others are undertaken to raise awareness of the value of official statistics.
- Internet-based products are developed that give necessary statistical information to businesses and individuals, and these products are promoted through initiatives with communities and respondents.
- A presence on social media is set up which provides, for example, key population and economic indicators.
- There are standard practices to receive feedback from respondents and to respond to their requests and complaints in a regular manner.
- Respondents are provided with necessary information about survey. This information consists of: the purpose of the survey (including the expected uses and users of the statistics to be produced from the survey), the authority under which the survey is taken, the collection registration details, the mandatory or voluntary nature of the survey, confidentiality protection, the record linkage plans and the identity of the parties to any agreements to share the information provided by those respondents.

Requirement 13.3: Sound methods including IT solutions are used in surveys to reduce or distribute respondent burden.

- Appropriate sampling techniques are used to minimize sample sizes to achieve the target level of accuracy.
- Sample surveys are coordinated to distribute the burden on respondents.
- Multiple modes of collection are offered to respondents, including electronic reporting initiatives, which are cost-effective and affordable from a respondent perspective.
- Collection of data is done at the most appropriate time of the day or the year.
- When possible, surveys are conducted from central registers or other common frames to better record, assess and control respondent burden.
- Questionnaires are tested to ensure simplicity, unambiguity, minimal intrusion on privacy and to respect public sensitivities and overall social acceptability.

Requirement 13.4: Data sharing, data linkage and use of administrative and other data sources are promoted to minimize respondent burden.

- Documentation of repositories for production and archived data exists.

- Technical tools for data sharing and data linkage within the national statistical system (e.g. formal agreements, web services, common databases) exist.
- Data archives are shared between statistical agencies for production of official statistics and in compliance with confidentiality policies.
- Information of quality of data to be linked exists (e.g. on coverage and linkage possibilities).
- Integration of surveys is promoted.

Level D. Managing statistical outputs

Detailed checklist for Principle 14: Assuring relevance

Requirement 14.1: Procedures are in place to identify users and their needs and to consult them about the content of the statistical work program.

- There is the legislation or some other formal provision which includes an obligation to consult with the main users of the statistics.
- Structured and periodic consultation processes (e.g., advisory council/committees or working groups) with key stakeholders and users is in place to review the content of the statistical program and the usefulness of existing statistics and to identify emerging data requirements.
- There is a well-publicized information or user support service, center or hotline available for the users to inform about their needs.
- Data sources meet user/stakeholder requirements, taking into consideration the conditions under which they would be available and any restrictions on their use.
- If current data sources do not fully meet user/stakeholder requirements, a strategy has to be proposed on how to fully meet user requirements.
- Procedures are in place to gather information on user needs.

Requirement 14.2: Users' needs and requirements are balanced, prioritized and reflected in the work program.

- Users' priority needs are met and reflected in the work program of the statistical agency.
- Procedures are in place to prioritize between different users' needs in the work program and strategic goals.
- The data on the use of statistics are analyzed to support priority setting.
- Periodic evaluation of the work program is carried out to identify emerging needs and lower priorities.
- There are processes in place to monitor and consult with stakeholders the relevance and practical utility of existing statistics (with respect to scope, level of detail, cost, etc.) according to emerging user needs.

Requirement 14.3: Statistics based on new and existing data sources are being developed in response to society's emerging information needs.

- An innovation laboratory to consider and experiment with new data sources is established.
- Possibilities of exploiting new data sources are regularly discussed by management, both with regard to replacing existing statistics and developing new ones.

Requirement 14.4: User satisfaction is regularly measured and systematically followed up.

- User satisfaction surveys/analyses or similar user studies are carried out and assessed regularly.
- Improvement actions arising from the user satisfaction surveys/analyses are defined and scheduled for implementation.
- User satisfaction surveys include questions on the opinions of users about metadata availability.
- Measures to assess satisfaction of main users with particular products are in place (e.g. specific user satisfaction survey/indicators on product level).

Detailed checklist for Principle 15: Assuring accuracy and reliability

Requirement 15.1: Source data, integrated data, intermediate results and statistical outputs are regularly assessed and validated.

- Systems for assessing and validating source data, integrated data, intermediate results and statistical outputs are developed and managed.
- Data sources and integrated data are systematically checked, and the used data are compared with data from other sources.
- Results are compared with other existing sources of information in order to ensure validity.
- Discrepancies in intermediate data are assessed and investigated.

Requirement 15.2: Sampling errors are measured, evaluated and documented. Non-sampling errors are described and, when possible, estimated.

- Procedures and guidelines are available on how to measure and manage (e.g. reduce) errors. It covers activities like:
    - identifying and describing sources of possible errors;
    - measuring and evaluation of sampling errors in sample surveys;

- when possible measuring and evaluation of non-sampling errors (response errors, coverage errors, errors linked to measurements, processing, analyses etc.);
- analysis and evaluation of errors to focus on improvement measures.

Requirement 15.3: Studies and analyses of revisions are carried out and used to improve data sources, statistical processes and outputs.

- Preliminary and revised data and statistics are clearly identified.
- Explanations about the timing, reasons for and nature of revisions are made available.
- Revision policy follows standard and transparent procedures in the context of each survey.
- Information on the size and direction of revisions for key indicators is used to improve the statistical process.
- Information on the size and direction of revisions for key indicators is provided and made public as appropriate.

Detailed checklist for Principle 16: Assuring timeliness and punctuality

Requirement 16.1: Timeliness of the statistical agency's statistics comply with international standards or other relevant timeliness targets.

- Timeliness of the statistical agency's statistics comply with dissemination standards for international organizations such as International Monetary Fund (IMF) or other relevant timeliness targets (e.g. requirements for Agenda 2030).
- Explicit consideration is given to overall trade-offs between timeliness and other dimensions of quality (e.g. accuracy, cost and respondent burden).
- Periodicity and frequency of statistics is considered in relation to quality dimensions such as timeliness, relevance and costs.

Requirement 16.2: The relationship with data providers is managed with respect to timeliness and punctuality needs.

- There are agreements on the planned delivery dates and format with data providers.
- Procedures are in place to ensure the effective and timely flow of data from providers and to statistical agencies.
- Follow-up procedures are in place to ensure timely receipt of data.

Requirement 16.3: Preliminary results can be released when their accuracy and reliability is acceptable.

- Consideration is regularly given to the possibility and necessity of releasing preliminary statistics, while also considering data accuracy and reliability.
- When preliminary statistics are released, they are clearly identified as such.
- Users are provided with appropriate information on the quality of the preliminary statistics.
- Preliminary results which are subject to revisions follow the revision policy.
- Final results are clearly distinguished from preliminary results.

Requirement 16.4: Punctuality is measured and monitored according to planned release dates, such as those set in a release calendar.

- Punctuality is measured according to what is set in the release calendar at least 3 months ahead of publishing the relevant statistics.

Detailed checklist for Principle 17: Assuring accessibility and clarity

Requirement 17.1: Statistics are presented in a form that facilitates proper interpretation and meaningful comparisons.

- Statistics are presented in a clear and understandable manner.
- Guidelines that describe the appropriate content and preferred formats and style (layout and clarity of text, tables, and charts) of the agency's outputs are available to authors of statistical publications/databases.
- Published statistical data are open for free use, given that reference is made to the responsible agency.
- Staff training and development programs are in place on writing about statistics (for press releases, publication highlights or other explanatory texts).
- Outputs comply with the agency's guidelines for the content, and preferred format and style.
- There is a regular production of up-to-date methodological documents (on concepts, scope, classifications, basis of recording, data sources, compilation methods and statistical techniques), as well as quality reports, part of the work program of the statistical agency, and these documents and reports are made available to the public.
- Explanatory texts that accompany the data are reviewed for clarity and readability.
- Meaningful comparisons are included in the publications when appropriate.
- Preliminary and revised data are identified and explained in published statistics.
- All metadata are available to users, but those most relevant for them are published together with and directly linked to the disseminated statistics.
- A policy for archiving published statistics is in place.

Requirement 17.2: A data dissemination strategy and policy exist and is made public.

- The public are made aware that custom-designed outputs, statistics not routinely disseminated, and longer time series can be provided on request when feasible, and they are instructed how the data can be ordered. These outputs are made public where possible.
- Catalogues of publications and other services are made available to users.
- There is well-publicized information or user support services, centers or hotlines available for handling requests for data and for providing answers to questions about statistical results.
- Pricing policies are made public. While official statistics are normally free and accessible for everyone, statistics that need to be produced on request might have a cost corresponding to the extra work it requires.
- A strategy has been developed and agreed upon with stakeholders for the release of anonymized data, metadata and (possibly) microdata.

Requirement 17.3: Modern information and communication technology is used for facilitating easy access to statistics.

- Statistics are disseminated in various ways, with the agency's website as the main channel.
- Users are able to generate their own tables from statistical databases on web in the most appropriate formats (xls, html, etc.).
- Statistical data can be downloaded by an Application Programming Interface (API).
- Statistics are disseminated in ways that facilitate re-dissemination by the media.
- The statistical agency consults users on a regular basis to find out about the formats of dissemination that they most prefer.
- Agreements with key users are established for efficient and regular transmission of statistics and data.
- Technical solutions for access to anonymized data are available.
- Explicit consideration has been given to trade-offs between accessibility and confidentiality (i.e. level of detail in tables).

Requirement 17.4: Access to microdata is allowed for research purposes, subject to specific rules and protocols on statistical confidentiality that are posted on the statistical agency's website.

- The statistical agency controls or monitors the access by researchers to microdata by providing them in a secure environment.
- Researchers are consulted regularly about the effectiveness of the microdata access arrangements.

- Remote access facilities are available for accessing microdata, with appropriate control.

Requirement 17.5: Mechanisms are in place to promote statistical literacy.

- The statistical agencies have a strategy to manage media relationships and maintain regular contact with the media.
- The statistical agencies arrange regular training and outreach for journalists.
- The statistical agencies arrange training for students on how to use statistics.
- The publication of articles on statistical issues, and how statistics should be used properly, is encouraged.

Requirement 17.6: The statistical agencies have a dedicated focal point that provides support and responds to inquiries from users in a timely manner.

- There are user support services available to give prompt assistance to users to help them access and interpret the data.

Requirement 17.7: Users are kept informed about the quality of statistical outputs.

- Standard quality reports harmonized for the NSS, and tailored for different users' needs, are defined.
- Published statistics are accompanied by standard quality reports, including information on the periodicity of the statistics, data sources, production methods and quality, i.e. about accuracy and reliability, timeliness and punctuality, coherence and comparability, accessibility and clarity.
- Results from quality assessments or reviews are made public.

Detailed checklist for Principle 18: Assuring coherence and comparability

Requirement 18.1: International, regional and national standards are used with regard to definitions, units, variables and classifications.

- Statistical agencies promote the adoption of national, regional or international standards.
- Guidelines, a common repository of concepts, definitions of units and variables and classifications and other mechanisms exist.
- Compliance with international, regional or national standards for statistical production are periodically assessed. Any deviations from these standards are made explicit, along with reasons for such deviations.

Requirement 18.2: Procedures or guidelines are in place to ensure and monitor internal, intra-sectoral and cross-sectoral coherence and consistency.

- Statistics derived from different sources or with different periodicities (e.g. monthly, quarterly and yearly) are compared and any differences are explained and reconciled.
- Cooperation and the exchange of knowledge between individual statistical programs/domains is promoted.
- Process-specific procedures and guidelines are available to ensure that outputs are internally coherent.
- Major related statistics are analyzed before designing and launching a new individual statistical program/domain.
- Statistical outputs are compared with other statistical or administrative sources that provide the same or similar information on the same subject matter, and divergences are identified and explained to users.
- Internal procedures or guidelines are developed in order to ensure and monitor internal coherence and consistency.
- Specific procedures and guidelines are developed in order to ensure that outputs obtained from complementary sources are comparable and can be properly combined. Compliance is periodically assessed.
- Internal cooperation and exchange of knowledge is promoted, and organizational tools are in place (e.g. intranet fora and working groups).

Requirement 18.3: Statistics are kept comparable over a reasonable period of time and within geographical areas.

- Changes in methods are clearly identified and measured to facilitate reconciliation.
- Quality reporting includes a section on the assessment of internal consistency and comparability over time and with other subject matter related statistics.
- Breaks in the series are explained and the methods for ensuring reconciliation over a period of time are made publicly available.
- Effects of changes in methodologies on final estimates are assessed and appropriate information is provided to users.
- Significant changes in the society and phenomena to be measured are reflected by appropriate changes to concepts, classifications, definitions and target populations.
- Differences within geographical areas or at the country level due to different concepts or methodologies are explained.

Detailed checklist for Principle 19: Managing metadata

Requirement 19.1: The metadata management system of the statistical agency is well defined and documented.

- A strategy, guidelines and procedures are in place for metadata management and dissemination.

Requirement 19.2: Metadata are documented, archived and disseminated according to internationally accepted standards.

- International, regional, national or internal standards are used for metadata documentation, management and archiving.
- Processes are in place to ensure that metadata are documented according to standardized metadata systems, and regularly updated.
- Metadata are made available at the same time as the data and statistics to which they pertain.
- A systematic way for archiving metadata is available which also ensures that they are accessible for reuse in the future.
- A glossary of statistical concepts is publicly available.

Requirement 19.3: Staff training and development programs are in place on metadata management and related information and documentation systems.

- Process managers are trained to properly document the data and describe the relevant processes.
- Statistical agency staff participate in international metadata fora.