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A statistical quality assurance framework for the United Nations

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1. Introduction

In 2017, the United Nations Statistics Division (UNSD) reported to the 48th session of the United Nations Statistical Commission (UNSC) that 'Chief statisticians of the United Nations system have developed and agreed on a generic quality assurance framework that addresses… the statistical work of regional and international agencies and is aimed at ensuring that appropriate quality assurance procedures are being followed' [1]. Thus, ended an anomalous gap in the official statistics infrastructure, where the UN encouraged member states to put in place a national quality assurance framework to support their statistical systems, but did not have an equivalent framework in place to support the UN statistical system itself.

The journey to develop what was eventually published as the *United Nations Statistical Quality Assurance Framework* (SQAF) began at the very first meeting of the newly convened Committee of Chief Statisticians of the United Nations System (CCS-UN) in Rome in September 2014. At that meeting, the first substantive order of business was to establish a task team[1] to begin work on scoping and drafting a generic SQAF for the UN statistical system. Two and half years later, the SQAF [2] was formally adopted at the 6th meeting of the CCS-UN in New York in Spring 2017.

The need for a SQAF was identified for a number of reasons. Firstly, there was no universally agreed definition of quality employed across the UN statistical system and secondly, there was no equivalent framework to the national quality assurance framework (NQAF) being promoted UN statistical agencies at country level. It was also recognized that an SQAF could be both a statement of intent as well as a description of good practice. An SQAF would help operationalize the *Principles Governing International Statistical Activities* [3] by introducing a common understanding of quality assurance and a common language to discuss these issues across all UN entities.

It was envisaged that an SQAF would bring several benefits, including:

1. provide a systematic mechanism for facilitating the ongoing identification of quality problems of statistical outputs of UN agencies and possible actions for their resolution;
2. provide a basis for creating and maintaining a statistics' quality culture across UN agencies; and

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[1]The task team consisted of UNSD, UNIDO, ODC, FAO, OCHA, ESCAP and ITU and was chaired by UNCTAD. This work was supported by Mr. Michael College who worked as a consultant. The CCS-UN would like to acknowledge his very considerable expertise and contribution to this framework.

3. give greater openness and transparency to the processes by which statistics of UN agencies are produced and their quality is assured and thereby reinforcing the UN as a trustworthy provider of good quality statistics;

The remainder of the paper is organized as follows: Section 2 explains the relationship and distinction between the SQAF and the NQAFs. Section 3 builds on this by detailing some of the unique features of the SQAF. Section 4 provides a summary of the components and dimensions of quality as defined by the SQAF. An update on adoption and implementation of SQAFs by UN agencies in provided in Section 5. Some implications and possible future developments are briefly discussed in Section 6, followed by a conclusion in Section 7.

2. Building on NQAF 2012

The SQAF is modelled on the United Nations National Quality Assurance Framework Template and Guidelines adopted in 2012 (UN, 2012) for countries but tailored to the circumstances of UN agencies. The NQAF 2012 was developed by the United Nations Expert Group on National Quality Assurance Frameworks (EG-NQAF). It was ground-breaking as it reflected the understanding that existing quality assurance frameworks shared a common core and followed the same principles despite being organized differently. In March 2019, the United Nations Statistical Commission at its 50th session adopted the United Nations National Quality Assurance Frameworks Manual for Official Statistics (*Manual*) [4] and the recommendations contained therein. The Manual updates the NQAF 2012 but was amended to reflect the emergence of an enlarged data ecosystem with potential new data sources, data providers, new technologies and methods. It also aims at implementation throughout the entire national statistical system and beyond, not just the National Statistical Office (NSO).

Both the SQAF and NQAF are generic and open for adaptation. They are both descriptive and only constitute guidance in the sense that they provide the components and a general structure within which individual country (NQAFs) – or agency (SQAFs) – specific can be developed. However, the quality principles contained in SQAF and NQAF have a prescriptive nature through the link to their respective governing principles, namely the *Principles Governing International Statistical Activities*[2] and the *Fundamental Principles of Official Statistics* [5].

The need for a SQAF (as distinct from using the NQAF) principally arose as the challenges facing a statistical unit in an UN agency are very different to those facing a NSO, both in terms of statistical processes and dissemination but most particularly in terms of institutional set-up. Institutionally, statistical units in an UN agency are very different to independently constituted NSOs, as they are embedded in larger policy oriented agencies whose core business is not the production of statistics and often one with a more politicised environment. Furthermore, statistical units in UN agencies will typically focus less on primary data collection, and more on compiling global datasets using data supplied by member states, which in turn involves testing data quality, adherence to international standards, concepts and definitions, and also estimation/interpolation to fill data gaps so that complete globally comparable data sets can be made available. Dissemination often requires elaborate consultation processes with member states to validate and clear estimates. Of course, statistical units in UN agencies also develop statistical indicators, normative standards and provide statistical capacity development to member states (see Peltola et al. [6] for an example of the types of activities a statistical unit in the UN can be involved in). The SQAF was also important as it formally set out, from a UN perspective, how statistical quality is defined. It was also important to show member states that the UN statistical system followed its own advice and had in place a formal SQAF to support the UN statistical system.

3. Some features of the SQAF

This section briefly outlines a number of issues that arose while drafting the SQAF for the UN system, that led to some noteworthy decisions and perhaps signal some important issues for the future.

3.1. Data v statistics

One question that quickly arose was whether it was a statistical or a data quality assurance framework that was required. Although the terms are frequently used inter-changeably, they are in fact two different things in the context of quality assurance for official statistics.

[2] These principles are the international equivalent of the UN Fundamental Principles of Official Statistics.

Data are basic elements or single pieces of information. Statistics are numerical data that have been organized through mathematical operations [7]. This issue was discussed at the 3rd meeting of the CCS-UN in Bangkok in 2015. At that meeting, the main line of discussion or debate focused on the appropriate scope of a QAF i.e. whether a quality framework should focus on the inputs (data) only, or should it also include the process and institutional environment. Interestingly, some viewed 'data' as too narrow a focus, arguing that the quality of a statistic is also affected by the process (see Section 4). Others argued that 'data' was a broader, more holistic concept than statistics, that included all sources and also analytics. In the end, given the ambiguity of scope surrounding 'data' and as the framework was being commissioned by the CCS-UN for a statistical community, it was agreed that a SQAF was more appropriate.

Another element of this debate was the growing importance of secondary data sources to the production of official statistics, the quality of which was of particular concern. In particular, whether or not some special treatment of big data was required in the SQAF. In principle it was agreed that big data should not be treated any differently from any other potential data source. Nevertheless, it was acknowledged that in practice this was a rapidly evolving field that might require some special consideration. Noting that the 45th session of the UNSC had established a *Global Working Group on Big Data for Official Statistics* [8], it was agreed that any recommendations from an envisioned *International Statistics Code of Practice for Big Data* should be incorporated into any QAF, but until that time, no particular specificities would be included.

A related issue that formed part of the discussion above, but perhaps received less attention, was the impact of the Data Revolution more broadly. Reflecting the issues raised in *A World That Counts* [9] there was a growing appreciation that the data world was changing rapidly and that official statistics was only a small part of a wider and rapidly expanding data ecosystem. Although the current discussions around data stewardship had yet to crystalize, there were nevertheless some discussions on how future data ecosystems might be explicitly addressed in a QAF.

3.2. National vs. international

An important feature of the SQAF is that it makes an explicit distinction between national and international official statistics. As outlined in Section 2, the roles of NSOs and international organizations (IOs), although complementary, are in several respects different. MacFeely [10] notes, one might think the need for such a distinction, and the substantive nature of that distinction would be clear, but history has shown this isn't always the case. Discussions at the Inter-agency and Expert Group on SDG Indicators (IAEG-SDG) and UNSC regarding the compilation of SDG indicators had highlighted the need to articulate the role of national and international official statistics more clearly (see [11]). Thus, at the 5th and 6th meetings of the CCS-UN, held in autumn 2016 and spring 2017, it was agreed that this distinction be made explicit, as UN agencies or other IOs are often required to modify or adjust official national statistics provided by a member state to align the data to internationally agreed definitions or concepts, thus making them more internationally comparable. In other cases, data may be amended to correct evidently erroneous values. In many cases, the biggest or most important contribution of official international statistics is, in the absence of a national estimate, UN agencies or IOs may estimate the data using a model. Thus, it was agreed that it was not sufficient or accurate to define official international statistics as simply the reproduction or aggregation of official national statistics.

Therefore, the distinction between official national and international statistics were explicitly defined.

Official national statistics are defined as:[3]

1. All statistics produced by the NSO in accordance with the Fundamental Principles of Official Statistics, other than those explicitly stated by the NSO not to be official; and
2. All statistics produced by the National Statistical System (NSS) i.e. by other national organisations that have been mandated by National government or certified by the head of the NSS to compile statistics for their specific domain.

[3] In 2021, the new *Handbook of Management and Organization of National Statistical Systems* [12] provided a more comprehensive definition of official statistics, but the definition did not stray beyond the boundaries of official national statistics from a national perspective. The handbook defined official statistics as comprising the following three elements: (a) Statistics describing the economic, demographic, social and environmental phenomena meeting diverse user requirements, at different geographical levels from sub-national, via national to supranational and international level; (b) Statistics developed, produced and disseminated in compliance with the United Nations Fundamental Principles of Official Statistics as well as internationally agreed statistical standards, codes and recommendations fostering trust and ensuring consistent and high quality; and (c) Statistics normally produced by a national statistical office (NSO) and other entities designated as producers of official statistics and indicated as official statistics in relevant legislation and in statistical programmes and documents.

In other words, all statistics produced by an NSO are, de facto, official national statistics unless stated otherwise. Statistics produced by other organisations within the NSS that have been mandated and/or are accredited or somehow certified or recognised are also considered official national statistics.

Official international statistics are defined as:

1. Statistics, indicators or aggregates produced by a UN agency or other international organisation in accordance with the *Principles Governing International Statistical Activities*.

Chapter 9 of the NQAF Manual also provides reference materials for statisticians that are interested in the relationship between quality assurance at the national and global level. It discusses the collaboration necessary across the global statistical system to assure data quality at global level, taking into consideration the need for international comparability of data, especially in the context of the compilation of the indicators for monitoring progress towards national, regional and global goals and targets of the 2030 Agenda for Sustainable Development.

3.3. Statistical quality mark

The question of whether a formal audit or review mechanism should be built into the SQAF was also discussed. For example, would the SQAF include an external peer review similar to the peer review process used by the European Statistical System? Further, was a certification or quality mark envisaged where a UN agency or particular statistics would carry a UN quality mark? The idea of an explicit quality mark was not adopted, but the importance of external peer review was recognized, but was left an as optional step in the SQAF where individual UN agencies could adopt their own quality mark if they wished.

However, at the 7th meeting of the CCS-UN, held in Muscat in September 2017, United Nations Office on Drugs and Crime (UNODC) presented *A Proposal for a Peer Review System of Statistical Programmes*. This proposal detailed UNODC's experience with an externally conducted peer review and important lessons for the CCS-UN in the context of quality assurance. It was agreed that this issue needed further consideration and would be returned to later, as UN agencies began adopting their SQAFs.

4. Components and dimensions of quality

As noted in Section 3.2, the SQAF adopted as underlying or defining principles, the principles articulated in the *Principles Governing International Statistical Activities* – see Appendix 1. The components and dimensions of quality selected were based on existing SQAFs[4] – see Fig. 1. Critically, they incorporate not only process and output components, but they also incorporate 'code of practice' type or institutional components of quality. Their inclusion was especially important, as increasingly it is this aspect of quality that has proven to be the most challenging, both for NSOs but also for UN agencies.

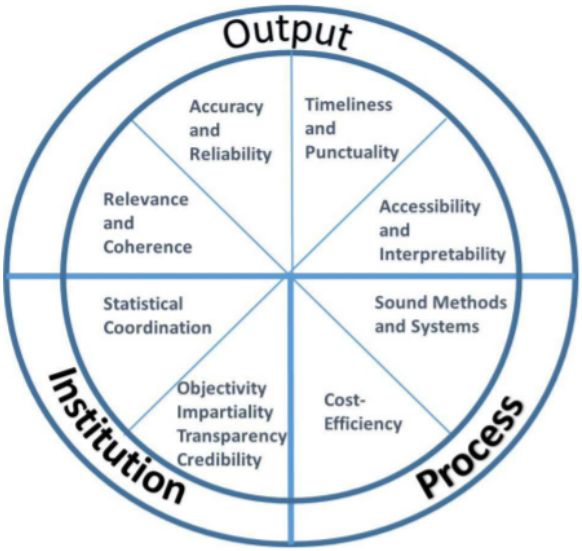

Fig. 1. Components and dimensions of quality.

The dimensions of accuracy and reliability, timeliness and punctuality, accessibility and interpretability, relevance and coherence are generally well understood as are the trade-offs within each pairing, and therefore do not require any additional comment. Arguably the same is true for the dimensions of process quality. It is issues involving institutional quality however, where some of the biggest challenges for multilateral organisations lie, and where discussion is warranted. In the context of UN statistics, arguably the biggest threat to credibility comes from the insistence that UN agencies use only data or statistics provided by member states (even when those data are not credible or do not adhere to internationally agreed standards or definitions).

[4] Notably, UNSD's generic National Quality Assurance Framework (NQAF) Template and Guidelines, FAO Statistical Quality Assurance Framework, WHO's Data Quality Assurance Framework for the Global Health Expenditure Data Production Process, the OECD's Quality Framework and Guidelines (QFG) and the European Statistics Code of Practice.

Another significant threat arises where member states apply political pressure in an attempt to stop UN agencies from fulfilling their mandate by interfering with the publication of objective, impartial and internationally comparable statistics. Thus, institutional quality is the Achilles heel of international official statistics, and of the application of SQAFs. This weakness is typically most acutely felt in specialized agencies, where national counterparts are not NSOs but ministries where a culture of impartial and independent statistics is often not as strong, and where there is less awareness of international statistical standards and methods. So, while chief statisticians of the UN system identified compliance with institutional quality principles as critical to overall statistical quality and identified objectivity and impartiality as critical dimensions for achieving this goal, just as their national counterparts in NSOs would, this remains a source of tension and contestation.

In 2020, the *Data Strategy of the Secretary-General* highlighted the importance of data quality for all UN organisations, noting that 'data is not an isolated concern, but permeates our organization and its use is integral to our success' [13, p. 8]. It was no accident that principle 5 of the 12 basic principles outlined to guide 'data actions', stressed the importance of impartiality.

The SQAF includes a generic statistical quality assurance framework (GQAF) to assist individual UN agencies that do not yet have a SQAF to prepare a suitable QAF. As noted in Section 2, the GQAF is modelled on the NQAF template and guidelines adopted by the UNSC in 2012 but tailored to the circumstances of UN agencies rather than NSOs. This approach acknowledged that a 'one size fits all' SQAF was not realistic given the varied and complex mandates and governance mechanisms employed across the UN system and hence the logic of a generic QAF that can be adapted to the specific circumstances of each individual entity.

The GQAF provides a template or menu from which a UN entity can adapt to their specific purposes. The GQAF details the broad benefits of having a SQAF along with actions that can be employed to promote the QAF both internally and externally. It details typical quality components and dimensions that an entity might consider and provides linkages to the CCSA statistical principles. It also provides a generic quality assessment checklist and discusses some of the pros and cons of introducing an external quality assessment or peer review.

5. Adoption and implementation

In spring 2022 a short survey was conducted to assess the implementation of the SQAF. Twenty-three of the 29 CCS-UN members responded (a response rate of 79 percent). An additional 8 institutions that are members of the wider Committee for the Coordination of Statistical Activities (CCSA)[5] also responded, although it should be noted that the SQAF was designed for UN agencies rather than international organisations more broadly.

Only 10 of the reporting CCS-UN members have a SQAF or a DQAF. As noted in Section 3, the interpretation of 'data' and what it means for scope varies across agencies. The survey did not pursue this question of interpretation, but simply quantified whether a QAF exists or not, and whether it was a SQAF or a DQAF. Of the 10 agencies, 4 had DQAFs, 4 had SQAFs and 2 had hybrid S & DQAFs. Six agencies had instituted their frameworks since the publication of the SQAF in 2017, the other 4 existed beforehand. Of these 4, only one is aligned with SQAF, the other 3 are not; one agency has plans to align in the future.

The SQAF recommends that each organization or entity appoint a chief statistician. Similarly, the *Data Strategy of the Secretary-General* recommended that organisations consider establishing a Chief Data Officer position (Rec #8 Enablers). Only 10 UN entities (43 percent) have a chief statistician or a chief data officer. This is a critical gap in the institutional governance, as it leaves entities without clear mandated statistical leadership and authority. The *Data Strategy of the Secretary-General* also identified as an action to be prioritized, that organisations develop a framework for strategy oversight and data governance, including a Data Strategy Group, Data Governance Council or a data stewardship model (Rec #13). 78 percent of reporting entities noted they had some sort of statistical or data coordination mechanism, although the majority of these are informal.

Five years after the adoption of the SQAF, only 43 percent of reporting CCS-UN members have implemented such a framework. But it is noteworthy that since the framework was adopted in 2017, the num-

[5] The CCSA is the committee that coordinates statistical activities across the wider international statistical system. It includes UN entities and organisations and other international and supra-national organisations that contribute actively to the development of a coordinated global statistical system producing and disseminating high-quality statistics e.g. the World Bank, OECD, Eurostat, development banks etc. See https://unstats.un.org/unsd/ccsa/.

Table 1
Number of CCS-UN members that have implemented UN SQAF

	CCS-UN			CCSA (excluding CCS-UN)			CCSA		
	Yes	No	Mabye or not stated	Yes	No	Mabye or not stated	Yes	No	Mabye or not stated
Number of Organisations that have a S/DQAF	10	13	–	3	5	–	13	18	–
of which:									
SQAF	4			1			5		
DQAF	4			0			4		
S/DQAF	2			2			4		
of which, plan to introduce a S/DQAF	6	4	3	0	1	4	6	5	7
Number of S/DQAFs that include an explicit peer review mechanism	4	6	0	1	2	0	5	8	–
Number of Organisations that introduced a S/DQAF since 2017	6			0			6		
Number of Organisations that have a Quality Declaration	2	21	0	3	5	0	5	26	0
Number of Organisations that have a Statistics or Data Coordination mechanism	18	5	0	2	1	0	20	6	0
of which:									
Formal	6			2			8		
Informal	12			0			12		
Number of Organisations that have a Chief Statistician or Data Officer	10	13	0	4	4	0	14	17	0
	$N = 29, n = 23$			$N = 16, n = 8$			$N = 45, n = 31$		

Source: Survey of CCSA members conducted in March 2022.

ber of UN agencies with a SQAF, has more than doubled from 4 to 10. Several agencies without a SQAF noted that they operate several quality assurance procedures or adopted their own data principles but have not adopted a general SQAF. However, six agencies noted that while they do not yet have a SQAF they have plans to implement one, or in two cases it is already under development. A further 3 agencies noted a SQAF is under consideration. Of more concern though, several agencies noted that a SQAF is not a priority for senior management or would not have senior management support.

These results should not be surprising. As noted above, statistical units in UN agencies operate in a more political environment than most NSOs, so adaptation of principles and quality standards can be a slow and challenging process. In 2014, the CCSA undertook an assessment of the implementation of the Principles Governing Statistical Activities [14]. At the time, 80% of responding international organisations assessed that their level of implementation of the Principles was either 'high' or 'full'. However, when it came to putting in place practical frameworks to support the implementation of the Principles, 55% of the organizations considered adoption to be 'low' or 'not implemented'. It was these findings, in part, that prompted the development of the SQAF.

6. Discussion

The SQAF is only 5 years old, but reflecting the rapid changes in the dataverse, there are areas where the framework might already need to be updated. As noted above, closer integration of 'new' data, such as geospatial information, big data and citizen science data with more traditional datasets are just some examples where some reconceptualization of quality of official statistics might be warranted, as it is not yet clear what this might mean for quality assessment and the existing dimensions of quality. If statistical agencies begin to complement co-production models with co-creation models, this too may have implications for how quality is conceptualised. Some additional thought must be given to whether the quality of statistics from these 'new' data sources can be meaningfully assessed in the same way as statistics based on traditional data sources have been assessed. What if discussions around the democratization of statistics grow legs, this might dramatically impact on how data and statistical quality is conceptualised; all of the existing frameworks have been prepared by statisticians for statisticians, but what might a SQAF drafted by data users look like?

These 'new' data sources may also have a more profound impact on official international statistics, as they may be the catalyst that forces to the surface a debate on the precise role or mandate and methods of international official statistics *vis-à-vis* the new dataverse and the new opportunities for the production of international statistics, such as the use of remotely-sensed data held by private corporations. This is a debate many might prefer not to have but it is hard to see how it can be avoided for much longer in the rapidly changing dataverse we now live in.

Clearly, the relative space occupied by official statistics in the information value chain is changing. Data was once seen by statisticians primarily as an input for statistics; now statistics are themselves only a small part of many rapidly expanding data ecosystems and economies. In addition, data have become a geopolitical issue [15], with war being waged for control of our data – the 'currency of the modern age' [16]. This fact combined with an awakening of governments to the importance of data and official statistics is contributing to a steady politicization of the field. This trend is likely to challenge institutional quality safeguards of international statistics, arguably the weakest link in the chain, even further.

7. Conclusion

The UN system adopted their SQAF in 2017. As noted in the introduction, this the anomalous situation where statistical agencies in the UN system encouraged member states to put in place a national quality assurance framework but yet did not have an equivalent framework in place. The importance of this decision can be gauged by the fact it was the first substantive order of business for the newly constituted Committee of Chief Statisticians of the United Nations System.

The need for a SQAF was politically self-evident but there were also valid statistical needs. The SQAF would bring a common definition of quality shared across the UN statistical system. Today, it is both a statement of intent as well as a description of good practice. It provides an operational tool that helps statistical units embedded in UN agencies to live or operationalize the *Principles Governing International Statistical Activities*.

Developing principles and standards is an important, often challenging, first step but it is often the easy part. Adopting those standards and principles and implementing them typically takes longer and requires more concerted effort. The SQAF is no exception – since publication in 2017, only an additional 6 UN entities have fully adopted a SQAF, but many entities have indicated that they are in the process of adopting these principles. Now the focus for the CCS-UN must be to assist all UN agencies to adopt the SQAF. The next challenge is to help statisticians to socialize SQAFs and their implications in their agencies. For while the statisticians themselves understand the importance of upholding the *UN Fundamental Principles of Official Statistics* and the *Principles Governing International Statistical Activities*, and of objective, impartial statistics, they do not always have the support of their institutions.

Progress has not been as fast or as even as the CCS-UN would wish. Since 2017, only 6 UN entities have adopted institutional wide S/DQAFs. But the publication of the *Data Strategy of the Secretary-General* reflects a growing awareness of the importance of data and the risks associated with an absence of governance and stewardship. The determination of senior management of the UN to improve data governance and implicitly data quality, presents an opportunity for UN entities to drive implementation and change across entities. A tangible indication of this support is the 'Senior Managers Compact' for 2021–2022, where senior management of the UN are being asked explicitly how they intend to operationalize the UN-wide data strategy [17]. Hopefully, with this new drive will come the fair winds that allow institutions that have not yet adopted a SQAF to do so.

In an era where fake news, lies, mendacity, misinformation are abundant and multiplying, the importance of independent, impartial official statistics as a bulwark against this trend, is critical. To fulfil that role, the quality of those data must be demonstrably robust. SQAFs play an important role in supporting this task. Quality assurance is an ongoing challenge; although the SQAF is only 5 years old, some areas of the framework might already need to be updated, to reflect rapid changes in the dataverse. As noted above, closer integration of 'new' data, such as geospatial information, big data and citizen science data with more traditional datasets are just some examples where some reconceptualization of the quality of official statistics might be warranted, as it is not yet clear what this might mean for quality assessment.

The CCS-UN is by UN standards still in its infancy. But over the past 8 years, this new committee has achieved a number of critical milestones (outside the scope of this paper). The design and implementation of the SQAF is one of the most important achievements. This work continues but CCS-UN remains committed to improving the quality of international and national official statistics.

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Appendix 1 – Principles Governing International Statistical Activities (https://unstats.un.org/unsd/ccsa/principles_stat_activities/)

1) High quality international statistics, accessible for all, are a fundamental element of global information systems
2) To maintain the trust in international statistics, their production is to be impartial and strictly based on the highest professional standards
3) The public has a right to be informed about the mandates for the statistical work of the organisations
4) Concepts, definitions, classifications, sources, methods and procedures employed in the production of international statistics are chosen to meet professional scientific standards and are made transparent for the users
5) Sources and methods for data collection are appropriately chosen to ensure timeliness and other aspects of quality, to be cost-efficient and to minimise the reporting burden for data providers
6) Individual data collected about natural persons and legal entities, or about small aggregates that are subject to national confidentiality rules, are to be kept strictly confidential and are to be used exclusively for statistical purposes or for purposes mandated by legislation
7) Erroneous interpretation and misuse of statistics are to be immediately appropriately addressed
8) Standards for national and international statistics are to be developed on the basis of sound professional criteria, while also meeting the test of practical utility and feasibility
9) Coordination of international statistical programmes is essential to strengthen the quality, coherence and governance
10) Bilateral and multilateral cooperation in statistics contribute to the professional growth of the statisticians involved and to the improvement of statistics in the organisations and in countries