UNCTAD Statistical Quality Framework

Version 1

Foreword

UNCTAD promotes integration of developing countries into the world economy. Since 1964 it has progressively evolved into an authoritative knowledge-based institution whose work aims to help shape current policy debates and thinking on development, with a particular focus on ensuring that domestic policies and international action are mutually supportive in bringing about sustainable development. In this role, UNCTAD has three key functions: providing a forum for intergovernmental deliberations; undertaking research, policy analysis and data collection; and providing technical assistance tailored to the specific requirements of developing countries.

With regard to data collection, the organisation compiles, validates and processes a wide range of data obtained from national and international sources. These data cover almost all economies of the world and span long periods, with some dating back to 1948. Thus, statistics are an important aspect of UNCTAD's work, and maintaining the quality of UNCTAD data is vital. Quality needs to be constantly monitored and improved. It is important to demonstrate that UNCTAD statistics are of good quality. The recently developed *UNCTAD Statistical Quality Framework (USQF)* is a means of doing this.

The USQF comprises principles, quality dimensions, guidelines and assessment tools.

- The essential aspects of good statistics, of the statistical system that produces them, and of the environment within production takes place, are summarised in the form of a set of *statistical principles*. These principles are based on the *Principles Governing International Statistical Activities* developed by the Committee for the Coordination of Statistical Activities and welcomed by the UN Statistical Commission.
- Quality is defined in terms of eleven *dimensions.* The seven dimensions of output data quality are relevance, accuracy, credibility, coherence, timeliness and punctuality, accessibility, and interpretability. The four dimensions of process quality are sound methodology, sound systems, cost-efficiency, and effective internal data usage.
- The USQF contains a synopsis of the *statistical quality guidelines* that are needed to underpin the quality assurance of UNCTAD data outputs and processes.
- The USQF defines a *quality assessment program* comprising self-assessment and peer based assessment, complemented by external assessment when circumstances demand it. It also provides a set of quality and performance indicators and a quality self-assessment checklist.

The USQF targets *data producers and users within UNCTAD* by providing a basis for assessment of the statistical production processes and for formulating quality and performance improvements. It also targets *external data users* by describing the quality standards being applied by UNCTAD and the likely quality of statistics disseminated.

This is the first version of the USQF. Comments and queries are very welcome.

(signed….senior UNCTAD official)

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Abbreviations and Acronyms

CCSA	(UN) Committee for the Coordination of Statistical Activities
DSIB	Development Statistics and Information Branch
ECB	European Central Bank
ECB SQF	European Central Bank Statistics Quality Framework
ESCoP	European Statistics Code of Practice
ESS QAF	European Statistical System Quality Assurance Framework
GLOBstat	UNCTAD Statistical Database (internal)
GSBPM	Generic Statistical Business Process Model
IMF	International Monetary Fund
IMF DQAF	Data Quality Assessment Framework (developed by IMF)
OECD	Organisation for Economic Cooperation and Development
OECD QFG	Quality Framework and Guidelines for OECD Statistical Activities
OECD.STAT	Output database maintained by OECD
UNCTAD	United Nations Commission on Trade and Development
UNCTADstat	UNCTAD Statistical Database (external)
UNECE	United Nations Economic Commission for Europe
USIS	UNCTAD Statistical Information System
UN DATA	Database and data portal maintained by UNSD
UNSD	United Nations Statistical Division
USQF	UNCTAD Statistical Quality Framework
WTO	World Trade Organisation

1 Introduction

1.1 Purpose, Content and Uses of Statistical Quality Framework

Need for Quality Framework

In order to address quality and efficiency concerns in a harmonised way across the United Nations Commission on Trade and Development (UNCTAD) it is vital to have a commonly accepted statistical quality framework on the basis of which quality and performance can be evaluated. Such an assessment framework itself depends upon a commonly understood definition of quality and its dimensions, agreement on quality and performance indicators, and a quality assessment program. These are the components of the UNCTAD Statistical Quality Framework (USQF).

Here the term *quality* is interpreted in a broad sense, encompassing all aspects of how well statistical processes and outputs fulfil user and stakeholder expectations. Good quality outputs are statistics fit for purpose from the user perspective, more specifically meaning that they are relevant, accurate, credible, coherent, timely, accessible, and interpretable. They are produced by good quality processes, meaning processes use sound methodology, are cost-effective and put minimum burden on the organisations and individuals from whom the incoming data are acquired.

Several other international and supra-national organisations have well established statistical quality frameworks. The USQF has been developed taking advantage of these frameworks but adapting and elaborating the ideas to UNCTAD's unique circumstances.

The USQF is a statement of intent as well as a description of current good practices. The aim over the coming years is to ensure that all statistical products and associated processes are assessed in accordance with the framework and that quality and performance improvement possibilities are identified, considered and implemented.

Contents of UNCTAD Statistics Quality Framework (USQF)

The main body of the USQF comprises:

- *principles* governing UNCTAD statistical activities, with examples of good practices to illustrate each principle;
- *definitions* of *data quality* and *process quality* in terms of specific *quality dimensions*;
- a synopsis of proposed *statistical quality guidelines*;
- a *quality assessment program,* including self-assessment and peer based assessment, complemented by external assessment when circumstances demand it.

The USQF annexes include:

- a list of reference documents;

- a proposed set of *quality and performance indicators*; and
- a *quality self-assessment checklist*.

Target Users and Uses of the USQF

The USQF is targeted at the following groups of users and uses:

- *data producers within UNCTAD* - the USQF provides a basis for assessment of UNCTAD statistical production processes and for formulating proposals for quality and performance improvements;
- *data users within UNCTAD* – the USQF indicates the quality checks and procedures being applied to data being collected and made available by UNCTAD data producers;
- *UNCTAD senior managers* – the USQF is a means of ensuring managers can be informed about quality issues and how quality is being managed;
- *data users outside UNCTAD* – the USQF indicates the quality standards being applied by UNCTAD and the likely quality of statistics disseminated.

1.2 Development of the UNCTAD Statistical Quality Framework (USQF)

UNCTAD from Statistical Perspective

In addition to its primary function of producing analytical reports, UNCTAD collects and disseminates statistical data. The most important uses of these data are to inform the organisation's analytical reports. In the absence of an analytical need for a particular type of data within one of its branches, UNCTAD does not have the mandate to acquire, process and publish these data. It is not primarily a statistical agency. However, although statistics are a by-product of UNCTAD's main function, they are nevertheless a very important output in their own right and merit consideration. As noted on the Statistics page of the UNCTAD website

> *Statistics is an inherent part of UNCTAD. Being the United Nations' focal point for the integrated treatment of trade and development and the interrelated issues in the areas of finance, technology, investment and sustainable development, UNCTAD compiles, validates and processes a wide range of data collected from national and international sources. Most time series cover long periods, with some dating back to 1948, for almost all economies of the world.*

Typically the data produced by UNCTAD are edited, completed and harmonised across countries. This represents value added by UNCTAD to the data from the original sources.

There are two distinct ways in which UNCTAD disseminates statistics externally:

- Statistics are disseminated (1) in the form of *databases* that can be interrogated, and (2) as free standing *statistical tables* in electronic and printed publications. Such statistics can be valuable to users, internal or external to the organisation, for analytical or policy purposes. This may be referred to as *direct* data dissemination. This is the primary form of dissemination.

- In addition, UNCTAD publishes data in the form of *statistical tables embedded in analytical and policy reports and studies*. These tables support analyses or policy proposals rather than being a statistical end in themselves. This may be referred to as *indirect* data dissemination.

That the reputation of UNCTAD may be affected by the quality of indirectly disseminated data as well as that of directly disseminated data has been recognized in developing the USQF.

Statistical activities and data production lines

For the purposes of the USQF, a *statistical activity* is an activity in which the primary focus is acquiring, processing, storing or disseminating statistical data rather than analysing or otherwise using them.

UNCTAD statistical activities may be divided into two groups:

- *statistical production activities* - associated with acquiring, processing, storing and disseminating specific statistical data, including the specification and design of these activities;
- *statistical infrastructure activities* - associated with developing or maintaining the *statistical infrastructure* that supports production activities and that includes statistical concepts such as standard definitions and standard classifications, and statistical processing and storage tools.

The set of statistical production activities is considerably larger and involves more staff than the set of statistical infrastructure activities. Thus, in the USQF, for ease of description and assessment, UNCTAD statistical production activities are divided into separate *statistical data production lines.* Each statistical data production line (abbreviated *production line*):

- is under the control of a single manager;
- covers a specified topic or range of topics;
- acquires data from a specific source or set of sources; and
- produces a specific statistical product or set of related products.

As of the date this document was written there were just under 40 production lines. Production lines may be added or removed over the years according to data needs.

Imputation and estimation

As previously noted, UNCTAD frequently adds value to incoming data by harmonising these data across countries, by adjusting for series breaks and by estimating data for countries for which no data have been received or the data received are of poor quality. Strictly speaking *estimation* of data for individual countries should be termed *imputation*, whilst estimation for regions using these imputed data is truly *estimation*. This distinction is made in the document.

Use of existing frameworks and guidelines

Several quality assessment/assurance frameworks have been developed in recent years. The USQF incorporates ideas from a range of international and national organisations.

International documents that were influential in developing the USQF are:

- *Principles Governing International Statistical Activities* – comprising principles and practices that were developed and publicized by the CCSA and that should underpin the production of statistics by an international organisation;
- *European Statistics Code of Practice (ESCoP)* – developed by Eurostat, comprising principles and indicators relating to statistical environment, processes and outputs of European NSOs and agencies;
- *European Statistical System Quality Assurance Framework (ESS QAF)* – developed by Eurostat, the focus of the framework is to assist in implementation of the ESCoP by European NSOs and Eurostat;
- *Data Quality Assessment Framework (IMF DQAF)* – developed by the IMF Statistics Division for use by NSOs and other national government agencies collecting and disseminating statistics;
- *Quality Framework and Guidelines for OECD Statistical Activities (OECD QFG)* – developed by the OECD for managing quality within its own organisation;
- *European Central Bank Statistics Quality Framework (ECB SQF)* - developed by the ECB for managing quality within its own organisation.

National documents that were influential are:

- *Statistics Canada Quality Assurance Framework (STC QAF);*
- *Statistics Canada Quality Guidelines (STD QG);*
- *Statistics Finland Quality Guidelines for Official Statistics (SF QGFOS); and*
- *UK Statistics Authority Code of Practice for Official Statistics.*

Ideas have been drawn from all these documents with intensive use of the OECD QFG and the ECB SQF in view of the similarities of situation of these organisations and UNCTAD. For all three organisations processing data and produces statistics is a by-product, but an important by-product of their main function. None of these organisations is a primary data collector. All gather data from contributing organisations over a range of countries and add value by drawing together the data, harmonizing them and analysing them.

2 Principles Governing UNCTAD Statistical Activities

2.1 Introduction

The principles summarise the essential components of good statistics, the processes that produce them and the environment within production takes place. They are accompanied by examples of good practices.

The principles are based on the *Principles Governing International Statistical Activities* developed by the Committee for the Coordination of Statistical Activities and welcomed by the UN Statistical Commission, but have been adapted to specific situation at UNCTAD. They also include ideas from European Statistics Code of Practice (ESCoP), the ESS Quality Assurance Framework (ESS QAF), the OECD Quality Framework and Guidelines (OECD QFG) and the ECB Quality Assurance Framework (ECB QAF).

2.2 Principles

1. UNCTAD statistics should be relevant, accessible and interpretable

Good practices include:

- Having regular consultations with key users both inside and outside the organisation to check that their needs are met and to determine new needs;
- Conducting periodic assessment of the entire statistical programme (i.e., statistical data production lines and infrastructure) to ensure its relevance;
- Publishing and explaining the content and conduct of the entire statistical programme, including data collection plans, thereby making gaps or overlaps clearly visible;
- Providing equal access to statistics to all external users;
- Ensuring free access to key statistics; and
- Accompanying data with metadata that enable each user to determine the extent to which the data are fit for purpose.

2. UNCTAD statistics should be timely, punctual, accurate and coherent

Good practices include:

- Minimizing the time required for data acquisition and processing by standardization and automation;
- Issuing and adhering to a dissemination calendar published in advance;
- Using internationally accepted methods and best practices for all steps in data production lines; and
- Using internationally accepted concepts, data items and classifications.

3. Erroneous interpretation and misuse of UNCTAD statistics should be immediately and appropriately addressed

Good practices include:

- Responding to perceived erroneous interpretation and misuse of statistics in influential documents; and
- Developing educational material for important user groups.

4. To maintain the trust in UNCTAD statistics, their production should be impartial and based on professional standards

Good practices include:

- Using strictly professional considerations and code of conduct for decisions on methodology, terminology, compilation and data presentation;
- Impartially compiling and disseminating statistics; and
- Making a clear distinction in publications between statistics and analytical comments on the one hand, and policy prescriptive and advocacy comments on the other.

5. Concepts, definitions, classifications, sources, methods and procedures employed in the production of UNCTAD statistics should be chosen in accordance with scientific standards and made transparent to users

Good practices include:

- Aiming to improve statistical methodology and systems continuously and thereby to better manage and improve the quality and transparency of statistics;
- Enhancing the professional level of statistical staff by encouraging them to attend training courses, to do analytical work, to publish scientific papers and to participate in seminars and conferences;
- Documenting concepts, definitions and classifications as well as data collection and processing procedures used and quality assessments carried out, and making this information publicly accessible;
- Documenting how data are collected, processed and disseminated, in particular including information about the editing and imputation mechanisms that have been applied to country data;
- Giving credit in the dissemination of international statistics to the original source(s) and using agreed quotation standards when reusing statistics originally collected by others; and
- Making officially agreed standards publicly available.

6. Sources and methods for obtaining data should be appropriately chosen to be cost-efficient and to minimise the burden on the organisations providing the data

Good practices include:

- Facilitating the provision of data by organisations within countries;
- Periodic review of statistical programmes to minimize the burden on the organisations providing data;
- Sharing data with other international and national organisations;
- Ensuring that national statistical offices and other national organisations producing official statistics are duly involved when data are collected in their countries.

7. Individual data obtained about natural persons and legal entities, or about small aggregates that are subject to national confidentiality rules, should be kept confidential and used only for statistical purposes

Good practices include:

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

8. The UNCTAD statistical programme should be coordinated with that of other international organisations in order to strengthen the quality, coherence and governance of international statistics and to avoid duplication of work

Good practices include:

- Designating a unit to coordinate UNCTAD statistical work and to represent the organisation at international statistical meetings;
- Participating in international statistical meetings and bilateral and multilateral statistical consultations;
- Working systematically towards common agreements on standard concepts, classifications, and methods;
- For each important set of statistics working systematically towards common agreement on which statistical product(s) is (are) to be considered authoritative; and
- Coordinating technical cooperation activities between donors and organisations in national statistical systems to avoid duplication of effort and to encourage complementarities.

9. Bilateral and multilateral cooperation with developing statistical organisations should be encouraged as a means of improvement of statistics and professional growth of the statisticians involved.

Good practices include:

- Sharing knowledge with statistical organisations in developing countries and regions and with other international organisations involved in capacity building;

- Establishing technical assistance projects within the framework of national strategies for development of statistics.
- Basing technical assistance on country requirements, taking account of local circumstances including stage of statistical development; and
- Empowering recipient national organisations to take the lead in statistical developments.

10. Users should be informed about the statistical work of UNCTAD

Good practices include:

- Making decisions about statistical work programmes publicly available; and
- Making documents for, and reports of, statistical meetings publicly available.

3 Dimensions of Quality

3.1 Introduction

It is generally agreed that whilst *statistical product quality* can be summarized in line with the definition in the ISO 9000 Standard for any product as *fitness for use*, there is a need to elaborate this definition in terms of its various *dimensions*. Many versions of quality dimensions have been proposed over the last 20 years, most of which contain essentially the same ideas and all of which include a significant expansion of the original narrow interpretation of quality as simply *accuracy*.

Influential documents in this respect have been quality assurance framework defined by NSOs starting with Statistics Canada, also the IMF DQAF, the ESS quality dimensions that were subsequently incorporated in the ES Code of Practice, the OECD QFG, and the ECB QAF.

The 11 quality dimensions in the USQF have, in essence, been derived by complementing the output data quality dimensions in the OECD QFG with four process quality dimensions as further described in the following paragraphs.

3.2 Dimensions of Data Quality

1. *Relevance*

The *relevance* of a data product is the degree to which the data serve to address the purposes for which they are sought by users. Relevance has three aspects: coverage of the required population (completeness); inclusion of the appropriate content: and use of appropriate concepts. Value is further characterised by the merit of the data uses in terms of the UNCTAD mandate.

Typically a data product has multiple users and uses. Thus, measuring relevance requires the identification of user groups and their needs, whilst recognizing that these may change over time.

Relevance may be indirectly assessed by ascertaining whether there are processes in place to determine the views of users and the uses they make of the data.

Users of UNCTAD data may be divided into two main groups;

- *internal users* - primarily analysts within UNCTAD branches; and
- *external users* - including other UN organisations, other international organisations, national governments, national statistical offices and other national organisations, and academic institutions.

Whilst internal users are the most important, it is essential that the content and format of published outputs be adapted to the full range of target audiences.

2. *Accuracy*

The *accuracy* of a data product is the degree to which the data correctly estimate or describe the quantities or characteristics they are designed to measure. Accuracy refers to the closeness between the values provided in the product and the (unknown) true values. Accuracy has many attributes, and in practical terms there is no single overall measure of it. Typically, accuracy is described in terms of the errors, or the potential significance of errors, introduced at various stages in the production process from initial acquisition of the data to dissemination of aggregates.

In the case of data from sample surveys, the major sources of error are coverage, sampling, non-response, response, processing, and seasonal adjustment. For data from censuses there are no sampling errors. For data from administrative sources, there are also no sampling errors, but there are additional problems due to mismatching of administrative concepts or classifications to statistical requirements. For compilations such as the national accounts or balance of payments, in addition to errors in the incoming data, errors also arise because the incoming data do not fully meet the compilation needs in terms of coverage, timing or valuation (and techniques for compensating for these deficiencies are only partially successful), also from separation of price and quantity in the preparation of volume measures.

An aspect of accuracy, commonly referred to as *reliability,* is the closeness of the initially released values to the subsequent values of data releases. In this context it useful to consider the sources of revision, which include (1) replacement of preliminary source data with later data, (2) replacement of projections with source data, (3) changes in definitions or estimating procedures, and (4) updating of the base year for constant-price estimates.

The accuracy of the data produced by UNCTAD is largely determined by the accuracy of the data received from the contributing organisations. UNCTAD activities can improve accuracy; for example, quality checks may detect errors in data provided by contributing organisations and lead to improvements in these data. Alternatively UNCTAD activities can have an adverse effect, for example by introducing errors during any of the processing stages.

3. *Credibility*

The *credibility* of a data output refers to the confidence that users place in that product based primarily on their image of the data producer and the product, i.e., the *brand image*. It is based on the users' *perceptions* of accuracy as well as the actual accuracy.

Credibility is built over time. An important aspect is trust in the objectivity of the data. This implies that the data are perceived to be produced professionally in accordance with appropriate statistical standards, and that policies and practices are transparent. In particular, data are not manipulated, nor their release timed in response to political pressure.

Another aspect of credibility is trust in the integrity of the production process. To obtain complete coverage UNCTAD may impute data for missing countries; to improve accuracy it may adjust data received. The extent to which this is well done and well understood affects credibility. Also, once agreement between UNCTAD and an organisation has been reached on how data will be provided or imputed, the agreement should not be subsequently withdrawn in response to political pressure.

4. *Coherence*

The *coherence* of a data product reflects the degree to which it is logically connected and mutually consistent with other data products. Coherence implies that the same term should not be used without explanation for different concepts or data items; that different terms should not be used without explanation for the same concept or data item; and that variations in methodology that might affect data values should not be made without explanation.

Coherence in its loosest sense implies the data are "at least reconcilable." For example, if two data series purporting to cover the same phenomena differ, the differences in time of recording, valuation, and coverage should be identified so that the series can be reconciled.

Within UNCTAD coherence is often referred to as *consistency*. The two terms should be regarded as synonymous. The term coherence is used in the USQF to be in line with international standards such as the European Statistics Code of Practice.

Coherence has four important sub-dimensions.

- *Coherence within a dataset* implies that the elementary data items are based on compatible concepts, definitions, and classifications and can be meaningfully combined. Incoherency within a dataset occurs, for example, when two sides of an implied balancing statement, such as assets and liabilities, or inflows and outflows, do not balance.
- *Coherence across datasets* implies that the data are based on common concepts, definitions and classifications, or that any differences are explained and can be allowed for. An example of incoherency across datasets would be if exports and imports in the national accounts could not be reconciled with exports and imports in the balance of payments. Unexplained inconsistencies across datasets can seriously reduce the interpretability and credibility of UNCTAD statistics.
- *Coherence over time* implies that the data are based on common concepts, definitions, and methodology over time, or that any differences are explained and can be allowed for. Incoherence over time refers to breaks in a series resulting from changes in concepts, definitions, or methodology.
- *Coherence across countries* implies that, from country to country, the data are based on common concepts, definitions, classifications and methodology, or that any differences are explained and can be allowed for. Ensuring coherence across countries is one of the major sources of value added by UNCTAD.

Metadata plays a fundamental role in explaining possible changes in concepts or methodologies over time and across countries.

5. *Timeliness and Punctuality*

The *timeliness* of a data product is the length of time between its availability and the event or phenomenon it describes. Timeliness is assessed in terms of a time scale that depends upon the period for which the data are of value, i.e., are sufficiently timely to be acted upon. The concept applies equally to short-term or structural data, the only difference is the time scale.

Although UNCTAD processes themselves can have an adverse effect, for the most part the timeliness of the UNCTAD data products is determined by the timeliness of the data it receives from the contributing organisations.

Punctuality implies the existence of a *data product dissemination schedule.* A data product is punctual if it is disseminated in accordance with the schedule. In the case of data published externally the schedule may comprise a set of target release dates or may involve a commitment to release data within prescribed time period. (Here "release date" refers to the date on which the data are first made publicly available, by whatever medium, typically, but not inevitably the web site).

A dissemination schedule assists:

- internal users, by enhancing their capacity to plan their work based on target internal dissemination dates for data they require;
- external users, by improving their capacity to make timely use of UNCTAD statistics;

There may be occasions when UNCTAD simply cannot adhere to the dissemination schedule due to the late acquisition of data from input sources. In such circumstances advance warning regarding the delay in dissemination should be communicated to users.

Although timeliness and punctuality are different concepts they are grouped together in a single quality dimension for two reasons, first because their separate achievements are heavily inter-related in practice, and second to be in line with international standards and practices.

6. *Accessibility*

The *accessibility* of a data product reflects how readily the data can be discovered, located and accessed from within UNCTAD data holdings. It includes the suitability of the forms in which the data are available, the media of dissemination, the availability of metadata and user support services, and, in the event that there is a charge, the affordability of the data to users.

From the perspective of data availability, UNCTAD users are divided into two very distinct groups: internal users; and external users. Typically, because of the differences in access methods, internal users can access data earlier and in more detail than external users. Thus these two groups may have quite different perceptions of accessibility.

The range of different external users leads to the need for multiple dissemination formats and selective presentation of metadata. A publication policy should be articulated and made publicly known.

7. *Interpretability*

The *interpretability* (sometimes called *clarity*) of a data product reflects the ease with which users can understand and properly use the data. The degree of interpretability is largely determined by the adequacy of the definitions of concepts, target populations, variables and other terminology describing the data, and its limitations.

If there are several dissemination mechanisms they should be harmonised in order to avoid confusing users.

Coping with the needs of the broad range of external users leads to the use of metadata presentation in layers of increasing detail. The content and format of published products should be adapted to the different target groups. Where there are alternative data products available UNCTAD should help users in selecting those that are most appropriate to their needs.

Balancing output data quality dimensions

The data quality dimensions are not mutually exclusive in the sense that there are relationships between the factors that contribute to them. Factors leading to improvements with respect to one dimension may result in deterioration with respect to another. Thus, in designing a data production line and products, it is often necessary to trade-off quality in one dimension with quality in another. The most significant trade-offs to consider are as follows.

- *Accuracy and timeliness.* This is probably the most frequently occurring and important quality trade-off. Improvement in timeliness can be obtained by terminating data acquisition earlier and compiling products based on a smaller number of countries and/or reduced editing. However, as this reduces accuracy, there needs to be a trade-off. For major products a compromise is to disseminate a preliminary version of the data product based on partial acquisition and then one or two revised products based on successively more acquisition and editing. The size of the revisions between preliminary and revised products is an indicator of degree of accuracy that is being sacrificed in order to produce the increased timeliness.
- *Relevance and accuracy*. Relevance can be increased by acquiring more data items, but accuracy may be diminished because the additional data are less reliable. Conversely elimination of inaccurate data items will increase accuracy but reduce relevance.
- *Relevance and timeliness*. Timeliness may be improved by reducing the number of data items collected or by replacing those that are difficult to collect by ones that are easier. This will have a negative effect on relevance.
- *Relevance and coherence*. Improvements in relevance, for example by redefining the data items for which data are collected, or moving to a later version of a classification, will reduce comparability over time, perhaps to the point of requiring a series break. Conversely, the desire to retain comparability over time may inhibit changes in content required to improve relevance.
- *Accuracy and coherence*. Improved methods may increase accuracy but reduce coherence by introducing changes in data that are attributable to changes in methods not in what is being measured. Conversely, the desire to retain coherence may inhibit the changes required to improve accuracy.

3.3 Dimensions of Process Quality

8. *Sound Methodology*

Sound methodology refers to the use of international standards and best practices through all stages of a data production line from identification of requirements, through design, data

acquisition, processing, analysis, dissemination, archiving and evaluation. Application of standards and best practices not only engenders UNCTAD process and product quality, it fosters comparability across organisations and countries.

Sound methodology includes both theory and its application in the sense of ensuring that, not only are procedures well designed, but also they are well implemented and documented, and that staff are well informed and trained.

9. *Sound Systems*

Sound systems refers to the use of international standards and best practices in systems development, including liaising with systems developers in other statistical organisations and making optimum use of off-the-shelf or shared statistical products where available

Sound systems also includes both theory and its application in the sense of ensuring that systems are well designed, developed, implemented and documented, and that staff are well trained in their use.

10. *Cost-efficiency*

The *cost-efficiency* with which data products are produced is a measure of the costs incurred relative to the benefits of the products. Evidently the aim is to produce a given set of products at minimum cost.

Efficiency can affect all dimensions of product quality in the sense that, if a product can be produced more efficiently with the same quality, then the resources released can be used to improve the quality of that product or other products, or to create new products.

Two types of costs may be incurred:

- the costs to UNCTAD of the production line, in other words, of acquiring, processing and disseminating the data;
- the costs incurred (if any) by organisations from which the data are acquired.

UNCTAD never collects data directly from basic units (enterprises, households, institutions) to which the data refer and that provide the original individual data. Thus their costs are not a consideration.

UNCTAD only infrequently requests and acquires data from direct from NSOs or other national government agencies. When it does so the cost incurred depends significantly on whether or not the national organisations have already collected the data for their own purposes. If they have then the costs are essentially those of repackaging and transmitting data already collected. If they have not then the full cost of data collection must also be included

Most data acquired by UNCTAD are obtained from other international organisations. Furthermore, most of these data are obtained by extraction from the external databases maintained by the organisations at essentially no cost to the organisations. In a few cases UNCTAD may require other international organisations to repackage and transmit data, in which case some costs will be incurred.

11. *Effective Internal Data Usage*

Effective data internal usage refers to the degree to which UNCTAD users make full and appropriate use of UNCTAD data relevant to the topic of their analysis or report. It involves ensuring that:

- internal users are well informed about the data available within UNCTAD;
- internal users make appropriate use of the UNCTAD data they reference
- the report clearance process works effectively and includes a check on data quality and use.

This quality dimension is unique to UNCTAD. It reflects the fact that UNCTAD publishes significant amount of statistical data in the form of tables in reports and studies, and that these should be of good quality.

4 Synopsis of Quality Guidelines

4.1 Introduction

Whilst quality guidelines are an integral component of the USQF, they are too voluminous to be included in full detail in this document. Thus, this section of the USQF presents a ***synopsis*** of the guidelines that are proposed for development and presentation in a separate document that will be entitled *UNCTAD Statistical Quality Guidelines (USQG)* and for which material will be drawn from the OECD Quality Framework and Guidelines and other international and national quality guidelines.

The guidelines will be presented in two broad groups: those applying to any *individual statistical data production line* within UNCTAD; and those applying to the UNCTAD *statistical infrastructure.*

- An individual statistical production line is subdivided in accordance with an international standard, namely the *Generic Statistical Business Process Model (GSBPM)*, published by UNECE) into 9 *phases*. The guidelines are presented in subgroups corresponding to these phases.
- Statistical infrastructure activities are broken into 3 subgroups, namely metadata management, quality management, and process/systems management.

For each subgroup of statistical activities thus defined, the guidelines will be presented in a standard format, as follows:

1. *Context* – a short description of the statistical activities to which the guidelines refer;
2. *Aims* – the general aims of the guidelines, the particular aspects of quality and performance they need to address
3. *Guidelines* – the actual guidelines in full detail;
4. *Monitoring mechanisms* – the methods by which adherence to the guidelines might be monitored, including quality and performance indicators and quality assessments; and
5. *Reference documentation* – documents that elaborate the guidelines and/or that were instrumental in their formulation.

Even if not explicitly referenced it may be assumed that staff training is a part of every phase.

A synopsis of the guidelines covering items 1 and 2 above is presented in the following paragraphs. Quality and performance indicators and quality assessment procedures are further discussed in Section 5.

4.2 Quality Guidelines for Individual Statistical Data Production Lines

1. *Specify Needs*

Context

The statistical activities in this phase are triggered when the possible need for a new statistical product is identified, or a current data product comes under a review. The activities involve determining whether there is a strong internal demand for the product, whether there is in addition a strong external demand, thereby leading to a decision whether the corresponding branch in UNCTAD should start, or continue, to produce the data product.

In this phase, UNCTAD:

- determines the need for the statistical data product(s);
- specifies in more detail the data requirements;
- identifies the relevant population and data items for which data are required and the appropriate classifications;
- evaluates data currently available from other sources and the extent to which the data requirements can be met with data from these other sources; and (assuming the requirements cannot be fully met)
- prepares the business case for development, or substantial revision, of the statistical data product line and product(s).

Aims of Guidelines

- To ensure that information about expected new (or revised) statistical product is shared across UNCTAD thereby maximizing data coherence and minimizing the risk of duplication of effort and waste of resources;
- To provide an opportunity to interested staff in different branches to contribute to the development or redevelopment of the data production process;
- To ensure maximum use of existing data sources;
- To improve the sharing of data between branches within UNCTAD;
- To improve the coherence of data acquired and produced by UNCTAD;
- To minimize costs associated with the statistical product; and
- To minimize burden on any organisations requested to provide data.

2. *Design*

Context

The statistical activities in this phase refer to the development and design work needed to define or redefine the statistical concepts, outputs, data acquisition methods and instruments, processing, storage and dissemination procedures and systems associated with the statistical product.

The databases from which data can be acquired fall into one of three categories:

- internal, created by other UNCTAD data production lines;
- external, belonging to other international organisations; or
- external, belonging to national statistical organisations.

Given that data available from international organisations' databases have mostly been collected from national statistical organisations in the first place, there are two access options available:

- data can be extracted from the international organisation's database, thus incorporating the benefits of editing and compilation already undertaken by the organisation, but providing no opportunity to identify sources of error or to correct errors at source;
- data can be acquired directly from original national organisations, which requires more resources and imposes more reporting burden on the organisations.

In this phase, UNCTAD:

- defines (or redefines) the concepts – countries to be included, data items and classifications;
- designs (or redesigns) the statistical outputs – tables, datasets, databases;
- designs (or redesigns) the data acquisition methods – including formal agreements if required for data acquisition;
- designs (or redesigns) the processing methodology - routines for coding, editing, imputing, estimating, integrating, validating and finalizing data outputs; and
- designs (or redesigns) the production systems and workflow - from data acquisition to archiving.

Aims of Guidelines

- To ensure that the most appropriate concepts, definitions, classifications are used, typically those already in use by the international statistical community, thereby improving the coherence of UNCTAD statistical products.
- To ensure use of the most appropriate sources and data acquisition methods.
- To ensure efficient and effective data processing methods, making use of established and internationally accepted methods to the fullest extent possible.
- To involve experts in the field wherever appropriate.
- To ensure the development of comprehensive metadata as required both for data production and for users.

3. *Build*

Context

The statistical activities in this phase refer to building/re-engineering and testing the procedures and systems prior to use.

In this phase, UNCTAD:

- builds the (new or revised) data acquisition methods;
- builds or enhances the (new or revised) processing components - data repositories, processing tools, management dashboard functions, and metadata management tools;
- configures (new or revised) workflows – setting up the systems and data transformations from acquisition to archiving;
- tests all (new or revised) systems – includes technical testing and sign-off of new programs and routines;
- finalizes the entire (new or revised) production system – involving possibly several iterations until the process is working satisfactorily; and
- produces documentation and trains production staff and users in use of the systems.

Aims of Guidelines

- To ensure that the best available statistical and IT tools are used, for example databases rather than worksheets are used for data storage.
- To ensure a smooth workflow in which all activities within the entire production process fit together efficiently with no gaps or redundancies.
- To ensure all procedures and systems are fully tested before being put into production.
- To meet deadlines for production of the new statistical product, or reengineering of the existing one.

4. *Collect*

Context

The statistical activities in this phase refer to the actual acquisition of all necessary data, using different sources and collection modes as designed, and storing these data securely in an appropriate repository.

In this phase, UNCTAD:

- operationalizes procedures for data acquisition (if any) from national organisations, including liaising and responding to comments, queries and complaints;
- acquires data and corresponding metadata from internal UNCTAD databases, and/or from databases of other international or commercial organisations, and/or by request from other international organisations and/or national organisations ;
- finalizes data acquisition - loading the data and metadata into a suitable repository, including, possibly, converting data received from other organisations to a standard format.

Aims of Guidelines

- To ensure all the required data and metadata are acquired.
- To minimize the risk of errors in data and metadata acquisition.
- To minimize UNCTAD resources spent in data and metadata acquisition;

- To minimize the burden on any organisations providing data and metadata and to ensure a positive relationship with these organisations.
- To ensure information concerning data and metadata flows between any organization in a country and UNCTAD is communicated to the national statistical office in the country.

5. *Process*

Context

The statistical activities in this phase refer to the cleaning of incoming data and their preparation for analysis. This includes imputation of data for countries for which no data have been received or for which data are inadequate.

In this phase, UNCTAD:

- integrates data from the various sources, and classifies and codes these data where needed;
- reviews and validates/edits the data – applying checks that identify missing, invalid or inconsistent data or metadata;
- imputes missing values where necessary to fill in missing data;
- applies adjustments to harmonise data across countries and/or to overcome time series breaks caused by changes in concepts or methodology;
- derives values for new data items for which data have not been directly acquired but are required;
- compiles the final data and metadata – including totals, averages and ratios for regions, and measures of dispersion; and
- stores data and metadata in internal databases from which statistical products can be compiled and prospective internal users can make extracts.

Aims of Guidelines

- To minimize the resources required for data and metadata verification, imputation, derivation, compilation and storage.
- To ensure that the best statistical tools are used.
- To ensure that appropriate procedural metadata are produced.
- To maximize internal accessibility to and interpretability of data.
- To allow easy integration of the data with data from other production lines in order to draw attention to their coherence.

6. *Analyse*

Context

The statistical activities in this phase refer to the analysis required for verification of the statistical products and their preparation for dissemination. It includes checking that the data

will support the analyses for which they were designed. It does not imply actually undertaking the analyses.

In this phase, UNCTAD:

- prepares draft data products - including derivation of additional data items, such as indices, trends and seasonally adjusted series, as well as production of quality indicators;
- scrutinizes, analyses and explains the data in relation to expectations - including building a body of knowledge about the specific statistical domain so as to be able to identify divergences from expectations and to allow informed analyses;
- applies disclosure control where needed; and
- finalizes outputs, ensuring the statistics and associated metadata are fit for purpose.

Aims of Guidelines

- To ensure all reasonable checks are applied, including review of coverage and item response rates, comparisons with statistics for previous reference periods, and confrontation with other related data.
- To ensure there is in-depth understanding of the data and that they are viewed from all perspectives.
- To ensure that the outputs do not breach any relevant confidentiality rules.
- To ensure supporting information, including interpretation notes, briefings, measures of uncertainty and any other necessary metadata are prepared and discussions take place with internal subject matter experts before dissemination.

7. *Disseminate*

Context

The statistical activities in this phase refer to the dissemination of the statistical products to users within UNCTAD branches and, where planned, to external users.

In this phase, UNCTAD:

- formats data and metadata and loads them into internal and external output databases;
- notifies internal users and enables their access;
- disseminates statistical products externally in accordance with the design, including preparing printed publications and making databases accessible via the web site;
- prepares briefings for senior officials of international or national organisations and for the press;
- promotes products externally to ensure that they reach the widest possible audience, for example via wikis and blogs;
- manages communications with internal and external users by ensuring that user queries are recorded, that responses are provided, also that queries are regularly reviewed as a whole as a means of identifying new or changing external user needs.

Aims of Guidelines

- To ensure that statistical products are disseminated externally in accordance with any relevant UNCTAD publishing and presentation guidelines.
- To maximize internal and external accessibility to, and interpretability of, the products.
- To ensure that products are timely and punctual.
- To maximize the coherence of products in terms of content and presentation.
- To minimize resources required for dissemination.

8. *Archive*

Context

The statistical activities in this phase refer to archiving or disposal of statistical data and metadata that have been acquired or derived.

In this phase, UNCTAD:

- defines an archiving policy and procedures for statistical data, including consideration of the medium and location of the archive, as well as the requirement for keeping duplicate copies;
- manages an archive repository comprising databases and physical locations where copies of data or metadata are stored, and maintains catalogues with sufficient information to ensure that individual data or metadata products can be easily retrieved;
- archives data and associated metadata, including identifying what is to be archived, formatting those data and metadata, loading or transferring them to the repository and cataloguing them;
- disposes of data and associated metadata – given the low costs of data storage, disposal is typically limited to intermediate versions of statistical products; disseminated versions are retained indefinitely in the archive.

Aims of Guidelines

- To ensure need for archiving is well understood and that an archiving policy and procedures exist and are in line with general UN and UNCTAD archiving policies.
- To ensure retrieval processes are periodically tested.
- To ensure periodic checking of the integrity of archived data and metadata.
- To ensure upgrading of archiving procedures and archived data when archiving software or hardware changes.

9. *Evaluate*

Context

The statistical activities in this phase refer to the various forms of quality assessment of a statistical product line and associated products. The assessment may refer to one specific instance (cycle) of the process and product, or a set of instances, for example the process and all

the products during the course of the previous two years. The assessment may be lightweight or detailed, ranging from a review of the key quality and performance indicators for a given cycle, to an annual self- assessment, to a more detailed peer based assessment, to an even more penetrating external assessment. In its most detailed form, evaluation involves a comprehensive review of the product relative to the original data requirements and of the process relative to the original design.

In this phase, UNCTAD:

- gathers assessment inputs, which may take many forms, including documentation of objectives, procedures and systems, feedback from users and other operational metadata, and suggestions from production staff;
- sets up an assessment team, which may comprise simply the production line staff in the case of review of QPIs or self-assessment, or may include staff from other production lines or external evaluators;
- provides the team with all relevant documentation;
- conducts the assessment – the team analyses the assessment inputs and produces an report that describes the quality issues and makes recommendations for improvements; and
- agrees on quality improvement plan - bringing together the managers with sufficient authority to make decisions on a quality improvement plan based on the assessment.

Aims of Guidelines

- To ensure the need for and objectives of each form of assessment are well understood.
- To ensure that production line and product assessments take place in accordance with an agreed assessment program.
- To ensure that quality and performance improvement proposals arising from assessments are considered by appropriate managers and decisions are made regarding the proposals that are to be implemented.

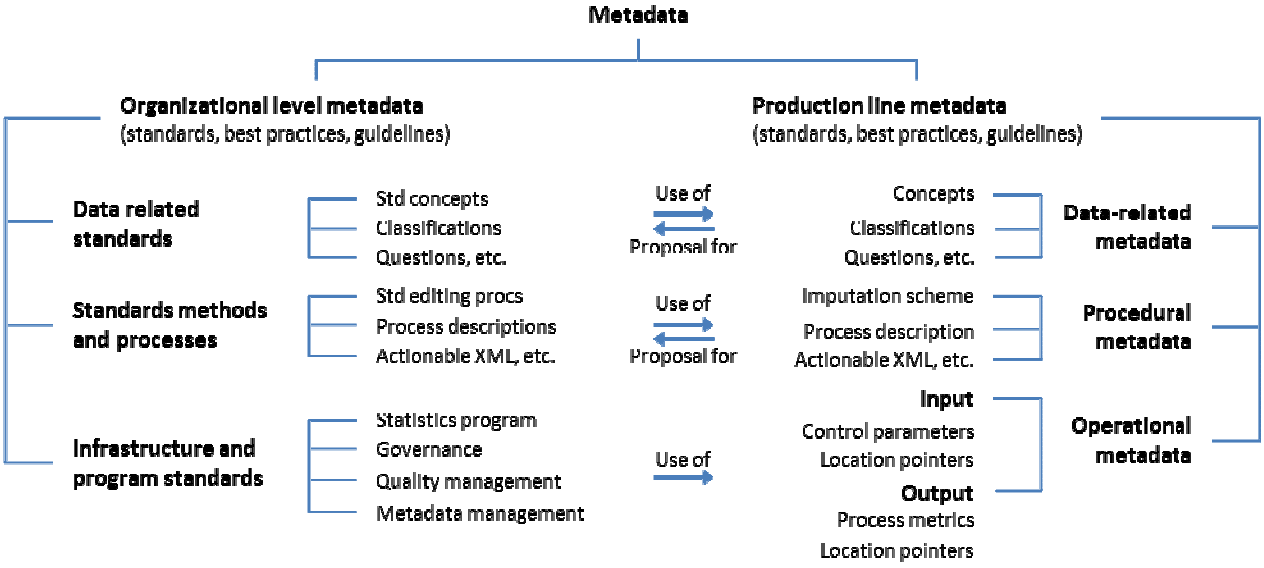
4.3 Quality Guidelines for Statistical Infrastructure

10. *Metadata Management Infrastructure*

Context

The term *metadata* has come to have a very broad meaning, covering all the information about data and the production lines that acquire and produce them. Metadata come in all sorts of shapes and sizes and are grouped for ease of management. Figure 3 illustrates the broad groups into which metadata are classified based on their usage. The most basic distinction is between *organisational level metadata*, which refer to UNCTAD as a whole, and *data production line metadata*, which describe specific UNCTAD data production lines.

Figure 3: Metadata Types



- *Organisational level metadata* are metadata that have been designated as UNCTAD standards, for example, ISIC Rev 4, or the definition of GDP, or UNCTAD data presentation standards, or UNCTAD data dissemination policy. Infrastructure metadata are a source of data production line metadata.
- *Data production line metadata* describe a single data production line, for example, the Handbook of Statistics production line, or the Global Investment Fund Monitor production line.

Data production line metadata may be divided by use into three broad groups: data-related metadata, procedural metadata, and operational metadata.

- *Data-related metadata* are those metadata that describe the content and coverage of the data production line and its inputs and outputs. Examples are concept definitions, data item definitions, and classification codes.
- *Procedural* metadata are those metadata that describe the particular processes constituting a data production line and the procedures within these processes. Examples are (1) the reasons for preferring to acquire data from a particular source rather than an alternate source, and (2) the procedures for imputing data for a country for which no data have been acquired. *Active* procedural metadata drive procedures in the sense that the procedure cannot commence without them; *passive* procedural metadata simply document the procedure.
- *Operational metadata* are metadata that describe the inputs and outputs of a process. Input operational metadata *enable and control* the execution of (a particular instance of) a particular process, for example they include the location of the input dataset to be processed, which is information that may have been created by an earlier process in the data production

line. Output operational metadata comprise metadata that *result from the execution* of (a particular instance) of a particular process. They include information to be passed to a later process in the data production line, and process metrics that are generated during the execution of processing, for example: number of countries for which data estimated.

Organisational level metadata are divided into the same three broad groups as data production line metadata:

- *Data related standards* – comprising conceptual standards, such as concepts, classifications, item definitions, and coding schemes;
- *Standard methods and processes* – comprising methodological standards for acquisition, editing, imputation, estimation, seasonal adjustment and dissemination; and
- *Infrastructure and program standards* – comprising operational standards, such as standard response status codes for incoming data from countries.

UNCTAD requires the infrastructure to manage all these various types of metadata effectively and efficiently.

Aims of Guidelines

- To ensure that the various types of metadata, and the needs for and uses of them, are fully understood.
- To ensure that the metadata management infrastructure is designed, built and operational.
- To ensure that metadata are properly registered and the registration process is well documented so there is clear identification of ownership.
- To ensure that there is a single, authoritative registration authority for each metadata type.
- To ensure that metadata are active to the greatest extent possible, thereby ensuring they are accurate and up-to-date, and paving the way for automation.
- To ensure that passive metadata are recorded at the time they are created, preferably automatically as a by-product of the process that generates them.
- To ensure that there is a single copy of each metadata value, which is entered once and can be accessed or superseded, but not overwritten, with previous values being retained to allow historical access.
- To ensure there are different views of the metadata corresponding to the differing needs of the various users.
- To ensure that metadata are reused rather than recreated wherever possible.

11. *Quality Management Infrastructure*

Context

Quality management is management of the factors that can effect quality and/or performance. In the context of statistical products and processes, the USQF is the core component of quality management.

The quality management infrastructure includes:

- a set of recommended quality and performance indicators for production lines;
- procedures and a checklist for quality self-assessment of production lines and their products; and
- procedures for peer based quality assessment of a production line.

UNCTAD requires these infrastructure components to implement the USQF, as further discussed in Section 5.

Aims of Guidelines

- To ensure the quality management infrastructure is designed, built and operational.
- To ensure the USQF can be effectively and efficiently implemented.

12. *Process and Systems Management*

Context

The basis for harmonization and cost-efficiency is the development and use of standard processing tools to support data production lines. The UNCTAD Statistical Information System (USIS) is a step in this direction. Further refinements and improvements are required to make its procedures and systems more readily usable by other production lines and to persuade the data production line managers to do so.

Aims of Guidelines

- To ensure that there are standard statistical tools (procedures and/or systems) to support the entire sequence of processes and procedures constituting a typical data production line.
- To assemble these tools into the USIS and to promote their use.
- To ensure that, whenever an existing data production line requires a major modification or complete re-engineering, the possibility of using USIS tools is actively promoted, and that reasons for not using them are documented, discussed and approved by senior management before being implemented.

5 Quality Assessment Procedures and Program

5.1 Introduction

There are three basic reasons for quality assessment:

- to check ongoing operations, monitor performance with respect to target objectives, and identify sources of operational errors;
- to identify structural weaknesses; and
- to propose quality improvements.

For USQF purposes, five types of quality assessment are distinguished according to amount of detail and effort involved, the frequency with which the assessment is conducted, and target of assessment. They are:

- monitoring of quality and performance indicators;
- self-assessment of a statistical data production line and products;
- internal peer based assessment of a statistical data production line and products;
- internal peer based assessment of the statistical infrastructure;
- external (independent) assessment of a statistical data production line and/or statistical infrastructure.

The UNCTAD Quality Assessment Program comprises all these types of assessment blended into a coherent, rotating annual program.

5.2 Monitoring of Quality and Performance Indicators

Objectives

The objectives of identifying and monitoring quality and performance indicators (QPIs) are to quickly check ongoing operations, to monitor performance with respect to target objectives, and to identify sources of operational errors and correct them.

Description

QPIs are required to monitor statistical operations for quality (i.e., effectiveness) and performance (i.e., efficiency). They are in three groups:

- product QPIs - for a statistical data output;
- process QPIs - for a statistical data production line;
- infrastructure QPIs - for the statistical infrastructure.

QPIs are very carefully chosen. Too few QPIs, or the absence of QPIs covering key aspects, will result in ineffective monitoring. Too many QPIs, or ill-chosen ones, will overload the production procedures and be a waste of resources.

The procedures involved in development and use of QPIs for a production line and associated products are:

- define a suitable set of process and product QPIs;
- designate selected QPIs as being *key* and set targets for each of these;
- analyse the values of product QPIs each cycle;
- analyse the values of process QPIs each cycle or on a regular basis – this may be daily, weekly, monthly, annual - depending upon the what is being monitored;
- take action to address *operational* problems thereby identified; and
- document *structural* problems, i.e., problems that cannot be solved at operational level, and provide them as input to the next quality assessment.

Quality and performance indicators

A provisional list of QPIs is given in Annex 2.

5.3 Quality Self-Assessment of a Data Production Line and Product(s)

Target of assessment and assessment objectives

The target of a self-assessment is a *data production line and its product(s).* The objectives of the assessment are to help the staff responsible to develop an impression of the quality of the production line and product(s) and, hence, to identify structural weaknesses and to propose quality improvements.

Self–assessment procedures

A self-assessment of quality is conducted by the staff responsible for the statistical production line and the corresponding products. Depending upon the particular production line, a self-assessment may be conducted annually or biennially.

The basis for assessment is the *UNCTAD Quality Self-Assessment Checklist for a Statistical Data Production line and Products*. The checklist covers all aspects of the data production line from identification of data needs, through design, data acquisition, processing, and analysis, to dissemination and archiving. A copy of the checklist is attached as Annex 3.

Typically self-assessment is the responsibility of the manager in charge of the statistical production line and product(s).

Self-assessment involves:

- Assembling documentation about the data production line and its product(s);

- Convening one or more meetings with the staff responsible for all aspects of processing, and at these meetings reviewing the documentation, completing the relevant sections of the checklist, and identifying process and product weaknesses and potential improvements;
- Convening one or more meetings with the principal users and at these meetings reviewing the products, completing the relevant sections of the checklist and identifying product weaknesses and potential improvements; and
- Taking action on any improvements that can be implemented with existing resources and documenting improvements that would require additional resources and/or support from other areas.
- Presenting a summary of the results to senior management.

Supported self-assessment is a form of self-assessment in which a DSIB quality expert sits in on the self-assessment process and helps guide the assessment. This is the recommended approach for a first self-assessment.

5.4 Internal Peer Based Quality Assessment of a Data Production Line and Product(s)

Objectives

As for self-assessment, the target of the assessment is a *data production line and its product(s).* However, in this case the assessment is more penetrating and the target audience includes senior management as well as the staff responsible for the process and product.

More explicitly, the objectives of the assessment are to help UNCTAD senior management and the production line manager know the quality of the production line and its data product(s) and hence to identify structural weaknesses and to propose quality improvements.

Procedures

Assessment by peer review involves the following steps:

- Identification of the review team, typically involving one or more senior staff from other areas and including the production line manager as a resource person, not the team leader;
- Obtaining documentation and a recently completed quality self-assessment checklist from the production line manager;
- Convening one or more meetings with the staff responsible for processing, in order to review the documentation and self-assessment results, to probe further into areas of weakness, and to identify additional weaknesses and potential improvements;
- Convening one or more meetings with the principal users, reviewing the products and self-assessment results and further investigating product weaknesses and potential improvements;
- Ensuring action is taken on any improvements that can be implemented with existing resources; and

- Documenting the results of the assessment and reporting to senior management, with particular emphasis on the major weaknesses and the improvements required to address them.

5.5 Internal Peer Based Quality Assessment of Statistical Infrastructure

Objectives

The target of the assessment is one or more components of the *statistical infrastructure* that underpins and supports the individual data production lines, for example the set of standard definitions and classifications, central databases, metadata management methods, and quality management methods. The target audience is senior management and the staff responsible for the infrastructure.

More explicitly, the objectives of the assessment are to help UNCTAD senior management and the infrastructure staff know the status of the statistical infrastructure, its strengths and weaknesses and the developments that are proposed to address the weaknesses or to incorporate new technology or procedures.

Procedures

Assessment by peer review involves the following steps:

- Identification of the review team, typically involving senior staff from other areas and including the infrastructure manager as a resource person, not team leader;
- Obtaining documentation describing the infrastructure;
- Convening one or more meetings with the staff responsible for the infrastructure, probing into areas of weakness, and identifying potential improvements
- Ensuring action is taken on any improvements that can be implemented with existing resources; and
- Documenting the results of the assessment and reporting to senior management with a particular emphasis on the major weaknesses and the improvements required to address them.

5.6 External Quality Assessment

Objectives

External quality assessment is used only if concerns about quality of products or processes reach such a high level that an external evaluation is needed in order to address the criticisms. Whilst this is not likely to happen often, UNCTAD will not shy away from external assessment if criticisms are widespread and are undermining confidence in the data, or if there is a possibility that the criticisms may prove to be justified.

The target of an external assessment may be a *data production line and its products*, or it may be *one or more aspects of the statistical infrastructure*. The assessment objectives are to provide UNCTAD senior management and production line manager with an objective view of the quality of the production line and product(s), and/or statistical infrastructure, and hence to identify any structural weaknesses and to propose quality improvements to address them.

Procedures

An external quality assessment involves the following steps:

- Defining the terms of reference for the assessment;
- Identification of the assessment team, involving a team leader and members from outside UNCTAD with the manager of the production line, or of the infrastructure, as a resource person;
- Obtaining documentation and any recently completed self-assessment checklists or results from peer review assessments;
- Convening meetings with relevant UNCTAD staff to further elaborate the problem areas and improvements required to address them;
- Convening meetings with the principal users and further investigating the problem areas as reflected in product weaknesses;
- Reporting the results of the assessment to UNCTAD management in accordance with the terms of reference.

5.7 Quality Assessment Program

The *UNCTAD Quality Assessment Program* comprises all types of assessment combined into a coherent assessment program. As presently designed it involves:

- annual quality self-assessment of each production line and product(s);
- peer based quality assessment of each production line and infrastructure component on a rotating basis so that each is covered at least once in a five year cycle;
- external quality review of a particular production line or infrastructure component on an as needed basis.

Annexes

Annex 1: Reference Documents
Annex 2: UNCTAD Quality and Performance Indicators
Annex 3: UNCTAD Quality Self-Assessment Template/Checklist

Annex 1: Reference Documents

CSSA (2005) *Principles Governing International Statistical Activities.*

European Central Bank (2008), *ECB Statistics Quality Framework.*

Eurostat (2009) *ESS Handbook on Quality Reports*.

Eurostat (2011) *European Statistics Code of Practice. Revised Edition 2011*

OECD (2011) *Quality Framework and Guidelines for OECD Statistical Activities.*

Statistics Canada (2009) *Statistics Canada's Quality Assurance Framework.*

Statistics Canada (2003) *Quality Guidelines.*

Statistics Finland (2003) *Quality Guidelines for Official Statistics.*

UK Statistics Authority (2009) *Code of Practice for Official Statistics, Edition 1.0, January 2009*.

Annex 2: UNCTAD Quality and Performance Indicators

Introductory Note

The following lists are *provisional*. It is expected that the staff responsible for each production line and its product(s), and for the infrastructure components, will define and introduce additional quality and performance measures specific to their particular situation.

For a statistical data production line and its product(s)

a) Number of countries from which data requested.
b) Number of countries from which data acquired.
c) Proportion of countries responding to request for data to countries asked for data.
d) Number of countries responding by due date.
e) Proportion of countries responding who did so by due date.
f) Number of countries from whom data received generated validation errors.
g) Share in the world for the related indicator of countries from whom data received generated validation errors
h) Number of countries from whom data required imputation.
i) Share in the world for the related indicator of countries from whom data required imputations
j) Average number of validation errors over all responding countries.
k) Average number of data items imputed over all responding countries.
l) Number of countries that had to be consulted to address problems due to errors or missing data.
m) Number of countries for which entire country record was imputed.
n) Share in the world for the related indicator of countries from which entire country record was imputed.
o) Proportion of countries for which data disseminated was imputed.
p) Share in the world for the related indicator of countries for which data disseminated was imputed.
q) Time lag in date by which data acquired relative to date when data scheduled to be available.
r) The average time lag in the date by which country data became accessible relative to date by which they were made available to users.
s) Number of countries whose data generated validation errors.
t) Number of countries whose data required imputation.
u) Average number of validation errors over all countries.
v) Average number of data items imputed over all countries.
w) Number of countries for which the database owner had to be consulted to help address problems of accuracy, timeliness or access?
x) Number of countries for which there were problems with data comparability over time.
y) Number of countries for which there were problems with data coherence relative to other series.
z) Number of countries for which data had to be adjusted because of poor quality.

aa) Share in the world for the related indicator of countries for which data had to be adjusted because of poor quality.
bb) Number of countries for which data had to be adjusted for harmonization purposes.
cc) Number of countries for which data had to be adjusted to compensate for series breaks.
dd) Number of countries for which data had to be suppressed for confidentiality reasons.
ee) Share in the world for the related indicator of countries for which data had to be suppressed for confidentiality reasons.
ff) Number of countries for which UNCTAD had to compile seasonally adjusted and trend-cycle estimates.
gg) Number of days behind schedule data disseminated internally.
hh) Number of days behind schedule data disseminated externally.

For a statistical infrastructure component

a) Number of standard classifications maintained (by DSIB) and available within UNCTAD.
b) Change since 12 months ago in the number of standard classifications maintained (by DSIB) and available within UNCTAD.
c) Number of standard data item (variable) definitions maintained (by DSIB) and available within UNCTAD.
d) Change since 12 months ago in the number of standard data item (variable) definitions maintained (by DSIB) and available within UNCTAD.
e) Number of production lines using USIS for initial data storage and validation.
f) Change since 12 months ago in the number of production lines using USIS for initial data storage and validation.
g) Number of production lines using USIS for data processing.
h) Change since 12 months ago in the number of production lines using USIS for data processing.
i) Number of production lines using USIS for data dissemination.
j) Change since 12 months ago in the number of production lines using USIS for data dissemination.

Annex 3: Quality Self-Assessment Checklist for Statistical Data Production Line and Its Product(s)

Phase 1: Specify needs

a) Have the main internal and external users and/or potential users, been identified and consulted in determining the data requirements that justify the product(s)? If so, who are they?
b) Have the uses to which the products are put, including the probable duration of these uses, been well articulated and documented? If so, what are they?
c) Have the essential data requirements been specified and documented in terms of required concepts, content, coverage, frequency and timeliness? If so, what are they?
d) Have users been made aware of the relevant international concepts and classifications and encouraged to formulate their need in terms of them?
e) In formulating the data requirements were relevant experts in other branches consulted? If so, who?
f) In determining how data requirements could be met, were data available from other sources taken into account? If so, what sources and data?
g) In determining how data requirements could be met, was consideration given to the trade-offs between content, coverage, frequency, accuracy, timeliness, costs and burden on the organisations contributing the data. If so, what trade-offs were considered?

Phase 2: Design

a) Were existing international statistical standards and guidelines used wherever available for concepts, definitions, units, classifications and compilation methods? If not what were the divergences, were they justified and documented?
b) Did development of the statistical product(s) entail development of new concepts or classifications? If so, was the new development widely publicised and discussed with experts working in relevant national and international organisations? If so, which experts in which organisations were consulted?
c) Were all existing databases containing relevant data identified? What were the main databases identified?
d) Was sufficient metadata are acquired for each potentially useful database to determine whether or not that database could provide any of the required data items?
e) Were deficiencies found in database metadata that prevented a proper assessment of their potential utility? If so were these deficiencies documented, discussed with the corresponding database managers and remedied where possible?
f) Was maximum use made of data in UNCTAD and external databases? If not what were the reasons why not?
g) In the event that the same data were contained in both UNCTAD and external databases, all other things (detail, timeliness, etc.) being equal, were UNCTAD data used? If not, what were the reasons why not?

h) In the event that direct collection from national organisations was decided upon because the required data were not fully available from existing databases, was consideration given to changes in concepts, content, coverage, frequency, accuracy, or timeliness that would have eliminated the need for direct collection?
i) In the event that direct collection was decided upon, was the respondent burden on the contributing national organisations estimated and justified?
j) In specifying the data acquisition, processing, analysis and dissemination procedures for the production line were international and UNCTAD standards and best practices followed? If so, which ones? If not, were the divergences justified and documented, and what were they?
k) In specifying the procedures, was the requirement for comprehensive metadata taken into account? If so, what provisions were made for metadata generation? If not, why not?
l) In specifying the classifications and data dissemination procedures to be used, was DSIB consulted? If not, why not?
m) Were the statistical and IT training needs associated with the production line identified? If so what and how was training administered? If not, why not?
n) Was summary information about the development of the production line circulated throughout UNCTAD? If so, by what means?

Phase 3: Build

Note: items 3a) – 3d) below are applicable only in the case of the production line involving direct data collection.

a) Was the technical capacity of each national organisation from which data were to be acquired taken into account in establishing the particular data collection and transmission mechanisms appropriate for that organisation?
b) If data provision required that additional data collection be conducted by national organisations, were comprehensive survey procedures developed and issued by UNCTAD in line with internationally recognised standards and best practices? If not, why not? In particular was the questionnaire designed and tested before use?
c) Were all possible sources and types of error identified and analysed and provisions put in place to check and correct for them? If so, what are the main sources of error and what is done to correct for them?
d) Are international standards (in particular SDMX) used for data and metadata transmission? If not why not?
e) In the event that data are acquired from another international organisation, is best practice as described in the document entitled *Modalities of data sharing among international organisations adopted by the CCSA at its 14th session* followed? If not why not?
f) In the event that data have to be extracted from an UNCTAD database are they extracted from the original database rather than from a derived database? If not, why not?
g) In the event that data are extracted from a database, are the extraction procedures are fully automated? If not, what else could be automated and why has it not been?
h) On reception and during processing of data is the repository in which data are stored a database? If not, what is its type (e.g., Excel file) and why is it preferred over a database?
i) Is the repository in which data are stored for dissemination a database? If not, why not?

j) Is USIS used for dissemination? If not why not?
k) Are data processing and dissemination procedures fully automated? If not, what else could be automated and why has it not been?
l) Are there adequate procedures for keeping track of processing and revised versions of the data? If not, what else should be done and why has it not been?
m) Are there adequate procedures for ensuring data security and backup? If not, what else should be done and why has it not been?
n) Has the workflow associated with the whole production line been analysed and optimized? If not, what should be done and why has it not been?

Phase 4: Collect

Note: items 4a) – 4e) below are applicable only in the case of the production line involving direct data collection.

a) Does data transmission occur as soon as the data are available? If not, why not?
b) In the event that data are transmitted as time series, does each transmission include the full length of the series? If not, why not?
c) When confidential data are transmitted are they clearly identified? If not, why not?
d) Is there is ongoing liaison with the managers of the national organisations from which data are obtained to ensure that potential data problems are uncovered and addressed? If so, what is the form of the liaison?
e) In the event that a national organisation other than the NSO is providing data, is the NSO kept informed of the data flow? If so, how? If not, why not?
f) In the event that data are extracted from a database is there is ongoing liaison with the manager of the database to ensure that potential data problems are uncovered and addressed? If so, what is the form of the liaison?
g) Is data acquisition constantly monitored to check on coverage, content and quality relative to expectations and is timely action taken to solve any emerging problems? If so, what are the monitoring mechanisms?

Phase 5: Process

a) Are verification procedures, outlier identification rules and imputation procedures defined and documented before verification begins? If not, what has not been defined, and why not?
b) Are verification procedures automated? If not, why not?
c) Are verification processes are repeatable and objective? If not, why not?
d) Are individual data item values subject to checks to ensure that they are within valid ranges and respect accounting identities? If not, why not?
e) Are individual data items are subject to comparisons within country, across countries and over time to identify potential outliers? If not, why not?
f) Are outliers investigated with source organisations and the conclusions documented? If not, why not?
g) Are data item values that are missing or failed verification checks imputed? If not, why not?

h) Are verification and imputation procedures consistent in the sense that reapplying the verification procedure to imputed records yields no further verification failures? If not, why not?
i) In the event that a data item value is imputed by UNCTAD, or has already been imputed by the organisation from which the data were acquired, is the label "estimate" and the source of the imputation attached to the value? If not, why not?
j) Are data made comparable across countries and over time by adjustments in definitions, coverage and classifications? If so what adjustments are made and are these in accordance with internationally accepted standards and practices? If not, why not?
k) Are all adjustments made by UNCTAD clearly described in the accompanying metadata? If not, why not?
l) Are supra-national aggregates computed using internationally accepted standards or practices? If so, what standards or practices? If not, why not?
m) Is data processing constantly monitored with respect to verification errors, imputation levels and progress relative to expectations, and is timely action taken to solve any emerging problems? If so, what are the monitoring procedures?

Phase 6: Analysis

a) Are reasonableness checks applied to the data, including checks on coverage and item response rates, comparisons with statistics for previous reference periods, and confrontation with other related data? If so, what checks are applied?
b) Is any data confidential? If so, is there a mechanism to ensure that outputs do not breach relevant confidentiality rules? If so, what is the mechanism?
c) Are data disseminated externally, if so, are they discussed with internal subject matter experts before dissemination? If not, why not?
d) Are seasonally adjusted and trend-cycle values computed? If so, are the procedures and adjustment parameters documented? If not, why not?
e) In the event that seasonally adjusted and trend-cycle values are computed, are computation methods in line with internationally accepted standards and practices. If so, which standards or practices are used? If not, why not?
f) If nationally adjusted data are available, are they used only if the procedures are compatible with those adopted by the UNCTAD?
g) Are data analysed from the perspective of the issues for which the data acquisition was originally initiated? If so, how?
h) Are data are analysed in conjunction with other related data produced by UNCTAD or other international organisations? If so, what related data are used in the analysis, from what organisations are they obtained
i) In the event that data are analysed in conjunction with other related data, have apparent inconsistencies been found? If so, have they been analysed and explained?

Phase 7: Disseminate

Note: items 7d) – 7r) below apply only to external dissemination

a) Are data that have passed verification and imputation procedures made immediately available to internal users? If not why not?
b) In the event that there are specific data access restrictions applying to internal users, are the reasons for these restrictions communicated to users? If so, what is the nature of the restrictions and how are they communicated?
c) Are there inconsistencies between national and regional values? If so, have explanations been provided to users?
d) Is there a check on the quality of data before dissemination that ensures that data are not publicly released if of such poor quality that their dissemination would adversely affect the overall credibility of UNCTAD statistics? If yes, how is the check conducted? If not, why not?
e) Have any data not been disseminated because of quality or confidentiality concerns? Is so, what were the concerns?
f) Are the data disseminated subject to revision? If so, are they accompanied by a statement advising that the data may be revised? If not, why not?
g) Are some data not publicly disseminated yet made available to certain individuals or organisations external to UNCTAD? If so, in what circumstances and subject to what conditions?
h) Are data manipulated, or withdrawn, or their dissemination timed, in response to external pressure? If so, what is the nature of the pressure?
i) Are data disseminated in accordance with a release calendar published in advance? If so, how is the release calendar published? If not, why not?
j) Do the metadata provided with the data include target and actual populations, data sources, definitions of key concepts, data items and classifications, and indications of key accuracy issues and likely sources of error, including variations over time and across countries? If not, which of these metadata are missing?
k) Are the metadata provided sufficient for users to have an appreciation of quality issues and to understand the strengths and limitations of data? Is so, what are the key accuracy issues?
l) For products that include primarily analytical results, do the metadata provided include the analytical objectives, models, methods, assumptions and caveats?
m) Is dissemination and presentation of data and metadata in accordance with applicable UNCTAD standards? If so, what standards? If not, why not?
n) Is presentation of data and metadata clear and unambiguous, with varying degrees of detail according to user needs? If so, what specific provisions are made to satisfy users simply requiring an overview as well as those requiring a high degree of detail?
o) Is the data product new? If so, was a usability test is conducted before the initial dissemination? If so, what were the results and what changes were made as a consequence?
p) Does a contact name and e-mail address accompany all published data so that users can readily make comments or submit queries? If so, what are they? If not, why not?
q) Is free access given to all national government organisations and (subject to reciprocal arrangements) to international organisations, and (to the extent possible) to the general public? If not, why not?

r) Are disseminated data made available in electronic form? If not, why not?

Phase 8: Archive

a) Does UNCTAD have an archiving policy applicable to the statistical product(s)? If so, what is it, and is it followed?
b) Have any data been archived? If so, when and how?
c) In the event that data have been archived, have the archived data been retrieved and checked? If so, when was the last time? If not, why not?
d) Have any archiving issues been raised in the last two years? If so, what were they and how have they been addressed?

Phase 9: Evaluate

a) Is documentation of the production line processes and resulting product(s) and complete and readily available? If not why not?
b) Is there an evaluation program for the production line and its product(s)? If so, what forms of evaluation does it contain, and is it followed?
c) Have specific quality and performance indicators for the process and for product been defined? If not, why not?
d) In the event that quality and performance indicators have been defined, what are they, how are they monitored, and what changes have been made as a result of their being monitored in the last two years?
e) Has there been a self-assessment within the last two years? If so, when, and what were the main outcomes?
f) Has there been an internal peer-based assessment within the last two years? If so, when, and what were the main outcomes?
g) Has there been an external assessment within the last two years? If so, when, and what were the main outcomes?
h) In the event that there has been one or more assessments within the last two years, have the detailed findings of the assessments been made fully known to internal users? If not, why not? Have the general findings of the assessments been made known to external users? If so, by what means? If not, why not?
i) Have there been any concerns raised by users in the last two years? If so, what were they, and what action was taken to respond to them?