

What Is Data Quality? A Distillation of Experience

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I. INTRODUCTION

1. The purpose of this paper is to stimulate discussion of the elements that represent data quality and the organization of those elements into a framework to help in assessing data quality across a range of country and data situations. The approach is inductive: the paper examines a sample of reviews of national statistical systems and of statistical products to distill from this experience some answers to the question “What is data quality?” and then some of the elements that represent it and therefore can be used in assessing it.

2. The paper has four sections following this Introduction. Section II describes the IMF’s work toward a framework for assessing data quality. It outlines the stimuli for this work and the characteristics of a useful framework that derive from these stimuli, the current status of work on the framework, and the ongoing process of engaging the international statistical community in its further development. Sections III and IV assemble material to help identify elements of data quality. The hoped-for result of the exercise is that it will confirm the overall thrust of the framework that has emerged to date and assist in refining it. Specifically, Section III introduces the sample of national reviews and identifies some key features. Section IV initially focuses on one of the features—the standard or criteria used in the reviews. Then it considers the recommendations made in some of the reviews. The premise is that the combination of criteria for reviews actually conducted and recommendations for improvements or strengthening statistical systems or products actually may help in a practical way to identify “data quality and the elements that may be used to

¹ This paper is an extension and updating of a paper prepared in mid-July for the 9th Meeting of the Heads of National Statistical Offices of East Asian Countries, Japan, August 23-25, 2000. The views expressed in this paper are those of the author and not necessarily those of the International Monetary Fund. Further, the framework for assessing data quality that is described is work in progress and is made available in this paper to stimulate further comment and debate. The author would like to thank the many people in the Statistics Department who are working on the data quality project, but especially Candida Andrade, Adriaan Bloem, Sarmad Khawaja, and Claire Liuksila for their direct contribution to this paper. Kenneth Kirkley provided research assistance and Elia Cadena provided secretarial support.

assess it.” The final section, Section V, uses the criteria and recommendations as a springboard to encourage comment on the IMF framework that is emerging.

II. TOWARD A FRAMEWORK FOR ASSESSING DATA QUALITY

3. Work toward a framework for assessing the quality of data has been underway in the IMF’s Statistics Department for some time, but the project has been pursued with special intensity over the last year. This section describes briefly the stimuli for this work; parts of the framework, as work in progress; and the process that is underway, including the steps to bring in the views and experience of the international statistical community.

A. The Stimuli for the Statistics Department’s Work on Data Quality

4. Statistics have been recognized as playing a key role in the work of the IMF from the organization’s beginning. The provision of data to the Fund by member countries is rooted in its Articles of Agreement, in which, under the heading of General Obligations of Members, the basic principles are set forth. Discussion by the Executive Board of the IMF in 1946 led to systematic collection of data and their monthly dissemination through *International Financial Statistics (IFS)*. From this base, the IMF’s statistical activity has developed over the years in response to the needs of the IMF and its members. Within that general context, there are three main stimuli for the recent work on data quality.

5. The first stimulus centers around the Special Data Dissemination Standard (SDDS) and General Data Dissemination System (GDDS), established in 1996 and 1997, respectively, to provide guidance to countries on the provision of data to the public.² The SDDS identifies best practices in the dissemination of economic and financial data in four areas—the so-called four dimensions: data (coverage, periodicity, and timeliness); public access to the data; integrity of the data; and—last but not least—data quality. Two points about the treatment of data quality in the SDDS may be noted.

- The first three dimensions dealt with several desirable characteristics of data—for example, timeliness and integrity. The quality dimension, then, refers to other desirable characteristics—such as accuracy, adherence to international statistical guidelines, and consistency.
- The quality dimension calls for the provision of information that would facilitate data users’ assessment of these characteristics—that is, accuracy, etc.—according to their own needs. Specifically, the quality dimension calls for dissemination of, first, methodological statements (covering the analytical framework, concepts and

² For brief introductions, see the “Overview” of the SDDS and “What is the GDDS?” at <http://dsbb.imf.org>.

definitions, accounting conventions, nature of basic data, and compilation practices) and, second, information that permits cross checks for reasonableness.

6. The GDDS focuses explicitly, given the wider range of countries for which it is intended, on encouraging countries to improve data quality and helping them evaluate needs for data improvement. It is built around the same four dimensions as the SDDS, but with a difference. The data and quality dimensions are organized around statistical products, and the access and integrity dimensions are organized around the agencies preparing the statistical products. The GDDS focuses on improving data—both the data product directly and via strengthening the producing agencies.

7. Questions about data quality continued to arise, especially in the setting of increased access to data on the Internet that is, indeed, partly attributable to the SDDS.

- What assistance can be provided to data users, including those in financial markets, to help them evaluate the quality of the data available to them?
- Is there a way to focus more attention on data quality issues?
- How can national statistical authorities be assisted in assessing the quality of their data, and what incentives can be provided to encourage cost-effective improvements?

Several of these points and variants of them were raised at the Statistical Commission in 1999 and discussed further in 2000. In effect, these points were a challenge to supplement the SDDS and GDDS to make the link with data quality more active.

8. The second stimulus, like the SDDS and GDDS, had its origin in the Mexican financial crisis of 1994-95. Not only did this crisis focus attention on the need for countries to disseminate data to the public, but it also highlighted the need for countries to provide data to the IMF to support it in meeting its responsibilities for surveillance of members' economic policies. In a series of discussions beginning in 1995, the IMF's Executive Board noted that it was imperative for the IMF, as well as for member countries, to improve the quality of data. The Executive Board, among other steps, asked the staff to undertake further work to define the appropriate coverage, periodicity, and timeliness of provision of data to the IMF.³ Earlier this year the Executive Board again assessed the situation. At this time, its major step was to establish benchmarks for the provision of data to the IMF on reserves and foreign currency liquidity and on external debt. In addition, it encouraged work on the provision of

³ *Annual Report of the Executive Board* (for the Financial Year Ended April 30, 1996), in the section on "The Fund's Statistical Policy and Provision of Data for Surveillance," pp. 43-44 (IMF, Washington, DC, 1996).

fiscal data and underlined the importance of establishing a practical framework for the assessment of data quality.^{4, 5}

9. The third stimulus traces to the more recent financial crises in Asia, Russia, and elsewhere. In the wake of these crises, there has been widespread agreement that the adoption of internationally accepted standards, or codes of good practice, can make an important contribution to the efficiency of markets and a strengthening of the international financial system. The IMF is responding to the request by the international community that it prepare, as part of its mandate to conduct surveillance of its member countries' economic policies, a report "that summarizes the degree to which an economy meets internationally recognized disclosure standards."⁶ For data dissemination, the SDDS and GDDS were identified as the relevant standards. By the end of 1999, two rounds of experimental assessments—"reports on the observance of standards and codes," or ROSCs—had been completed and a third round is underway. Each report comprises two elements: a description of country practices, primarily in the core areas that directly impact on the IMF's work, and an independent commentary by IMF staff on the extent to which these practices are consistent with the standard being assessed. Data dissemination has been included in reports for ten countries thus far.⁷ The earlier reports focused on the disclosure elements of the international standards—that is, the requirements to make information available to the public. The later reports also consider the quality of the information disclosed, reflecting the experience that the reports that only dealt with the disclosure were not totally satisfying. Specifically, it was noted that the reports would be more useful if they dealt with, *inter alia*, the quality of the information disclosed.

10. All three stimuli pointed to the need for more work on data quality. To start, attention would need to be given to the definition of data quality. It has been pointed out that years ago quality in statistics might have been synonymous with accuracy, but today a consensus is

⁴ On the IMF's Website (<http://www.imf.org>), see Public Information Notice No. 00/59 (August 7, 2000), and the staff paper on Data Provision to the Fund for Surveillance Purposes.

⁵ Issues surrounding misreporting of information to the IMF in the context of lending arrangements also focused attention on the quality of data.

⁶ G-22 Working Group on Transparency and Accountability, October 1998. The G-20 finance ministers and central bank governors, meeting in Berlin in mid-December 1999, agreed to demonstrate leadership in the implementation of international standards and codes by undertaking the completion of these reports.

⁷ Most of these experimental reports are on the IMF's Website at: <http://www.imf.org/external/np/rosc/index.htm>.

emerging that quality is a much wider, multidimensional concept.⁸ However, no internationally agreed definition of data quality exists.⁹ To further a common understanding of data quality, the IMF undertook to host a Data Quality Reference Site on the Internet. The site is on the Dissemination Standards Bulletin Board (<http://dsbb.imf.org>) on the Internet. Drawing on contributions from the statistical community, the site introduces definitions of data quality, describes tradeoffs among aspects of data quality, and gives examples of evaluations of data quality.

11. In addition, one clear, practical need was for more structure and a common language for assessing data quality—to complement the SDDS and GDDS, to guide IMF staff in assessing whether national data are adequate for surveillance and in designing technical assistance, and to guide IMF staff (and others) in assessing and reporting on the observance of standards and codes. Given these interrelated purposes, it seemed that a framework would need to have the following characteristics:

- Comprehensive in coverage of the dimensions of quality and of elements (indicators) that might represent quality,
- Balanced between the rigor desired by an expert and the bird's-eye view desired by a general data user,
- Structured but flexible enough to be applicable across a broad range of stages of statistical development,
- Structured but flexible enough to be applicable to (at least) the major macroeconomic datasets,
- Lead to transparent results, and
- Arrived at by drawing on best practices by national statisticians.

B. The Framework Thus Far: An Overview

12. A substantial part of the country work undertaken by the IMF's Statistics Department to help member countries improve their statistics begins with a visit to diagnose the strengths and weaknesses of the main sets of macroeconomic statistics and the statistical offices, central banks, and ministries that produce them. Thus, the data quality framework that is emerging reflects the Department's practical experience and ongoing consultations as well as

⁸ Tim Holt and Tim Jones, "Quality Work and Conflicting Quality Objectives," paper for the 84th DGINS Conference, Stockholm, May 1998.

⁹ 1999 Report of the Auditor General of Canada, April, Chapter 3, "Statistics Canada: Managing the Quality of Statistics."

the growing literature on the subject, mainly from national statistical offices (see references to the literature on the Data Quality Reference Site).

13. The framework that is emerging comprises a general assessment framework, specific assessment frameworks for main aggregates used for macroeconomic analysis and policy, and supporting guidance notes. The main framework, which brings together the internationally accepted core principles/standards/or practices for official statistics, serves as the umbrella under which the dataset-specific quality assessment frameworks are developed. The draft general framework, as of mid-July 2000 (see the next subsection), is shown in Annex 1.

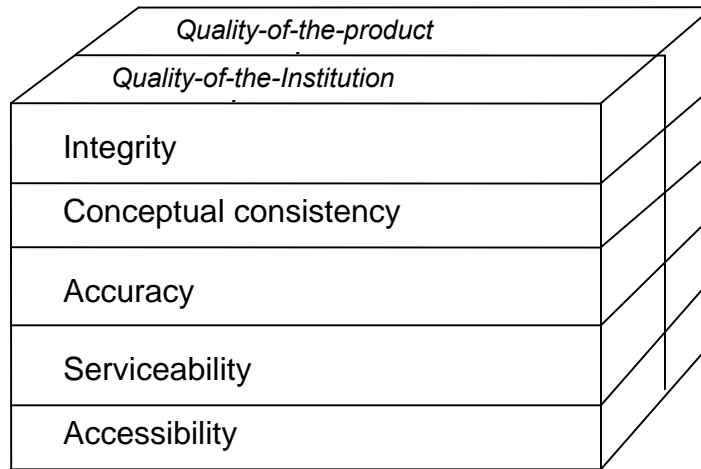
14. The framework is built around five **dimensions of quality**:

1. integrity,
2. conceptual consistency,
3. accuracy,
4. serviceability, and
5. accessibility.

For each of these interrelated dimensions of quality, the framework identifies pointers, or observable features, that can be used in assessing quality. For each dimension, there are three-to-four (two-digit) **elements**, which are then broken into more detailed and concrete **indicators** (three-digit). Below the three-digit level, especially in the dimensions dealing with conceptual consistency and with accuracy, the specific frameworks tailor the pointers to the dataset. As shown in Box 1, for each of the five quality dimensions there may be elements and indicators that relate to the institution¹⁰ the statistical agency and the statistical system and the product.

¹⁰ Some work on data quality is framed in terms of processes. In fact, many of the elements and indicators in the draft framework relate to processes—some associated with institutions and some products.

**Box 1. The Dimensions of Data Quality
in the Assessment Framework**

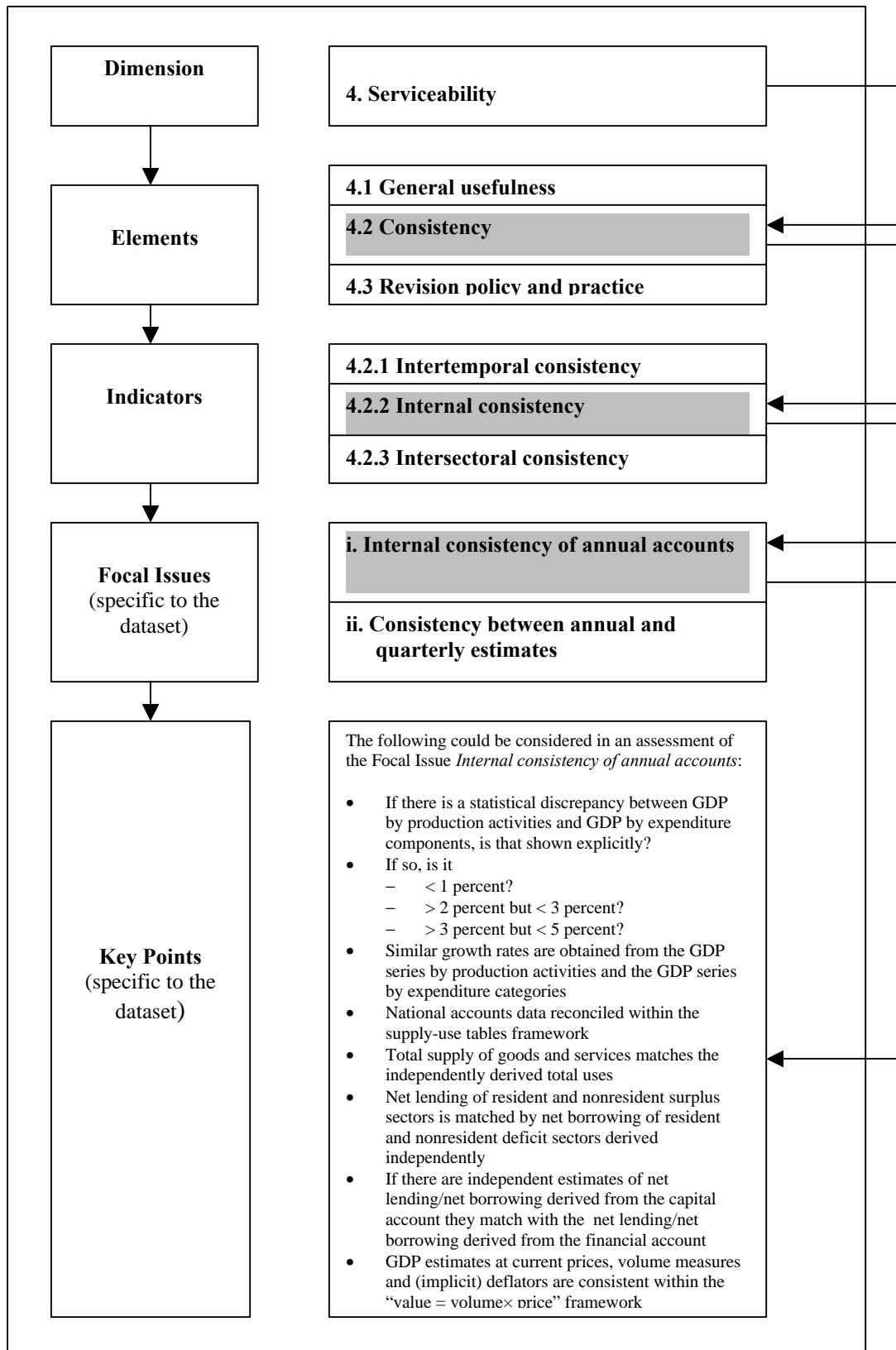


The framework has attempted the following:

1. Synthesize the quality-of-the-product with the quality-of-the-institution approaches
2. Establish an international language on data quality
3. Develop a taxonomy or classification of data quality dimensions and aspects

15. Box 2 provides an example of this structure drawn from the draft framework for assessing national accounts estimates (see the next subsection). Using serviceability as the example of a dimension of quality, the box shows how the framework identifies three elements that point toward quality with respect to serviceability and shows how an assessment focuses in on, or drills down to, consistency, one of those elements. Quality is assessed, in this example, with respect to internal consistency of the annual accounts by considering specific key items.

**Box 2: The Quality Assessment Framework:
An Example Using National Accounts (Draft as of mid July 2000)**



16. The draft quality assessment framework attempts to meet the substantive characteristics identified in paragraph 11.

- ***Comprehensive.*** The framework comprises quality-of-the-institution and quality-of-the-product approaches. The framework's comprehensiveness helps ensure that all relevant elements are assessed. A less comprehensive approach—for example, if heavily weighted toward quality of the product—would not bring to the surface issues about inter-agency cooperation that are often key in less advanced statistical systems. However, specific weights are not assigned to the dimensions or the several elements/indicators in recognition that different country situations will call for different tradeoffs.¹¹
- ***Balance between rigor and a bird's-eye view.*** The framework is purposefully flexible as a structure for conducting an assessment and presenting the results. Depending on the level of interest and expertise, the framework can be applied in several ways. A national statistical office (or other producer of statistics) or others with some background in statistics could carry out a full assessment, including the technical dimensions, and at the most detailed level of the framework for a specific dataset. A person or organization with a more general background could focus on the less technical dimensions to get a picture of the institutions that prepare statistics in a given country. The level of detail in which the results are presented could depend on the purpose; for the general user of data, brief summary statements at a higher—say, two-digit—level could be appropriate.
- ***Applicable across a range of country situations.*** The comprehensiveness of the framework as promoting its applicability to various stages of statistical development was noted above. In addition, the framework encourages use of a common language about quality and taxonomy across countries and thus enhances the comparability of assessments.
- ***Applicable across a range of datasets.*** The framework's tiered approach combines a common structure with dataset-specific detail.
- ***Transparent results.*** The framework provides a systematic and reproducible approach in that the same dimensions, elements, and indicators can be applied across a wide range of situations, thus discouraging ad hoc and/or partial assessments. The indicators are designed to maximize the use of observable fact.

¹¹ Further, as indicated in describing Box 2, one technique being experimented with is that the lower, more detailed, levels of the framework would not be exhaustive but would instead focus on factors—often where statistical difficulties arise—that have been found in practical application to be indicative of quality.

C. Status of the Work on Data Quality and the Process

17. The work is proceeding in an interactive, consultative manner. In late 1999, the IMF engaged Statistics Sweden to help develop the general framework. As the framework took shape, work was undertaken on several specific frameworks.

18. The first of the specific frameworks to reach a stage that the draft was ready for discussion outside the IMF was for national accounts. This framework, on which the United Nations Statistics Division was involved, was the subject of a workshop in June 2000 (an extension of a workshop to review the IMF's draft document on compilation of quarterly national accounts). Representatives of national statistical offices and the organizations in the Inter-Secretariat Working Group on National Accounts participated. The participants in this workshop encouraged the Statistics Department to move forward by expanding the pilot testing of the framework and inviting a wider set of comments on the work in progress. The draft general framework and the draft specific framework for national accounts, as revised after the workshop, are shown in Annex 1 (already introduced) and 2, respectively.

19. The other specific frameworks on which work is underway are meant to cover a range of types of data and institutional settings. They are for balance of payments, merchandise trade, analytical accounts of the central bank, and government finance statistics. It is expected that there will be some experimentation with the techniques to be used in identifying focal issues and key points in the several datasets. Occasions over the next five months in which these drafts can be discussed are being identified. The goal is to have 4-6 specific frameworks well along by the end of the year, both for their own value and contributing to the fine tuning of the general framework.

III. REVIEWS OF STATISTICAL ACTIVITIES

20. Reviews of statistical activities—whether of national statistical systems or individual agencies within the system or of specific sets of statistical products—have taken a variety of forms.¹² For example, over the last decade or so:

- The so-called Boskin Commission, a group of academics, reviewed the U.S. CPI. The study was mandated by Congress to answer questions about the adequacy of the CPI as a measure of the cost of living.
- The Auditor General of Canada reviewed the management of quality in Statistics Canada.

¹² This section expands upon my paper “Quality Reviews: A Background Note” prepared for the 48th plenary session of the Conference of European Statisticians, Paris, June 2000. See <http://www.unece.org/stats/documents/2000.06.ces.htm>.

- The UK Treasury reviewed the institutional framework for statistics and presented its ideas for enhancing the integrity of statistics.
- A management consultant was commissioned by Ireland's National Statistics Board to review the organizational performance and capability of the Central Statistical Office.

21. These and a sample of other reviews now in the public domain are listed (with citations) in Annex 3. The notion of a review has been cast broadly to include quality assessment and documentation efforts, for which presumably a review was undertaken as a first step. This sample is clearly not random in that it is largely drawn from material in English on the Internet.¹³ Key characteristics/features of the reviews are noted in the columns of the Annex. Before turning in the next section to the criteria used in the reviews and the recommendations made, the following points are of interest.

- The **subject** of the reviews ranged widely (column A). Some dealt with specific data products, such as a consumer price index, and some with specific programs, such as a household survey program, and these reviews tended to probe in depth. Some dealt with institutions (agencies and statistical systems), and these reviews tended to be wide in their scope and less technical.
- The **reviewers**—those who undertook the reviews—have varied in training and background (column B). Some were statisticians and some were nonstatisticians; some were within the agency being reviewed and some were outside. Outsiders included academics with expertise in a dataset, management consultants, senior staff from another country's statistical office, and statisticians from an international organization. Partly as a result, the **processes** within which they worked differed because the reviewers held differing degrees of familiarity with the subject and needed to differing degrees to establish their objectivity (column E).
- The **motives** for the reviews are diverse (column C). In some cases, the motive was to set out the facts and alternative remedies for a perceived problem. The UK's *Statistics: A Matter of Trust* falls into this category. In some, an agency wished to confirm the overall strength of its program, perhaps with a view to identifying where improvements (and resources) were needed. BEA's Mid-Decade Strategic Review of the Economic Accounts falls into this category. In some, the review is part of a quality assurance or documentation process. The Australian Bureau of Statistics' review of the household survey program is an example of the former; the Danish Quality Declaration is an example of the latter. In yet others, a government auditor or inspector general was following their mandate to promote efficiency and good

¹³ The reviews considered in this paper pertain to national statistical activities. Reviews of supranational and international activities are outside the paper's scope.

governance in the public sector. The Canadian Auditor General's report is an example. In almost all of these cases, the audiences for the review were primarily domestic—that is, the persons or bodies who would make decisions based on the review were viewed as dealing with domestic issues.¹⁴ In particular, some of the decisions dealt with the future course of statistics within the country. In contrast, the audience for the Report on Observance of Standards and Codes (ROSC)—Data Dissemination for Albania was different: the ROSC is intended to reach an international audience, who typically use the statistics being reviewed but who have little or no direct say in the future course of those statistics.

IV. CRITERIA AND RECOMMENDATIONS AS IDENTIFIERS OF THE ELEMENTS OF DATA QUALITY

22. The sample of reviews includes some that were conducted against specific, pre-set standards or criteria of what constitutes data quality (column D). Some of the reviews provided recommendations (column F). The criteria used in the reviews can be used to help identify the dimensions of data quality, and once these dimensions are identified one can start to look for the elements that can be used in a framework to assess data quality. For the purposes of this paper, the recommendations that relate to organizational, process, or procedural topics are used to help identify elements that can be used in the framework, especially at the more detailed level. (The dataset-specific topics, such as the recommendations on the calculation of a consumer price index, are outside the bounds of this paper but could be drawn upon in developing the dataset-specific frameworks.) The next two subsections summarize these criteria and recommendations, respectively, and then in Section V they serve as springboards to encourage comment on the draft framework.

¹⁴ Of course, technical cooperation projects in statistics often begin with a review of the current status. However, these reviews are often viewed as confidential advice to the domestic authorities and thus are not in the public domain (or thus in Annex 3).

A. Criteria in the National Reviews

23. Table 1, which is based on column D in Annex 3, lists the criteria used in the sample of national reviews where such criteria are explicitly laid out.¹⁵

**Table 1. Criteria Used in National Reviews of Statistical Activities
(Arranged alphabetically by country)**

Australia: high-quality statistics need to be— (5)	Canada: Quality characteristics: (7)	Denmark: high-quality statistics are seen as— (14)	Ireland: policy formulation requires statistics that are— (9)	UK: fine- quality service: provides data that are— ¹ (1)	US	
					Agency required to evaluate— (6)	Users require interrelated characteristics: (2)
accurate	accuracy	reliable: accurate	accurate	accurate	accuracy	accuracy
not subject to large revisions		reliable: provisional figures give true and fair picture			reliability	reliability
timely	timeliness	timely	Timely	timely	promptness in release	timeliness (as part of relevance)
relevant	relevance	relevant				relevance
easily accessible	accessibility	accessible				
comprehen- sive in coverage			comprehen- sive			
	coherence	coherent				
	interpretability					
				cost effective		
				enjoying public confidence		
					documentation	
					avoidance of premature disclosure	

¹ A similar set appeared in UK reference (4): accuracy, reliability, efficiency, and freedom from political interference.

Note: Numbers in parentheses are the reference numbers from Annex 3.

¹⁵ The ROSCCData Dissemination for Albania was omitted because the criteria used represent an early version of the Fund's assessment framework.

24. It is not a surprise that accuracy appears in each list. Even when it is explicitly acknowledged that the degree of accuracy may be unknowable, the idea of “getting the numbers right” is central to quality. Closely related, reliability appears in most lists. In some reviews, the term is not defined, and in some it explicitly relates to the question of whether the first, or provisional, estimates are close to being on target as shown by later estimates. Timeliness also appears in all lists, and usually refers to the lag between the end of the reference period and the initial publication of statistics for that period.

25. Several of the lists embrace criteria that became more prominent in the broadening of the definition of data quality that has taken place in recent years. These broader definitions, around which a consensus seems to have been emerging, focus on aspects that impact on “fitness for use” or “how well statistics meets users’ needs and expectations.”

- Relevance appears in most lists and, while its meaning may seem obvious, there are some differences in the attributes that it encompasses. In one of the referenced papers from the United States, timeliness is treated as part of relevance because, the reasoning goes, statistics that are not available “soon enough” for a particular use are, in fact, irrelevant for that use. More generally, relevance is viewed as referring to the ability of data to meet current and potential user needs, both nationally and internationally, to shed light on the most important features and developments within society (Denmark) and as measuring the concepts in which users are interested (Australia).
- Accessibility refers to both the statistics and documentation about the statistics, with recognition that the dissemination must be adapted to the target group. In many settings, an increasingly electronic twist is put on accessibility by an emphasis on the speed with which data can be located, retrieved, understood, and reused (downloaded).¹⁶
- Interpretability, which appears as one of Statistics Canada’s six characteristics, refers to the “ease with which the user may understand and properly use and analyze the data or information. The adequacy of the definitions of concepts, target populations, variables and terminology underlying the data, and information on any limitations of the data largely determines their degree of interpretability.”¹⁷
- Coherence, as described by Statistics Denmark, starts from the idea that for statistical information to be of greatest significance in shedding light on developments within society, statistics need to be as coherent as possible. Coherence embraces four

¹⁶ Tim Holt and Tim Jones, “Quality Work and Conflicting Quality Objectives,” paper for the 84th DGINS Conference, Stockholm, May 1998.

¹⁷ Statistics Canada, *Quality Guidelines*, third edition, October 1998.

characteristics: coherent internationally (facilitating international comparisons), coherent over time, coherent conceptually, and coherent presentation.¹⁸

26. Freedom from political interference, or objectivity, is not always listed explicitly among the criteria. One set of authors explain that they do not include objectivity in the concept of quality (1) because the case of deliberately false official statistics is exceptional and (2) because it is difficult to discuss and assess objectivity openly.¹⁹ However, such a criterion is very much in evidence in the Fundamental Principles of Official Statistics, adopted unanimously by the United Nations Statistical Commission in 1994. The second principles states: “To retain trust in official statistics, the statistical agencies need to decide according to strictly professional considerations, including scientific principles and professional ethics, on the methods and procedures for the collection, processing, storage and presentation of statistical data.”²⁰

27. Cost-effectiveness also is not always mentioned among criteria. However, even when it is not, it is sometimes noted that cost will need to be considered as entering in tradeoffs that are made with elements of quality. Eurostat takes this approach, and Eurostat’s standard quality report calls for “related information on response burden, cost, and resource budget.”²¹

B. Recommendations in the National Reviews

28. Using the recommendations on organizational, process, and procedural topics as potential indicators of quality is less straightforward. First, for the purposes of this paper one would be looking for *important* additions to the elements already in the framework. But how does one decide the boundary between useful concreteness and detail and too much concreteness and detail? Second, one should abstract from the recommendations that are *too* specific to one’s country situation. But how does one decide the boundary between a country-specific practice and an emerging best practice? In the end, the list drawn up for this paper must be considered somewhat subjective.

¹⁸ *Strategy 2005: The Corporate Framework and Objectives of Statistics Denmark for the Years 2000 to 2005*, Statistics Denmark, June 2000.

¹⁹ Eva Elvers and Bengt Rosen, “Quality Concept for Official Statistics,” *Encyclopedia of Statistical Sciences*, Update, volume 3, pages 621-629. New York: John Wiley & Sons, 1999.

²⁰ United Nations Economic and Social Council, 1994, Report of the Special Session of the Statistical Commission (New York, 11-15 April 1994), E/1114/29.

²¹ See, for example, “Assessment of the Quality of Statistics,” Doc. Eurostat/A4/Quality/99/General/Standard Report, December 1999.

29. Box 3 lists recommendations, using or closely paraphrasing the original language in the six national reviews from which they are drawn. The recommendations grouped themselves rather naturally into six categories.

Box 3. Recommendations About Organization, Process, and Procedure Found in National Reviews of Statistical Activities

User contact and assistance

- Should maintain close and regular contact with its principal users (9); should develop user consultative mechanisms further and be able to respond faster to changing requirements (4)
- Should consider standing advisory committees and regular user conferences as a means to assess user needs (9); should examine the need for external expert advisory committees (13); should establish systematic and regular involvement of outside statistical experts and the users of statistics at all stages of a program to improve or change important statistics (10)
- Should develop a capacity to use its statistical outputs as a basis for analytical pieces (along with mechanisms to ensure that the analyses are strictly non-political (13); should put greater emphasis on the analysis and explanation of statistics to assist users in their interpretation of basic data (9)

Intra-government relations

- Should liaise with other Government Departments to ensure a high standard of statistical analysis (9)
- Should keep administrative sources used for statistical information under regular review (1)
- Should formalize the relationship with a major government data user with a Service Level Agreement (10); should explore formal protocols with federal client departments, not as a substitute for strong working relations but as a framework to facilitate their evolution (13)
- Should strengthen its client relations, particularly with respect to federal and cantonal governments (13)
- should take decisions on the location of statistics (as between a central office and other agencies) on a case by case basis (4)

Quality assurance and informing the public about quality

- Should apply self-assessment techniques widely as one component of the formal processes used to assess quality (7); should establish a quality assurance function to review statistical methodologies, research and standards, and to act as a support/research service to all surveys (9)
- Should improve the coverage and content of information on statistical quality in its annual Performance Report to Parliament (7)
- Should follow the policy about quality-related information, including, as a minimum, an explicit reference to a source of information on methods, concepts and definitions in all catalogued publications (7)
- Should establish a methodological research unit within the service; should have earmarked resources for evaluation and methodological research in the budget for major statistical series (1); should expand the methodological staff and support research activities, methodological developments, and openly quote sources of error and sampling variability (4); should ensure regular reviews of the main index numbers, covering not only survey sources but the index numbers and methodologies themselves (10); should record in full all conclusions, including technical issues and decisions, when there is a major methodological review (10)
- Should introduce a kitemark/benchmarking/trademark of quality to stimulate improvements in quality and inform the public that particular statistics achieve quality standards (4)

Continued on next page

Resources

- Should have the freedom to select the appropriate individual for a task without constraint (9)
- Should ensure that adequate technical expertise is available at essential times (10)
- should establish an internal audit function with a clear charter, encompassing financial regularity, operational auditing and value for money review (9)
- Should track costs of all statistical projects on an on-going basis in order to provide cost elements needed for a planning system (13)

Release Procedures (including revisions)

- Should embargo access, with few exceptions, to statistical results before their publication (1)
- Should clearly indicate revisions to important statistical series in written and oral press briefings (10)

Institutional infrastructure and processes

- Should establish a National Statistical Commission along advisory lines, bringing together key voices in support of objectivity, integrity, timeliness and scope of official statistics (1) and independent of Government and producers of statistics (4); should reconstitute and strengthen the Statistical Commission, explicitly giving it a watching brief over the nonpolitical character of the OFS and its freedom from political interference (13)
- Should benchmark relevant operations against other organizations (9)
- Should retain operational and methodological matters, including definitions, compliance with international standards, content and timing of publications, and the release of data to the archive as the responsibility of the Director of Statistics (1); should put responsibility for professional matters and for delivery of the full set of national statistics with the head of National Statistics (4); should place head of FSO where he/she is recognized as the guarantor of the statistical system's integrity (freedom from political interference, protector of the confidentiality of individually identified records, professional integrity) (13)
- Should articulate the legal role of the FSO as the coordinator of the statistical system (13)

Note: Numbers in parentheses are the reference numbers from Annex 3.

V. COMMENT ON THE DRAFT FRAMEWORK ESPECIALLY IN LIGHT OF THE CRITERIA AND RECOMMENDATIONS IN THE SAMPLE OF REVIEWS

30. As was noted at the outset and all through the paper, the draft framework for assessing data quality described in this paper is a work in progress. Comments in response to the following questions about the general framework's features and their impact on its usefulness as a tool for assessment would be particularly welcome. Of course, concrete examples of problems and suggestions for improvements are invited. Specific comments on the draft framework for national accounts (Annex 2) would also be welcome.

31. Dimensions of quality in the general framework:

- Are the links from the criteria used in assessing quality including, but not limited to, those found in the national reviews to the dimensions in the framework sufficiently strong? For example, is it acceptable to subsume "reliability" under "accuracy"?

- Is there anything missing from the list of dimensions of quality that should be there?

32. Elements and indicators of the general framework

- Do the elements and indicators actually represent, or provide pointers to, the dimensions of quality, as they were intended to?
- Is the structure acceptable? Clear? For example, is it acceptable to place the indicator related to staff, financial, and computing resources (1.1.2) with the dimension “integrity” (because it is part of the institutional setting) even though resources affect most other dimensions as well, or should a separate block of elements and indicators, perhaps designated 0, be set up?
- Does the structure provide appropriately cascading detail and concreteness?
- Are there any elements or indicators—for example, from among the recommendations from the national reviews—that should be added? Made more explicit? For example, should there be more explicit reference to quality assurance processes, which were prominent among the recommendations?

33. Does the framework strike an appropriate balance between needed structure, on the one hand, and flexibility for different countries and datasets, on the other?

34. Does the terminology strike a balance at each level of being clear and concrete enough for those who would use it? Does it strike a balance between using familiar terms, such as found in the national reviews, and those that represent greater precision?

35. A sample of how an assessment could emerge from an element-indicator at the detailed level for the national accounts was shown in Box 2. To what extent would that kind of assessment be satisfying for an expert? Will a similar approach but at, say, the element (two-digit) level serve more general users of data?

Annex 1. Data Quality Assessment Framework
General Framework
(Draft as of mid-July 2000)

Quality Dimensions	Elements	Indicators
1. Integrity <i>Enabling institutional foundations for the collection, compilation, and dissemination of statistics are in place.</i>	1.1 Institutional setting - <i>Clearly specified responsibilities and commensurate resources are in place.</i> 1.2 Legal and administrative basis – <i>Adequate provisions to ensure professionalism and transparency in statistical policies and practices are in place.</i> 1.3 Ethical standards – <i>Staff's behavior guidelines are clear and publicized.</i>	1.1.1 The responsibility for compiling macroeconomic statistics is clearly specified, data sharing between data producing agencies is adequate, and measures to ensure the cost-effectiveness of the various statistical programs are implemented. 1.1.2 Staff, financial, and computing resources are commensurate with institutional functions. 1.2.1 Professional independence of staff is ensured. 1.2.2 Access to respondents' records and administrative data for statistical purposes is adequate . 1.2.3 Statistical reporting is ensured through legal mandate and/or measures implemented to encourage voluntary response. 1.2.4 The confidentiality of respondents' data is guaranteed. 1.2.5 Disclosure of confidential data is prevented and penalized. 1.2.6 Statistical policies and practices are transparent and publicized. 1.1.3 Statistical processes are guided by ethical standards.
2. Conceptual consistency <i>Concepts, definitions, coverage, and classification and sectorization systems follow international standards and recommendations.</i>	2.1 Overall structure – <i>Standard statistical frameworks are used to compile and present statistics.</i> 2.2 Scope – <i>The scope of the statistics in each subject field is comprehensive and in accordance with internationally accepted standards.</i> 2.3 Classification/sectorization – <i>Classification and sectorization systems are in accordance with internationally recommended systems.</i>	2.1.1 Concepts and definitions used follow internationally accepted standard conventions. (See dataset-specific framework.) 2.2.1 The scope of the statistics is comprehensive and in accordance with internationally accepted standards. (See dataset-specific framework.) 2.3.1 Systems implemented are in accordance with internationally recommended systems. (See dataset-specific framework.)

Quality Dimensions	Elements	Indicators
	2.4 Basis for recording – <i>Concepts are valued and accounted for according to internationally accepted standards.</i>	2.4.1 Accounting is done on accrual basis. 2.4.2 Market prices are used to value flows and stocks.
3. Accuracy Source data and compilation techniques are sound, informed exclusively by statistical considerations, and final data accurately reflect the reality portrayed.	3.1 Source data – <i>The selection of sources and collection methods is informed exclusively by statistical considerations.</i> 3.2 Statistical techniques – <i>Statistical techniques employed conform with sound statistical procedures.</i> 3.3 Accuracy assessment – <i>Accuracy measures and indicators are regularly produced and monitored.</i> 3.4 Data analysis – <i>Data analysis to identify and control potential errors are undertaken at various stages of the statistical process.</i>	3.1.1 Source data are collected from comprehensive data collection programs that take into account country-specific conditions. 3.2.1 Data compilation and other statistical procedures employ sound statistical methods. 3.3.1 Surveys are subject to accuracy assessments with regard to coverage, sampling error (where samples are taken rather than complete enumerations), response rate, and any serious accuracy or consistency problem with the survey results. 3.3.2 Shortcomings of administrative data are assessed and adjusted before using these data for statistical purposes. 3.4.1 Source data undergo validation and consistency checks. 3.4.2 Main intermediate results are validated against other information where applicable.
4. Seviceability Statistics are relevant, timely, consistent and follow a predictable revisions policy.	4.1 General usefulness – <i>Statistics cover pertinent information on the subject field, and their timeliness and periodicity follows internationally accepted dissemination standards.</i> 4.2 Consistency – <i>Statistics are consistent over time, internally, and with major data systems.</i>	4.1.1 Timeliness follows dissemination standards. 4.1.2 Periodicity follows dissemination standards. 4.1.3 Processes to monitor the relevance of existing statistics to meet user's needs are in place. 4.2.1 Statistics are consistent or reconcilable over a reasonable period of time. 4.2.2 Statistics are internally consistent (e.g., accounting identities observed). 4.2.3 Statistics are consistent or reconcilable with those obtained through other sources and/or statistical frameworks.

Quality Dimensions	Elements	Indicators
	4.3 Revision policy and practice – <i>Data revisions follow a regular and publicized procedure.</i>	4.3.1 Revisions follow a regular, well established and transparent schedule. 4.3.2 Preliminary data are clearly identified 4.3.3 Results of studies undertaken, such as links between the preliminary to the revised data, are made public.
5. Accessibility <i>Clear data and metadata are easily available and assistance to users is adequate.</i>	5.1 Data accessibility – <i>Statistics are presented in a clear and understandable manner and forms of dissemination are adequate.</i> 5.2 Metadata accessibility – <i>Up-to-date metadata information is made available on a timely manner.</i> 5.3 Assistance to users - <i>Prompt and knowledgeable support service is available.</i>	5.1.1 Impartial statistics are presented in a way that facilitates proper interpretation and meaningful comparisons (layout and clarity of text, tables, and charts). 5.1.2 Forms of dissemination and dissemination media are adequate. 5.1.3 Non-published (but non-confidential) sub-aggregates are made available upon request. 5.1.4 Statistics are made available to all users at the same time and follow a pre-announced release schedule. 5.2.1 Main documentation on concepts, classifications, data sources, and statistical techniques is available, and differences from standards are annotated. 5.2.2 Different levels of detail are provided depending on intended audience and type of collection. 5.3.1 Contact person for each subject field is publicized.

**Annex 2. A Framework for Assessing the Quality of National Accounts Estimates
(Draft as of Mid-July 2000)**

The points of contact in the IMF for this Framework are:

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The Framework is organized in a cascading structure that progresses from the abstract/general to the more concrete/specific. The first-digit level defines the five dimensions of quality in the Framework: integrity, conceptual consistency, accuracy, serviceability and availability. The first-digit level is sub-divided by elements (two-digit level) and indicators (three-digit level). Each element/indicator is accompanied by a brief statement of good quality corresponding to it (asterisked and underlined). A series of questions then addresses concrete quality aspects underlying the statement. The list of bullet points below each question pinpoints concrete items that describe quality features to consider in answering the question.

1. Integrity

1.1. Institutional setting

1.1.1 Roles and responsibilities of statistical agencies

***The responsibility for compiling and disseminating national accounts estimates is clearly specified, data sharing between data producing agencies is adequate, and effective mechanisms ensure the cost-effectiveness of the national accounts program**

i. Is it established clearly which agency performs the primary role in compiling and disseminating national accounts estimates?

- A statute, such as the Statistical Law, or other arrangements¹ specify the responsibility for compiling and disseminating national accounts estimates
- Practice is consistent with the statute or other arrangements
- If several agencies are involved in compiling and disseminating national accounts estimates (or parts of the system), arrangements are in place to ensure exchange of data and consistency of methods and results

ii. Are there adequate mechanisms to coordinate data sharing between the agency (agencies) compiling national accounts and other data producing agencies?

- Arrangements are in place to ensure smooth and timely flow of data from other data producing agencies
- Close contacts are maintained with external data suppliers

iii. Are effective mechanisms in place to monitor the cost-effectiveness of the national accounts program?

- In particular, an oversight body²
 - gives advice on policy and priorities
 - determines the requirements for adequate funding
 - establishes priorities concerning the collection of the data
 - promotes the best choice of sources and methods (data sources mix)
 - ensures that the flow of data within the agency (agencies) is smooth
 - ensures that the duplication of effort within the statistical agency (agencies) is avoided
 - ensures that reducing the response burden of data providers is a primary concern
- Concepts and methodologies used within the agency (agencies) are in harmony with those of national accounts

¹ For example, executive decrees, inter-agency protocols.

² Such as an advisory council, technical committee of data users and data providers.

- Accounting conventions used within the agency (agencies) are in harmony with those of national accounts

1.1.2 Resources and training programs

*** Staff, financial, and computing resources are commensurate with the national accounts program**

i. Does the national accounts program have adequate staff resources?

- The number of the staff is adequate
- The quality of the staff is adequate
 - it has sufficient experience / knowledge of concepts and practice
 - it undergoes internal training in national accounts methodology
 - it participates in international training courses / seminars / workshops
- The incentive structure is sufficient to retain trained staff

ii. Does the national accounts program have adequate financial resources?

- The resource allocation is sufficient
- It is commensurate with the overall resource availability of the agency (agencies)

iii. Does the national accounts program have adequate computing resources?

- Sufficient resources are allocated to automate the national accounts compilation and dissemination procedures
- Best efforts are made to exploit the potential of modern computing technology

1.2 Legal and administrative basis³

1.2.1 Professional independence

*** Professional independence of staff is ensured**

i. Do the terms and conditions of compiling statistics guarantee the professional independence of the staff?

- Statutory provisions and/or other arrangements
 - emphasize the professional independence of the statistical agency (agencies)

³ Refers to guidelines for official statistics such as provided in the “Fundamental Principles of Official Statistics,” United Nations Economic and Social Council. 1994. Report of the Special Session of the Statistical Commission (New York, 11-15 April 1994), E/1994/29.

- govern the appointment and independence of action of the head(s) of the statistical agency (agencies)
- prevent improper external influence on the content or release of statistical information
- The compilers of statistics are free to choose the data sources with regard to quality, timeliness, costs and the burden on respondents
- The statistical agency (agencies) is (are) entitled to comment on erroneous interpretation and misuse of statistics

1.2.2 Access to administrative and other data for statistical purposes

*** Access to the administrative and other data required for national accounts purposes is adequate**

i. Is there easy and timely access to administrative and other data?

- Statutory provisions or other arrangements guarantee access to administrative records and other data⁴
- If access to administrative records is limited, other arrangements ensure that the agencies producing administrative and other data assemble statistical information themselves in accordance with statistical standards and provide it to the statistical agency (agencies)

1.2.3 Nature of reporting

*** Statistical reporting is ensured through legal mandate and/or other arrangements ensuring voluntary response**

i. Are the statutory provisions and/or other arrangements adequate to ensure reporting of the data for national accounts purposes?

- Statutory provisions and/or other arrangements include:
 - collection of data
 - provision of information
 - inspection of books and records, premises, and stocks of the respondents in order to obtain the required information, in case of noncompliance
 - substantial penalties against the offender in case of noncompliance with the required provision of the data
- Serious efforts are made to create goodwill among the data providers to obtain the necessary information

⁴ Such as the data produced by government ministries, the central bank, and the data produced in special surveys conducted by other agencies.

1.2.4 Confidentiality of individual data

*** The confidentiality of individual data is guaranteed**

i. Are the statutory provisions and/or other arrangements adequate to ensure the confidentiality of individual data?

- Statutory provisions and/or other arrangements:
 - protect the privacy of individual data
 - forbid the use of confidential data in litigation except in cases relating to the breach of statistical law

1.2.5 Avoiding disclosure

*** Disclosure of confidential data is prevented and penalized**

i. Are the rules and regulations adequate to prevent the disclosure of confidential data?

- Rules and regulations aimed at avoiding disclosure of confidential data include penalties against the staff who disclose confidential data
- Computer programs safeguard against the exposure of confidential data
- Confidentiality of data is appropriately guarded during the process of their destruction
- The premises for storing data are adequately secured

1.2.6 Transparency in statistical practices

*** Statistical practices are transparent**

i. Does the public have easy access to the laws, regulations, terms and conditions under which the data are compiled and disseminated?

- The terms and conditions under which the data are produced and disseminated are available to the public
- Internal government access to the data is identified prior to their release
- Advance notice is given of major changes in methodology
- Advance release calendars are publicized and disseminated
- The data are released simultaneously to all interested parties
- Documentation on the methodology of national accounts is disseminated

1.3 Ethical standards

*** Statistical practices are guided by ethical standards**

i. Are there clear ethical guidelines for official statistics and are these followed by the staff?

- There is a code of conduct for official statistics⁵
- If there is such code it is publicized
- Professionalism is promoted by management⁶
- Reasonable efforts are made to benefit from methodological and organizational developments elsewhere

⁵ See footnote 9

⁶ For example, through analytical work, publication of methodological papers, holding of lectures / seminars / conferences and participation in them.

2. Conceptual Consistency

2.1 Overall structure: Concepts and definitions

*** The overall structure of the national accounts follows internationally endorsed standards and recommendations**

i. Are national accounts concepts and definitions based on internationally recommended standards and recommendations?

- 1993 SNA / 1995 ESA⁷ are followed

2.2 Scope

*** The delimitation of the economy, and the production and assets boundaries are in accordance with the 1993 SNA**

i. Is the delimitation of the constituent units of the economy in accordance with the 1993 SNA?

- In particular, the following are included as part of the economy:
 - territorial enclaves in the rest of the world⁸
 - free zones / bonded warehouses / factories operated by offshore enterprises under customs control
 - workers who work part of the year in another country

ii. Is the production boundary in accordance with the 1993 SNA?

- In particular, the following items are in scope for output measurement⁹:
 - own-account production of all goods for own final consumption
 - research and development on own-account
 - output of goods for own-account fixed capital formation
 - mineral exploration
 - production of entertainment, literary or artistic originals
 - illegal output sold to willing buyers

⁷ Further references to 1993 SNA, imply 1993 SNA / 1995 ESA.

⁸ Such as embassies, consulates, military bases, scientific stations.

⁹ Irrespective of the coverage that is actually achieved

iii. Is the assets boundary in accordance with the 1993 SNA?

- In particular, the following items are in scope for estimating the assets boundary¹⁰:
 - Among tangible assets
 - defense related assets that could be used for civilian purposes¹¹
 - valuables and historical monuments
 - agricultural work-in-progress
 - Among intangible assets:
 - mineral exploration (whether successful or not)
 - systems and standard applications computer software and data bases¹²
 - entertainment, literary or artistic originals
 - patented entities
 - leases and other transferable contracts¹³

2.3 Classification/sectorization: Systems implemented

*** The classifications used are in accordance with internationally recommended systems**

i. Are internationally recommended systems or national systems used for classification purposes?

- The 1993 SNA is followed to classify:
 - institutional units
 - transactions
 - other flows
- COICOP¹⁴ is used to classify household consumption
- COFOG¹⁵ is used to classify functions of government
- If a national system is used, is it compatible with international classifications for classifying:
 - activities?
 - products?

¹⁰ Irrespective of the coverage that is actually achieved.

¹¹ Such as airfields, docks, roads, hospitals, and other buildings or structures.

¹² Whether purchased or built in-house.

¹³ Such as purchased goodwill.

¹⁴ Classification of individual consumption by purpose.

¹⁵ Classification of the Functions of the government.

2.4 Basis for recording: Accounting rules and valuation principles

*** Accounting is done on an accruals basis and market prices (or equivalent prices) are used to value flows and stocks**

i. Are the timing rules used for recording flows in accordance with 1993 SNA?

- In particular, work-in-progress is recorded in the period it is produced
- Government-related transactions are recorded on an accruals basis, in particular
 - taxes and subsidies on products
 - arrears
 - expenditures
 - revenues

ii. Are the valuation rules used for recording flows and stocks in accordance with 1993 SNA?

- Market output is valued at basic / producer prices
- Output for own-use is valued at equivalent market prices
- Transport margins are included in the valuation of intermediate consumption
- If levied, sales and excise taxes are included in the valuation of intermediate consumption
- If value added taxes are in place, they are included in the valuation of intermediate consumption, excluding the deductible part of the value added taxes
- If applicable, the deductible part of the value added taxes is excluded from the valuation of final uses
- Corrections are made when transfer prices are detected
- Information on insurance and freight by commodities for import is available
- Total imports and exports are valued on a f.o.b. basis
- Transactions in foreign currency are converted using the mid-point exchange rate prevailing in the market at the moment they take place

3. Accuracy

3.1 Sources and collection methods

*** The source data are obtained from a comprehensive data collection program**

i. Are reliable sample frames used for conducting surveys of statistical units?

- A comprehensive and up-to-date business register provides the basis for sample surveys¹⁶
- In the absence of a business register, comprehensive and up-to-date sample frames are available (for example, census list updated with new registrations)
- A 'master' area sample frame is available

ii. Are annual business statistics collected through a regular establishment / enterprise survey program?

- Coverage is comprehensive
 - All industries are covered
 - If not, is the coverage¹⁷
 - < 60 percent?
 - 60 – 80 percent?
 - > 80 percent?
 - For the activities covered, all unit sizes are represented
 - If not, is the coverage
 - For mining, manufacturing
 - < 60 percent?
 - 60 – 80 percent?
 - > 80 percent?
 - For agriculture
 - < 60 percent?
 - 60 – 80 percent?
 - > 80 percent?
 - For construction
 - < 60 percent?
 - 60 – 80 percent?
 - > 80 percent?
 - For trade
 - < 60 percent?
 - 60 – 80 percent?
 - > 80 percent?

¹⁶ That is, they cover all activities and types of units.

¹⁷ The following ranges represent acceptable coverage with ascending degrees of quality

- For transportation
 - < 60 percent?
 - 60 – 80 percent?
 - > 80 percent?
- For business and personal services
 - < 60 percent?
 - 60 – 80 percent?
 - > 80 percent?
- Sample design and estimation procedures represent the survey universe
 - scientific random sampling techniques are used¹⁸
 - proper imputation methods are used to handle non-response
 - grossing-up factors are derived scientifically, based on sample design
 - survey sampling and estimation procedures are reviewed and corrected regularly
- Data collected are sufficiently detailed, and include:
 - for mining, manufacturing
 - to measure output, the data on sales and inventories of finished goods and work in progress
 - to measure intermediate consumption, the data collected include data on purchases and inventories of raw materials
 - data on own-account production of capital goods
 - data on wages
 - for agriculture
 - to measure output, the data on sales and inventories of finished goods and work in progress
 - to measure intermediate consumption, the data on purchases and inventories of raw materials
 - data are collected on own-account production of capital goods
 - for construction
 - to measure output, the data on values of construction put in place or on sales and inventories of finished goods and work in progress
 - to measure intermediate consumption, the data on purchases and inventories of raw materials
 - data on own-account production of capital goods
 - for trade
 - to measure trade margins, the data on sales, purchases and inventories of goods for resale
 - to measure intermediate consumption, the data are available on uses of non-durable goods and services
 - for transportation
 - data on revenue
 - to measure intermediate consumption, the data on purchases and inventories of raw materials
 - data on own-account production of capital goods
 - for business and personal services
 - to measure output, the data on revenue
 - to measure intermediate consumption, the data on uses of non-durable goods and services

¹⁸ Scientific random sampling comprises the body of randomized methods or designs for selecting units from a universe list that exhaustively enumerates the units in the target population, in such a way that the entire population is represented by the sample subject only to a random error. In doing so, the properties of the random sampling error can be fully characterized by the sample design.

iii. Are household surveys conducted on a regular basis?

- Coverage is comprehensive
 - Geographically
 - By socio-income groups
- Sample design and estimation procedures adequately represent the universe:
 - Scientific random sampling techniques are used
 - Proper imputation methods are used to handle non-response
 - Grossing-up factors are derived scientifically based on sample design
 - Sample design and estimation procedures are reviewed and corrected regularly
- Data collected are detailed and include, in particular, data on:
 - purchases of consumption goods
 - purchases of durable goods
 - production for own-consumption
 - purchases of valuables
 - own-account capital formation

iv. Are periodic (two or more years) surveys / censuses conducted on a regular basis?

- These include, at least, comprehensive surveys / censuses for
 - Establishments / enterprises
 - Population / households
 - Agriculture / livestock
- Census / sample design and estimation procedures adequately represent the universe:
 - Scientific techniques are used
 - Proper imputation methods are used to handle non-response
 - Grossing-up factors are derived scientifically based on sample design

v. Are sub-annual (monthly / quarterly) data collected?

- Sub-annual surveys of establishments / enterprises are conducted to obtain detailed quarterly / monthly indicators consistent with annual data, in particular, for:
 - Mining, manufacturing
 - Agriculture
 - Construction
 - Trade
 - Transportation
 - Business and personal services

vi. Are there provisions to conduct ad-hoc surveys?

- ***Ad-hoc surveys are conducted, when necessary, to supplement the regular survey program***

vii. Are detailed data obtained from other statistical systems on timely basis?

- Price statistics include, in particular:
 - producer price indices / wholesale price indices
 - consumer price indices / retail price indices
 - prices of agricultural products
 - prices or price indices of other major products
 - export and import price indices
- Detailed international trade statistics are obtained on timely basis
- Detailed balance of payments statistics are obtained on timely basis
- Detailed monetary and financial statistics are obtained on timely basis
- Government finance statistics include, in particular:
 - data on extra-budgetary funds
 - time series data on capital stocks
 - data on all defense-related expenditure
 - comprehensive data on local government operations

viii. Are detailed administrative data from the appropriate agencies available on timely basis?

- In particular, the data on the following are included:
 - taxes
 - social security
 - licenses and permits
 - occupational and professional organizations
 - educational system
 - health system

3.2 Statistical techniques¹⁹: Compilation procedures and statistical methods and adjustment

*** GDP by activities is compiled using sound procedures and methods**

i. Are the output estimates compiled at a sufficient level of industrial detail?

- In particular, for agriculture:
 - at the level of the main tabulation categories of the classification used (e.g. 1 digit ISIC)
 - at the level of all divisions of the classification (e.g. 2 digit ISIC) or several of them
- construction:

¹⁹ This section concerns the source data for the annual national accounts as described in the IMF GDDS (published 12-14 months after the end of the year).

- at the level of the main tabulation categories of the classification used
- at the level of all divisions of the classification

service industries:

- at the level of the main tabulation categories of the classification used
- at the level of all divisions of the classification or several of them

ii. Are the estimates of intermediate consumption compiled at a sufficient level of industrial detail?

- In particular, for
agriculture:
 - at the level of the main tabulation categories of the classification used (e.g. 1 digit ISIC)?
 - at the level of all divisions of the classification (e.g. 2 digit ISIC) or several of them?construction:
 - at the level of the main tabulation categories of the classification used?
 - at the level of all divisions of the classification?service industries:
 - at the level of the main tabulation categories of the classification used?
 - at the level of all divisions of the classification or several of them?

iii. Is there a sizeable part of the economy that is not covered by regular national accounts compilation²⁰?

- Is there a plausible and widely accepted estimate available of the part of the economy that is not covered by the regular national accounts compilation?
- If so, as a proportion of total official GDP, is the value added not covered in regular national accounts compilation
 - Less than 10 percent?
 - From 10 – 20 percent?
 - Over 20 percent?
- Is the proportion of the value added of mining, manufacturing not covered in the regular national accounts compilation in the total
 - Less than 10 percent?
 - From 10 – 20 percent?
 - Over 20 percent?
- Is the proportion of value added of agriculture not covered in the regular national accounts compilation in the total
 - Less than 10 percent?
 - From 10 – 20 percent?
 - Over 20 percent?

²⁰ Official estimate plus an estimate of unrecorded activities that is added on.

- Is the proportion of value added of construction not covered in the regular national accounts compilation in the total
 - Less than 10 percent?
 - From 10 – 20 percent?
 - Over 20 percent?
- Is the proportion of value added of trade not covered in the regular national accounts compilation in the total
 - Less than 10 percent?
 - From 10 – 20 percent?
 - Over 20 percent?
- Is the proportion of value added of transportation not covered in the regular national accounts compilation in the total
 - Less than 10 percent?
 - From 10 – 20 percent?
 - Over 20 percent?
- Is the proportion of value added of other services not covered in the regular national accounts compilation in the total
 - Less than 10 percent?
 - From 10 – 20 percent?
 - Over 20 percent?

iv. How are the official estimates of activities that are not covered in regular national accounts compilation developed?

- Using micro surveys of activities suspected to have production that is not covered in regular national accounts compilation
- Using the data from household and trade surveys
- Global estimates are made based on past benchmarks or judgements²¹

v. In compiling GDP by activities, what is the degree of reliance on fixed ratios derived from benchmarks or other sources that are more than 5 years old?

- In the total estimate of value added, do the estimates derived from such ratios account for²²:
 - Less than 20 percent?
 - 20 – 50 percent?
 - 50 – 80 percent?
 - over 80 percent?
- For mining, manufacturing do such ratios account for:

²¹ For example, by applying a fixed ratio to observed GDP.

²² The following ranges represent compilations with descending degrees of quality

- Less than 10 percent?
- From 10 – 20 percent?
- Over 20 percent?
- For agriculture do such ratios account for:
 - Less than 10 percent?
 - From 10 – 20 percent?
 - Over 20 percent?
- For construction do such ratios account for:
 - Less than 10 percent?
 - From 10 – 20 percent?
 - Over 20 percent?
- For trade do such ratios account for:
 - Less than 10 percent?
 - From 10 – 20 percent?
 - Over 20 percent?
- For transportation do such ratios account for:
 - Less than 10 percent?
 - From 10 – 20 percent?
 - Over 20 percent?
- For other services do such ratios account for:
 - Less than 10 percent?
 - From 10 – 20 percent?
 - Over 20 percent?

vi. Are proper techniques used to address specific issues of GDP compilation?

- **Owner-occupied dwellings:** output is valued as the estimated rentals that tenants would pay for similar accommodation
- **Work in progress:** the following are treated as work-in-progress:
 - growing crops
 - standing timber
 - stocks of fish
 - livestock reared for purposes of food
 - large construction projects
 - output of large equipment²³
- **Inventory valuation adjustment:** if inventories data are used in the estimates of output, output is adjusted for holding gains / losses accruing on inventories
- If inventories data are used in the estimates of intermediate consumption, intermediate consumption is adjusted for holding gains / losses on inventories
- **Consumption of fixed capital:** the perpetual inventory method is used as the conceptual basis for estimating consumption of fixed capital
- **Cash vs accrual:** the cash data are converted to accrual by allocating them to the period to which they relate, in particular for the data on:

²³ Such as ships.

- taxes and subsidies on products
- government arrears
- government revenue data
- government expenditure data

vii. Are proper procedures followed for compiling the volume measures of GDP?

- **Deflators / price indices:** deflators / price indices are compiled at a detailed level
- Deflators / price indices are consistent with the variables being deflated in terms of price concept, coverage, and reference period
- **Double indicator method:** suitable deflators / price indices are used to deflate output at least at the one-digit level of classification of activities
- Suitable deflators / price indices are used to deflate intermediate consumption at least at the one-digit level of classification
- **Single indicator methods:** if production indices / volume data are used to extrapolate value added, are the volume extrapolators representative?
- Is direct deflation of value added using output or input prices avoided?
- **Volume measures of taxes / subsidies on products:** are estimated by applying base year tax rates to the volume of transactions subject to a specific tax / subsidy
- If not, are these estimated by extrapolating the base year tax / subsidy using a volume extrapolator of transactions subject to a specific tax / subsidy?
- **Output volume of trade margins:** are estimated by applying the base year margin rates to the corresponding volume of sales
- If not, are these estimated by extrapolating the base year trade margin using a volume extrapolator of sales?
- **Measurement of volume change:** GDP volume change is measured using annual chain indices
- If not, the base year is changed at least on five-year basis

*** GDP by expenditure components are compiled using sound procedures and methods**

i. Are the GDP estimates by expenditure components derived independently?

- In particular, the following are derived independently (i.e., not as a residual):
 - household final consumption expenditure
 - gross fixed capital formation
 - changes in inventories

ii. What is the level of detail for which the GDP estimates are compiled?

- Household final consumption expenditure is compiled at least at the one-digit level of the appropriate classification (such as COICOP)

- Government final consumption expenditure is compiled at least at the one-digit level of the appropriate classification (such as COFOG)
- Gross fixed capital formation is compiled by activities and by type of assets
- Changes in inventories are compiled by activities and type of inventories

iii. In compiling GDP by expenditure components, what is the degree of reliance on fixed ratios derived from benchmarks or other sources that are more than 5 years old?

- In the total estimate of *final expenditure of households*, do the estimates derived from such ratios account for²⁴:
 - Less than 20 percent?
 - 20 – 50 percent?
 - 50 – 80 percent?
 - over 80 percent?
- In the total estimate of *final expenditure of NPISHs*, do the estimates derived from such ratios account for:
 - Less than 20 percent?
 - 20 – 50 percent?
 - 50 – 80 percent?
 - over 80 percent?
- In the total estimate of *fixed capital formation*, do the estimates derived from such ratios account for:
 - Less than 20 percent?
 - 20 – 50 percent?
 - 50 – 80 percent?
 - over 80 percent?

iv. Are proper techniques used to address specific issues of GDP compilation?

- In particular, government final expenditure is exclusive of incidental sales
- Expenses of residents abroad are included in household final consumption expenditure
- Expenditures on items that are considered stores of wealth (such as jewelry, works of art) are included in the estimates of valuables

v. Are adequate procedures followed to compile the volume measures of the components of GDP?

- Dedicated price indices / deflators are used to deflate GDP components at least at the one-digit level of level of the corresponding classifications
- Household consumption implicit deflator moves as the CPI

²⁴ The following ranges represent compilations with descending degrees of quality

3.3 Accuracy measures of source data: Survey/census and administrative data²⁵

*** *Accurate surveys/censuses together with appropriate administrative records*²⁶ with comprehensive coverage provide the main source for compiling national accounts statistics**

i. Is information available for sampling errors, non-sampling errors and non-response of the surveys/censuses²⁷?

- Information is available about sampling errors²⁸
- Information is available about non-sampling errors
- Sample selection is adjusted when sampling errors become large
- Information is available about non-response in the surveys or percentages of source data imputed
- The influence of outliers is limited
- Surveys/censuses are audited²⁹ to verify the accuracy of the individual survey data

ii. In compiling GDP estimates by activities, what is the degree of reliance on the source data obtained from surveys/censuses or appropriate administrative records?

- In the total estimate of *output*, do the observed data account for³⁰
 - Less than 20 percent?
 - 30 – 50 percent?
 - 50 – 80 percent?
 - 80 - 90 percent?
 - over 90 percent?
- In the total estimate of *intermediate consumption*, do the observed data account for
 - Less than 20 percent?
 - 30 – 50 percent?
 - 50 – 80 percent?

²⁵ As footnote 24.

²⁶ Such as government accounts.

²⁷ Ideally, this would apply to surveys mentioned in 3.1.ii above.

²⁸ This refers to standard errors, or coefficients of variation.

²⁹ For example, in accompanying filed collections / random post-enumeration checks

³⁰ This answer should be derived as a weighted average, ideally from the compilation level of detail.

- 80 - 90 percent?
- over 90 percent?

iii. In compiling GDP estimates by expenditure components, what is the degree of reliance on the source data obtained from surveys/censuses or appropriate administrative records?

- In the estimate of *final expenditure of households*, do the observed data account for
 - Less than 20 percent?
 - 30 – 50 percent?
 - 50 – 80 percent?
 - 80 - 90 percent?
 - over 90 percent?
- In the estimate of *final expenditure of NPISHs*, do the observed data account for
 - Less than 20 percent?
 - 30 – 50 percent?
 - 50 – 80 percent?
 - 80 - 90 percent?
 - over 90 percent?
- In the estimate of *fixed capital formation*, do the observed data account for
 - Less than 20 percent?
 - 30 – 50 percent?
 - 50 – 80 percent?
 - 80 - 90 percent?
 - over 90 percent?

3.4 Data analysis: Data validation and analysis of source consistency

*** Source data undergo appropriate validation and consistency checks before they are used for national accounts purposes**

i. Are appropriate measures taken to validate the source data and make them consistent with national accounts?

- The source data are analyzed to correct for underreporting / misreporting, in particular to check for:
 - temporal consistency
 - consistency with other related data sources
- The consistency of the source data with the national accounts is checked, in particular concerning:
 - definitions
 - valuation
 - reference periods
 - classifications of national accounts
- Source data are analyzed in the context of revisions

4. Serviceability

4.1 General usefulness

*** Timeliness and periodicity follow generally accepted good practices (as embedded in the IMF dissemination standards), and the national accounts program responds adequately to users' needs**

4.1.1 Timeliness and periodicity

i. Is improving timeliness an issue of systematic effort?

- The timeliness of quarterly national accounts data less than 1 quarter
- The timeliness of national accounts aggregates less than 9 months
- The timeliness of the national accounts comprehensive framework C14 months
- The release of the data take account of:
 - the timing and availability of major data sources
 - the preparation of important government economic political documents

ii. Does the periodicity of national accounts follow IMF dissemination standards?

- The periodicity of national accounts annual
- The periodicity of national accounts quarterly

4.1.2 Relevance of the statistical program³¹

i. Does the national accounts program adequately respond to users needs?

- Explicit / external reviews are conducted to assess whether the program meets user needs³²

4.2 Consistency

*** The national accounts data are consistent over time and internally, and with major data systems**

³¹ Relevance reflects the degree to which the program addresses the issues of most concern to the users.

³² In terms of the topics addressed, the accuracy and timeliness of information being produced.

4.2.1 Temporal consistency

i. Are the national accounts data consistent over time?

- Consistent time series data are available without break for a period of at least 5 years
- Erratic movements in the time series, when they occur, are explained to at least 10 years
- Back series are adjusted to account for methodological developments
- Back series are adjusted to avoid discontinuities arising from changes in data sources
- Outliers in the structural ratios are investigated, in particular:
 - intermediate consumption to total output
 - value added to total output
 - saving to national income
 - gross fixed capital formation to GDP
 - household consumption to GDP
 - exports to GDP
 - imports to GDP

4.2.2 Internal consistency

i. Are the annual accounts internally consistent?

- If there is a statistical discrepancy between GDP by production activities and GDP by expenditure components, is that shown explicitly?
- If so, is it
 - < 1 percent?
 - > 2 percent but < 3 percent?
 - > 3 percent but < 5 percent?
- Similar growth rates are obtained from the GDP series by production activities and the GDP series by expenditure categories
- National accounts data are reconciled within the supply-use tables framework
- Total supply of goods and services matches the independently derived total uses³³
- Net lending of resident and nonresident surplus sectors is matched by net borrowing of resident and nonresident deficit sectors derived independently

³³ $O + T_n + M_{g\&s} = C_i + C_f + GFCF + \Delta Inven + Val_{na} + X_{g\&s}$, where O , T_n , $M_{g\&s}$ are the components of supply - output, taxes less subsidies on products, and imports of goods and services, respectively; and C_i , C_f , $GFCF$, $\Delta Inven$, Val_{na} , $X_{g\&s}$ are the components of uses - intermediate consumption expenditure, final consumption expenditure, gross fixed capital formation, changes in inventories, acquisition less disposals of valuables and exports of goods and services, respectively.

- If there are independent estimates of net lending / net borrowing derived from the capital account they match with the net lending / net borrowing derived from the financial account³⁴
- GDP estimates at current prices, volume measures and (implicit) deflators are consistent within the “value = volume * price” framework
- Revisions are used to identify and remove causes of inconsistencies in the estimates

ii. Are the quarterly estimates of GDP consistent with the annual estimates?

- Concepts and definitions for compiling quarterly GDP are identical to those used to compile the annual estimates
- The discrepancy between the sum of quarterly estimates and the annual estimate is removed through benchmarking procedures (such as the Denton technique)

4.2.3 Intersectoral consistency

i. Are the national accounts data consistent with the balance of payments?

- Total net lending / net borrowing (from national accounts) is the same as the current account balance plus the capital account balance (from balance of payments)

4.3 Revision policy and practice

*** The revision of national accounts follows a regular and publicized procedure, in which the links between the preliminary and final data are identified and explained**

4.3.1 Stages of revision and scheduling of release

i. Are revised national accounts data released according to a regular, well-established, and transparent schedule?

- The release schedule is, in particular:
 - predetermined and reasonably stable from year to year
 - announced in advance of expected release dates

ii. Are the release and revision dates coordinated with the arrival of major data sources and the timing of preparation of important official economic policy documents?

³⁴ $NL_{cap} = NL_{fin}$, where NL_{cap} , NL_{fin} are the estimates of net lending / borrowing derived from the capital and financial accounts.

- New source data are incorporated as early as possible
- Are new source data, which indicate that previously released estimates should be revised, sometimes permanently or temporally suppressed?
- Revised data are released in time to be incorporated in important official economic policy documents

4.3.2 Identification of preliminary data

i. Does the revision policy identify the status of the data?

- In particular, the preliminary and revised data are identified in tables
- The revised data are accessible on a sufficiently detailed level

4.3.3 Analysis of revision

i. Does the revision policy have provision for explaining the links between the preliminary and the final data?

- Candid documentation is published on sources and methods of revising the data
The documentation shows, in particular:
 - the direction and magnitude of revisions
 - the main flows of data from the preliminary to the revised versions
 - the reasons for revisions

5. Accessibility

*** The dissemination of the national accounts estimates and metadata, and the related service and support are commensurate with users' needs**

5.1 Data accessibility: Forms of dissemination and dissemination media

i. Is the dissemination of national accounts estimates commensurate with users' needs?

- National accounts estimates are disseminated regularly, in particular,
 - at a detailed level and with time-series
 - according to a well-established production and release schedule
 - through a dedicated annual national accounts publication
 - through electronic means
- Quarterly national accounts estimates are disseminated regularly, in particular, through:
 - a dedicated sub-annual statistical publication
 - electronic means
- Non-confidential data at the compilation level are available upon request
- The data are properly catalogued to allow users to find out what information is available and assist them in locating it

5.2 Metadata accessibility: Documentation

i. How well does the documentation on national accounts methodology provide the users with information about concepts, definitions and classifications?

- Comprehensive description of national accounts methodology is published, in particular:
 - it shows the linkage with major data systems (for example, through bridge tables)³⁵
 - it highlights important differences with these data systems
- If there are deviations from international standards, they are well documented

5.3 Assistance to users: Service and support

i. Are there provisions to provide adequate assistance to users of national accounts statistics?

- A help desk provides prompt and knowledgeable service and support
- A national accounts contact person is available to provide further assistance as required

³⁵ Such as the balance of payments and government finance statistics.

Annex 3. A Sample of Reviews of Statistical Systems, Agencies, and Products
(Arranged chronologically)

Subject of the review (A)	Reviewer (B)	Origin or motive (C)	Standard or criteria used in the review (D)	Process and product (E)	Recommendations (F)	Reference (G)
Government Statistical Service (GSS); UK	Working Party set up by Royal Statistical Society (including academics and a former GSS head)	The Working Party was established to provide an independent review of the criteria and mechanisms for monitoring the integrity and adequacy of, and public confidence in, official statistics.	The GSS was seen as having to be of fine quality: - earning and enjoying public confidence; and - providing accurate, timely, and cost-effective data.	The Working Party drew on contributions made in an open meeting, which included the then head of GSS. Additional submissions were received later.	On organization, process, and procedural topics, in four areas: - centralization and control; - a unit to strengthen evaluation and methodological research; - an advisory national statistical commission; and need for a national statistical law.	1
Economic accounts—national, international, and regional; US Bureau of Economic Analysis (BEA)	BEA staff	The purpose of the review: to evaluate the performance of the economic accounts and develop a plan to maintain and improve that performance.	The uses made of the estimates in the accounts determine the characteristics required of them. Some characteristics, such as for international comparability or for long time series, reflect specific purposes. More generally, users require three interrelated characteristics that may be summarized in terms of C - accuracy, - reliability, and - relevance.	The review consisted of three steps (see also Col. F): - Preparation of a series of background papers; - Development of a draft plan to maintain and improve the accounts; and - Solicitation of outside comment and discussion. In earlier decades, reviews were performed by blue-ribbon panels. In this review, the outsider perspective was obtained in a different way Cby outside comment on an internal	On dataset-specific topics.	2

Subject of the review (A)	Reviewer (B)	Origin or motive (C)	Standard or criteria used in the review (D)	Process and product (E)	Recommendations (F)	Reference (G)
				review.		
Consumer Price Index (CPI); US Bureau of Labor Statistics	Advisory Commission to Study the CPI (Michael J. Boskin, chair, and four others)	Requested by the Senate Finance Committee, pursuant to a Senate Resolution. Upward bias when compounded over time, was seen as having enormous implication for the national debt due to over indexing of Federal programs.		The CPI Commission represented the first intensive external evaluation of US price statistics since 1961.	On data-set specific topics.	3
Statistical System—Office of National Statistics (ONS) and the Government Statistical Service; UK	Economic Secretary to the Treasury	The foreword of the consultative document opens with the statement that “Public Confidence in official statistics has for too long been clouded by concerns for their integrity.” The paper presents the Government’s ideas for enhancing integrity by improvements to the overall framework for statistics.	Government’s goal was enhanced integrity, both actual and perceived: - assured quality of official statistics (sufficiently accurate and reliable for the purposes for which they are required; efficiency also a factor); - freedom from political interference in the compilation and presentation of statistics. Refers to the Fundamental Principles of Official Statistics as part of the international context.	The paper posed a number of specific questions and invited comments on these and related questions.	A summary of the comments was made public. The key findings dealt with: - accountability and governance; - scope of national statistics; - location of responsibilities; - maintenance of professional standards; - devolution; - assuring quality and other issues.	4
Balance of payments and international investment	ABS staff	The review was provided in a chapter of a manual on <i>Concepts, Sources, and Methods</i> .	The approach taken reflected the view that, to be of most benefit to users, statistics need to be a reasonable and timely measure		Not applicable.	5

Subject of the review (A)	Reviewer (B)	Origin or motive (C)	Standard or criteria used in the review (D)	Process and product (E)	Recommendations (F)	Reference (G)
position; Australian Bureau of Statistics (ABS)			of the real world events to which they relate. High-quality statistics need to be— - accurate; - not subject to large revisions; - timely; - relevant (i.e., measures the concepts in which the users are interested); - comprehensive in coverage; and - easily accessible.			
National accounts aggregates—GDP and gross national income; US Bureau of Economic Analysis (BEA)	BEA staff	The focus was on the current quarterly estimates of current-dollar and real GDP and GDP components. Reliability was evaluated by looking at measures of revisions to answer four questions about direction, acceleration or deceleration, difference from trend, and cyclical turning points.	Reliability was defined in terms of measures of revisions: - bias, - dispersion, and - relative dispersion. The report does not directly address “accuracy,” because such an evaluation would require data on the total measurement error, which cannot be observed.	The article is based on a report to the US Office of Management and Budget required by Statistical Policy Directive No. 3. The Directive requires, for each principal Federal economic indicator, an evaluation every 3 years to consider, in addition to “accuracy and reliability,” - documentation; - avoidance of premature disclosure; and - promptness in releasing estimates.	Not applicable	6
Management of the Quality of Statistics; Statistics Canada (Stat Can)	Auditor General of Canada	The objectives were to determine whether - Stat Can systematically assesses the adequacy of quality management systems and	The four self-assessments (see Col. E) were performed relative to Stat Can’s six characteristics of quality (which embody a user’s perspective) in <i>An Outline of Statistics Canada’s Quality Assurance Framework</i> : - accessibility;	Over the past 20 years, Stat Can has put in place policies and practices to assure the ongoing relevance of its programs; built quality into its programs and products; and maintains an environment that encourages concern for quality.	On organizational, process, and procedural topics, in five areas - corporate assessment of quality; - Stat Can self-	7

Subject of the review (A)	Reviewer (B)	Origin or motive (C)	Standard or criteria used in the review (D)	Process and product (E)	Recommendations (F)	Reference (G)
		<p>practices...</p> <ul style="list-style-type: none"> - Stat Can's self-assessments provide reasonable assurance about the adequacy of quality management systems and practices; - Stat Can appropriately informs users about data quality and methodology used. 	<ul style="list-style-type: none"> - accuracy; - coherence; - interpretability; - relevance; and - timeliness. <p>The report notes that while there is general recognition that quality is multidimensional, there is no international standard definition of statistical quality.</p> <p>See also Col E about international comparisons.</p>	<p>The Auditor General audited Stat Can's self-assessments of four programs (see Col. D); reviewed Stat Can's policy and practices for informing users about data quality and methodology; reviewed documents and interviewed Stat Can staff; interviewed key users; compared Stat Can's approach to managing quality with practices in a number of respected statistical agencies in other countries.</p>	<p>assessment of four surveys;</p> <ul style="list-style-type: none"> - reporting performance to parliament; - information provided to users about data quality and methodology; - an integrated approach to managing quality. 	
Household Survey Program; Australian Bureau of Statistics (ABS)	ABS staff	<p>Impetus came from recognizing that the current level of demand for information from the household surveys exceeds the capacity of the survey vehicles and resources. As a result, there are important gaps in the statistics available. The review involved re-assessing continuing demands against emerging new demands.</p>		<p>Consultations, involving formal meetings and informal discussions, were undertaken by the review team with key government users. Information was circulated to a wider group and their input sought. Three papers were circulated. Review recommendations were discussed by the Australian Statistics Advisory Council.</p> <p>The operations and performance of the ABS are subjected to a comprehensive program of both internal and external scrutiny.</p>	<p>A further report on implementation of the review was promised for the next ABS annual report.</p>	8
Central Statistical Office (CSO);	Deloitte & Touche Management	<p>The National Statistics Board commissioned a consultancy review of</p>	<p>The formulation of appropriate economic and social policies requires national statistics which</p>	<p>The review was undertaken to assist the National Statistics Board (established by the 1993</p>	<p>The recommendations – on organizational,</p>	9

Subject of the review (A)	Reviewer (B)	Origin or motive (C)	Standard or criteria used in the review (D)	Process and product (E)	Recommendations (F)	Reference (G)
Ireland	Consultants The consultancy team included senior representatives from two national statistical institutions	the organizational performance and capability of the CSO.	are comprehensive, accurate and timely. The review involved benchmarking the CSO against equivalent agencies in other countries and in the context of the Irish public service.	Statistics Act) in meeting its statutory requirements to assess both the resource requirements of the CSO and its efficient use of existing resources: - appropriately skilled staff; - benchmarks (with some leading national statistical institutes); - internal audit, value for money, and quality assurance; - and several other issues.	process, and procedural topics dealt with - external focus - structural changes - information technology	
Revisions to the Average Earnings Index; UK	Martin Weale (National Institute for Economic and Social Research) and Peter Sedgwick (HM Treasury)	The Bank of England has attached particular importance to the average earnings data as a key factor in its decisions. Revisions of the index in October 1988, given their scale and impact, led the Chancellor of the Exchequer to request an external review.	Review and advise whether best practice has been followed in both methodological and managerial aspects.	The reviewers took evidence from a wide range of people. They drew on work of a team of academic statisticians and a group of experts assembled by the ONS.	On organizational, process, and procedural topics as well as dataset-specific topics. The former dealt with - dissemination of information about statistics; - organization and management.	10
Robustness Assessment Report for Income Distribution Data; UK	Department of Social Security staff	The report is intended to identify known or suspected imperfections in micro-data on income, which may affect the validity of income distribution results or require particular care in their interpretation, and to	A standard format was devised (see E): - ...major features of dataset - completeness of coverage of the population; - sample design, non-response biases, weighting; - item nonresponse, imputations and editing; - accuracy of income data;	Robustness assessment reports were an initiative of the Canberra Group—an international expert group on household income statistics. The Group, which was formed with the aim of improving statistics and the quality of international comparisons, encouraged the preparation of	Not applicable.	11

Subject of the review (A)	Reviewer (B)	Origin or motive (C)	Standard or criteria used in the review (D)	Process and product (E)	Recommendations (F)	Reference (G)
		report estimates of the impact of these imperfections on results.	<ul style="list-style-type: none"> - validity of income data as guide to consumption capabilities; - households, families, individuals, children; - general assessment. 	these reports for a number of countries.		
Consumer Price Index (CPI); Statistics South Africa (Stats SA)	Statistics Sweden staff	The CPI is expected to play a more explicit role in the context of economic policy in South Africa: the objective, or at least one of the main objectives, of monetary policy would be expressed in terms of the change in the CPI (or an index derived from the CPI). Stats SA requested that Statistics Sweden undertake an evaluation.	<p>The evaluation, to be conducted in light of recent international experience, was to deal with compilation and credibility:</p> <p>methods used in C</p> <ul style="list-style-type: none"> - conducting the household survey; - determining the basket of products; - sampling retail outlets; - survey methodology; - optional: methods used for housing component; - calculating the indexes (including the computer system); - publication and dissemination. 	Approach was to investigate (about 3 weeks time) with the assistance of Stats SA staff. Users, including the Reserve Bank and Department of Finance, were consulted.	On dataset-specific topics.	12
Federal Statistical Office (FSO); Switzerland	Peer review: I.P. Fellegi, Chief Statistician, and J. Ryten, Deputy Chief Statistician (retired), Statistics Canada	When undertaking a major restructuring, FSO management was concerned that the process should not only reflect the views of insiders. A peer review was sought—one drawing on expertise from the statistical office of another country.	<p>Practical standard: I.P. Fellegi, “Characteristics of an Effective Statistical System (1995)</p> <ul style="list-style-type: none"> - how adaptable ... in adjusting to evolving needs; - how effective in meeting existing client needs; - how credible in terms of quality and objectivity. <p>Standards such as the Fundamental Principles of</p>	<p>Scope of review:</p> <ul style="list-style-type: none"> - legal foundations for government statistical activity; - institutional framework; - core values of government statistics; - priority needs and activities; - coordination of statistical activities; - FSO’s structure and services. 	<p>Organizational process, and procedural topics:</p> <ul style="list-style-type: none"> - legal and institutional arrangements; - client relations; - internal, management issues; - output related issues. 	13

Subject of the review (A)	Reviewer (B)	Origin or motive (C)	Standard or criteria used in the review (D)	Process and product (E)	Recommendations (F)	Reference (G)
		Purposes: - identify strengths and weakness, by comparing the Swiss system with acknowledged models; - benefit from experience of benchmark statistical institutions; - elaborate proposals for improvement.	Official Statistics were in the background.	Used indirect methods: if staff are competent and well motivated and if basic mechanisms exist, then ...probability must be high that everything else is also in good order. Drew on external and internal interviews as well as extensive documentation prepared by FSO.		
Quality Declaration: Quarterly National Accounts; Denmark	Statistics Denmark staff	Statistics Denmark produces Quality Declarations for more than 250 statistical products.	Statistics Denmark expresses quality in five dimensions: high quality statistics are seen as— - relevant, - reliable, - timely, - coherent, - accessible.	The Declarations have a similar format and the contents are described in relation to the five dimensions of quality. Sweden and Norway also have procedures to publish Quality Declarations.	Not applicable	14
Report on the Observance of Standards and Codes (ROSC): Data Dissemination; Albania	Staff team from the International Monetary Fund on the basis of information provided by the Albanian authorities	See text of paper, paragraph 9.	The General Data Dissemination System (GDDS), which emphasizes sound practices in four dimensions: - the data (coverage, periodicity, and timeliness); - quality of the data; - integrity of the disseminated data; - access by the public. The coverage, periodicity, and timeliness of data were	The Report was prepared alongside documentation, including a plan for statistical improvement, for Albania's participation in the GDDS. Both the ROSC and the metadata for the GDDS are available on the IMF's Website.	On organization, process, and procedural topics as well as dataset-specific (especially national accounts) topics.	15

Subject of the review (A)	Reviewer (B)	Origin or motive (C)	Standard or criteria used in the review (D)	Process and product (E)	Recommendations (F)	Reference (G)
			summarized and contrasted with GDDS recommendations. Quality of data—including their integrity and accessibility features—were assessed against an experimental framework that identifies 6 key aspects: <ul style="list-style-type: none"> - statistical infrastructure; - conceptual framework; - source data; - statistical techniques; - serviceability; - accessibility. 			

1 Royal Statistical Society's Working Party on Official Statistics in the UK, "Official Statistics: Counting with Confidence," *J.R. Statist. Soc. A* (1991) 154, Part 1, pp.23-44.

2 "Mid-Decade Strategic Review of BEA's Economic Accounts," *Survey of Current Business*, February and April 1995. (Available on BEA's website: <http://www.bea.doc.gov/bea/aw/0295od/maintext.htm>.)

3 Final Report to the Senate Finance Committee from the Advisory Commission to Study the Consumer Price Index, "Toward a More Accurate Measure of the Cost of Living," December 4, 1996.

4 Economic Secretary to the Treasury, *Statistics: A Matter of Trust* (a consultation document presented to Parliament), February 1998 (CM 3882). (Available on the ONS website: <http://www.statistics.gov.uk>, under "Understanding Us." See also "Statistics Green PaperCA Summary of Responses" and "Statistics White PaperCBuilding Trust in Statistics" [October 1999]).

5 Australian Bureau of Statistics, "The Concept of Quality," in *Balance of Payments and International Investment, Australia: Concepts, Sources and Methods*, Chapter 15. (Available on the IMF Data Quality Reference Site: <http://dsbb.imf.org/aus.htm>.)

6 Bruce T. Grim and Robert P. Parker, "Reliability of the Quarterly and Annual Estimates of GDP and Gross Domestic Income," *Survey of Current Business*, December 1998, pp. 12-21. (Available on BEA's website: <http://www.bea.doc.gov>.)

7 1999 Report of the Auditor General of CanadaCAprilCChapter 3, "Statistics Canada: Managing the Quality of Statistics." Available via Internet at <http://www.oag-bvg.gc.ca> (Website of the Auditor General of Canada.)

8 1998-99 Annual Report of the Australian Bureau of Statistics, Chapter 2, "Review of the ABS Household Survey Program," Canberra, 1999. (Available on the ABS website: <http://www.abs.gov.au>.)

9 Consultancy Review of the CSO, Appendix 1 of the 1996-1997 Progress Report of the National Statistics Board. (Available on the CSO website at <http://www.cso.ie/misc/about.html>.)

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- 10 “Review of the Revisions to the Average Earnings Index,” report submitted by Sir Andrew Turnbull and Mervyn King to the Chancellor of the Exchequer, March 1, 1999. (Available on the HM Treasury website: at <http://www.hm-treasury.gov.uk> .)
- 11 The report is available at the Website of the Department of Social Security at <http://www.dss.gov.uk/asd/hbai/hbai99.html> .
- 12 “The South African CPI—the reliability of present practices and some potentials for improvement, “ report from a mission of Statistics Sweden, Pretoria, January 24-February 15, by Mats Haglund. (Available on the Stats SA website: <http://www.statssa.gov.za/Publications/Publications.htm> .
- 13 “A Peer Review of the Swiss Statistical System” by Ivan P. Fellegi and Jacob Ryten, (the report is available at the FSO Website: http://www.statistik.admin.ch/stat_ch/ber00/peer_review/peer_review.pdf .See also “Peer Review as an Essential Part of Restructuring of National Statistical Services—Switzerland’s Experience,” Carlo Malaguerra and Jacob Ryten, prepared for the 48th plenary session of the CES. Paris, June 2000.
- 14 For background, see *Strategy 2005: The Corporate Framework and Objectives of Statistics Denmark for the Years 2000 to 2005*, Statistics Denmark, June 2000.
- 15 Report on the Observance of Standards and Codes—Data Dissemination for Albania (prepared in May 2000 by the staff of the IMF). (Available on the IMF Website: <http://www.imf.org/np/rosc/index.htm> .