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**Items for discussion and decision: programme review:
national quality assurance frameworks**

Statistics Canada: national quality assurance frameworks

Note by the Secretary-General

In accordance with a request by the Statistical Commission at its fortieth session (see E/2009/24), the Secretary-General has the honour to transmit the report of Statistics Canada, containing a programme review on quality assurance frameworks. Based on a global consultation process, the report presents a review of current quality concepts, frameworks and tools; advocates the use by national statistical offices of a national quality assurance framework and describes its basic elements; puts forward three illustrative proposals for a generic template for such a framework which, it suggests, be accompanied by guidelines to assist national statistical offices in the formulation of their individual frameworks; and outlines a process for developing the generic template and guidelines for the Commission for adoption by the Commission at its forty-second session. The Commission is invited to express its views on the substance of the report and the recommendations for future work in this area.

* E/CN.3/2010/1.



Report of Statistics Canada on national quality assurance frameworks¹

I. Introduction

A. Background and benefits

1. Quality is a central concern for the production of official statistics. A number of countries and international organizations have developed detailed quality concepts and procedures for quality control. While there is considerable overlap between the various quality frameworks, there is no generic internationally agreed national quality assurance framework that can be used by a national statistical office to describe systematically how it assures quality, what its current quality concerns are and how it plans to introduce new quality assurance procedures. Such a generic framework would require a broad consensus regarding the notion of quality and would need to build on the frameworks developed thus far.

2. The present programme review is a first step in this direction. The international landscape, including quality concepts, frameworks and tools that have been developed to date, is presented in section II of the present report. The third section outlines the benefits of a national quality assurance framework, the case for a generic version, its possible realization in the form of a generic template and guidelines and the steps required to make these an internationally agreed framework. The present report has benefited from feedback on a preliminary version from more than 20 organizations. The authors are very grateful for these comments and have taken them into account to the extent possible.

Benefits

3. To fulfil its mandate, a national statistical office must deliver three things to its citizenry in an exemplary manner:² (a) information that responds to the country's evolving, highest priority needs for the future (programme relevance); (b) information that is representative of the world it seeks to describe (product quality); and (c) information that is produced at the lowest possible cost (efficiency).

4. Relevance and quality are intrinsically linked. In the absence of a strong proactive effort, relevance and quality both decrease over time. The economies and societies we are attempting to measure are changing at an unprecedented pace. We need to close the "relevance gap" between the information we produce and the priority needs of our users.

5. Similarly, a "quality gap" has opened. Household and business respondents are less and less willing to participate in surveys, while, owing to modern lifestyles and technology, it is increasingly difficult to contact them. The critical tools and computer systems needed to produce information deteriorate unless they are maintained. Unprecedented demographic changes within the workforce represent an

¹ The present report has been prepared by Statistics Canada as a programme review to be discussed at the forty-first session of the United Nations Statistical Commission.

² Sheikh, M., "A long-term vision for Statistics Canada", Statistics Canada, internal document, March 2009.

additional pressure for many national statistical offices. In some cases, these pressures have manifested themselves in the form of errors in critical data releases.

6. In the context of limited budgets, quality must be managed well, and trade-offs have to be considered. In doing so, quality indicators have to be developed to describe the various aspects of quality and to facilitate an overall assessment of quality at the aggregate level. In particular, there is a need to develop objective, composite quality indicators, aggregating the various elements of quality in order to achieve the twin objectives of having an overall understanding of quality and having the information needed to establish a balance in meeting the relevance and quality needs in a constrained budget environment. Given that the present state of the art is far from being able to quantify the various attributes of quality and relevance, let alone weight them to arrive at a composite measure, the need for a strong governance mechanism to balance competing demands is essential.

7. Some aspects of quality are relatively static in the sense that they are of constant concern and tend to evolve relatively slowly. Other aspects are more dynamic in that the attention they require may rapidly increase or decrease with changes in the particular environment of a national statistical office. Because many aspects of quality are dynamic and deteriorate without proactive effort, there is a continuing need to invest in quality simply in order to maintain the status quo. The situation is evolving and needs are changing more than ever before. Thus, the role of quality within the overall management of a national statistical office must be examined continuously.

B. Terminology

8. There is no internationally accepted and definitive glossary containing all the terms required to discuss a quality assurance framework in detail. In its absence, a number of terms are defined for the purposes of the present report.

9. A national statistical office is involved in a range of statistical processes, including sample surveys, censuses, administrative data collections, production of price and other economic indices and statistical compilations such as the national accounts and the balance of payments. In the present report, for brevity, and in keeping with a convention adopted by several countries, these processes are all referred to generically as “surveys”. This is an extension of the more usual meaning of survey. The term “survey programme” is used to mean a group of surveys within a domain, and the term “statistical programme” is reserved for the complete suite of surveys within a national statistical office as distinct from a survey programme.

10. The term “quality” is interpreted in a broad sense, encompassing all aspects of how well statistical processes and statistical outputs fulfil user and stakeholder expectations. Good quality is not just meeting user needs but also addressing the concerns of respondents regarding the reporting burden and confidentiality and ensuring that the institutional environment is impartial, objective and comprises sound methodology and cost-effective procedures.

11. A “national quality assurance framework” is assumed to be targeted at roughly the same organizational level as the “quality management system” described in the well-known International Organization for Standardization (ISO) 9000 quality management system series, but tailored to the specific context of a national

statistical office. It focuses on management of core statistical functions. It envelops “quality guidelines”, describing the mechanisms by which they can be implemented.

II. Current quality concepts, frameworks and tools

A. Quality concepts

12. Creation and use of a national quality assurance framework take place within the more general context of quality management. The development of international quality concepts are outlined below. The following subsections summarize existing quality tools.

13. The most widely used quality standard in the world is the ISO 9000 quality management system series. ISO 9000 expresses total quality management principles as follows:

(a) **Customer focus:** an organization depends on its customers and thus must understand and strive to meet their needs; customers are central in determining what constitutes good quality; quality is what is perceived by customers rather than by the organization;

(b) **Leadership and constancy of purpose:** leaders establish unity of purpose and direction of an organization; they must create and maintain an internal environment that enables staff to be fully involved in achieving the organization’s objectives; quality improvements require leadership and sustained direction;

(c) **Involvement of people:** people at all levels are the essence of an organization; their full involvement enables their abilities to be fully used;

(d) **Process approach:** managing activities and resources as a process is efficient; any process can be broken down into a chain of sub-processes for which the output of one process is the input to the next;

(e) **Systems approach to management:** identifying, understanding and managing processes as a system contributes to efficiency and effectiveness;

(f) **Continual improvement:** continual improvement should be a permanent objective of an organization;

(g) **Factual approach to decision-making:** effective decisions are based on the analysis of information and data;

(h) **Mutually beneficial supplier relationships:** an organization and its suppliers are interdependent and a mutually beneficial relationship enhances both.

14. However, as stated in the introduction of ISO 9001, the design and implementation of an organization’s quality management system is influenced by varying needs, particular objectives, the products provided, the processes employed and the size and structure of the organization. It is not the intent of the standard to imply uniformity in the structure of quality management systems or uniformity of documentation. In other words, optimum use of a standard for a particular organization or group of similar organizations implies interpreting the standard as required to deal with the specific context.

15. For national statistical offices the context may be characterized as follows:

(a) National statistical offices are governmental not private enterprises. They are not profit-based. They supply data to non-paying users rather than to paying customers. For the most part, the users cannot influence quality through purchase decisions;

(b) Some of the users are actually internal users, for example the national accounts is a user of data from numerous surveys as well as a producer;

(c) The primary inputs are typically data from individual enterprises, households and persons, whether collected directly or through administrative processes;

(d) The core production processes are transformations of individual data into aggregate data and their assembly into statistical products;

(e) The primary products (typically called outputs) are statistics and accompanying services.

16. The ISO publication, ISO 20252:2006 on market, opinion, social research, vocabulary and service requirements, published in 2006, provides the outline of a quality standard better suited to national statistical offices than did the ISO 9000 series. ISO 20252 places considerable emphasis on the need for a quality management system. The standard is not, however, entirely appropriate as it is a recent publication, aimed at commercial rather than governmental organizations. Thus, since the mid-1990s, the statistical community, national statistical offices and statistical divisions/directorates in international organizations compiling statistics, have been developing quality management tools ranging from quality concepts, policies and models to detailed sets of quality procedures and indicators, as summarized in the following subsections.

B. Quality policies and strategies

17. In 1994, the Statistical Commission provided guidance on the sort of environment within which quality management can flourish by promulgating the United Nations Fundamental Principles of Official Statistics for national statistical systems. While none of the 10 principles refers explicitly to quality, they are all basic to a quality management system. Subsequently, in 2005, the Committee for the Coordination of Statistical Activities (CCSA) promulgated an equivalent set of principles for international organizations compiling statistics, the United Nations principles governing international statistical activities.

18. In December 1993, the Statistical Office of the European Community (Eurostat) announced its mission to provide the European Union with a high-quality statistical information service. In 1995, it established a working group on the assessment of quality in statistics for business statistics with membership from the national statistical offices of member States of the European Union. The Union's Statistical Programme Committee subsequently extended the role of the working group to cover all statistics, and more recently broadened it further by dropping the words "Assessment of" in its title. In 1999, the Statistical Programme Committee established a leadership expert group on quality, chaired by Statistics Sweden. The leadership group was enormously influential in defining and promoting quality

awareness and initiatives within the European Statistical System (ESS) and outside. It presented 22 recommendations at the International Conference on Quality in Official Statistics, held in Stockholm in 2001, and delivered a final report to the European Commission in 2002. The recommendations have served as the basis for many subsequent developments in Eurostat and in the member States of the European Union.

19. The leadership expert group drafted the ESS Quality Declaration, which was adopted by the Statistical Programme Committee in 2001 as a formal step towards total quality management within the system. The declaration, which comprises the ESS mission statement, its vision statement and 10 principles based on the United Nations Fundamental Principles but tailored to the context of the European Union, served as the basis for subsequent formulation of the European Statistics Code of Practice, promulgated by the European Commission in 2005. The Code of Practice commits Eurostat and the national statistical offices of the member States of the European Union to a common and comprehensive approach to production of high-quality statistics. Building upon the ESS definition of quality, it comprises 15 key principles, covering the institutional environment, statistical processes and outputs. For each principle, the Code of Practice defines a set of indicators reflecting good practice and providing a basis for assessment. Compliance by the national statistical offices of the member States of the European Union has since been measured using both self-assessment and peer review tools.

20. The new regulation on European statistics (European Council regulation No. 223/2009), commonly known as the statistical law, was adopted by the European Parliament and Council on 11 March 2009. It contains broad provisions relating to quality and ethics, thus providing a framework for quality assurance and reporting within the European Union that goes far beyond the previous Council regulation No. 322/97 on community statistics. The main changes comprise a reference to the Code of Practice and a new article (article 12), which defines eight quality criteria, discusses the definition of quality targets and minimum standards and emphasizes ESS quality reporting.

C. Generic quality tools

21. In accordance with the recommendations of the leadership expert group, Eurostat and European national statistical offices developed a full suite of generic quality tools: the *ESS Standard for Quality Reports*, which was promulgated in 2003 and updated in 2009, provides recommendations for the preparation of comprehensive quality reports by national statistical offices and Eurostat units; and the *ESS Handbook for Quality Reports*, also updated in 2009, which provides more details and examples. Both documents contain the most recent version of the set of *ESS standard quality and performance indicators* for use in summarizing the quality of statistical outputs.

22. The *ESS Quality Glossary*, first published in 2003, covers many technical terms in the field of quality documentation, providing a short definition of each term and indicating the source of the definition. A more comprehensive and up-to-date glossary is the “Metadata Common Vocabulary”, developed by a partnership of international organizations, including Eurostat.

23. The “European Self-Assessment Checklist for Survey Managers” enables the conduct of quick but systematic and comprehensive quality assessments of a survey and its outputs and the identification of potential improvements. There is also an electronic version of the self-assessment checklist, including an electronic version of the user guide.

24. The ESS “Handbook on improving quality by analysis of process variables” describes a general approach and useful tools for identifying, measuring and analysing key process variables. The *Handbook on Data Quality Assessment: Methods and Tools*, issued by the European Commission, details the full range of methods for assessing process and output quality and the tools that support them.

25. Over the past few years, Eurostat has been developing a quality barometer, with the aim of summarizing the performance of ESS as a whole. More specifically, its objectives are:

- To measure the evolution of the data quality across domains and over time
- To identify good practices and structural weaknesses
- To provide better management information through a common monitoring framework.

26. In principle, the quality barometer is constructed from the values of the standard set of quality and performance indicators for each statistical process (survey) for each country reporting to Eurostat. The problem is that these data are not available for all processes for all countries; quality reports do not exist for some statistical processes; quality reporting requirements have not been fully harmonized; and existing quality reporting information is not always updated on a regular basis. Thus, current work is focused on refining the new set of ESS quality and performance indicators and ensuring they are consistent with the emerging European Union Statistical Data and Metadata Exchange (SDMX). The general idea is that, once the metadata structure has been implemented, it will provide the basis for obtaining the data needed for the quality barometer without adding an additional reporting burden.

27. Generic quality tools have also been developed by other international statistical organizations. Of these the best known is the International Monetary Fund (IMF) Data Quality Assessment Framework (DQAF). First developed in 2001 by the IMF Statistics Department, its aim is to complement the quality dimension of the IMF Special Data Dissemination Standard and General Data Dissemination System and to underpin assessment of the quality of the data provided by countries as background for IMF *Reports on the Observance of Standards and Codes*. Designed for use by IMF staff and national statistical offices to assess the quality of specific types of national datasets (for example, surveys, used in the broad sense of the present report), it presently covers national accounts, the consumer price index (CPI), the producer price index, Government financial statistics, monetary statistics, balance of payments and external debt.

28. The Data Quality Assessment Framework is a process-oriented quality assessment tool. It provides a structure for comparing existing practices against best practices using five dimensions of data quality: integrity, methodological soundness, accuracy and reliability, serviceability and accessibility, in addition to the so-called prerequisites for data quality. It identifies three to five elements of good practice for

each dimension and several indicators for each element. Furthermore, in the form of a multilevel framework, it enables datasets to be assessed concretely and in detail through focal issues and key points. The first three levels of the framework are generic, that is, applicable to all datasets, the lower levels are specific to each type of dataset.

D. Quality assurance frameworks for international organizations

29. This section briefly introduces four publicly available documents describing quality assessment frameworks for international organizations compiling statistics. The documents are geared to the specific characteristics of such organizations, which are as follows:

(a) Statistics production is secondary to the primary aims of the organization and belongs to a unit (department, division, etc.) within the organization;

(b) The institutional structures of the organizations are quite different;

(c) Statistics are principally or entirely compiled using data supplied by national statistical offices or other organizations, not from data collected directly from businesses and households.

30. Except in the realm of direct data collection, however, these documents contain many useful ideas for the construction of a generic national quality assurance framework:

(a) The Organization for Economic Cooperation and Development (OECD) *Quality Framework and Guidelines* for OECD Statistical Activities were developed in 2002 and published in 2003. Output data quality is defined in terms of seven dimensions: relevance; accuracy; credibility; timeliness; accessibility; interpretability; and coherence. Credibility is an addition to the usual set of dimensions, reflecting the key role that user and stakeholder perceptions play in OECD context. Another factor specifically taken into account in the framework is cost-efficiency;

(b) Eurostat has developed its own “Quality assurance framework” (latest version December 2008) in accordance with the generic guidelines that it also drafted (discussed below). The framework views quality assurance as comprising five basic elements: documentation; standardization of processes and statistical methods; quality measurement; strategic planning and control; and improvement actions. It defines four assessment types, which are, in increasing order of complexity: self-assessment; supported self-assessment; peer review; and rolling review;

(c) The European Central Bank statistics quality framework was produced in 2008. It sets forth the main quality principles and elements guiding the production of the Bank’s statistics. These principles refer to institutional environment, statistical processes and statistical outputs. Specific quality assurance procedures cover the following areas: programming activities and development of new statistics; confidentiality protection; data collection; compilation and statistical analysis; data accessibility and dissemination policy; monitoring and reporting; and monitoring and reinforcing the satisfaction of key stakeholders;

(d) Since 2005, the Committee for the Coordination of Statistical Activities has supported a project on the use and convergence of quality assessment frameworks for international organizations with the aim of ensuring that their current and future quality activities are well integrated. Within the scope of this project, Eurostat has developed “Guidelines for the implementation of quality assurance frameworks for international and supranational organizations compiling statistics”. An updated version, taking into account comments from Committee members on the first (2007) version, was released in August 2009. In this document the various elements of different existing quality initiatives are brought together in a model for statistical quality assurance framework that can be modified by individual international organizations to fit their particular environment.

E. Quality tools used by national statistical offices

31. Individual national statistical offices have also developed numerous quality policies, standards and tools for their own purposes. At Statistics Canada, for example, the *Compendium of Methods of Error Evaluation in Censuses Surveys* was produced in 1978, followed by the *Quality Guidelines (1985)*, expansion of the *Policy on Informing Users of Data Quality and Methodology (1986)* and the first version of a formal Quality Assurance Framework (1997). The *Quality Guidelines* were revised in 1987, 1998 and 2003, and the fifth edition was released in 2009. The Quality Assurance Framework was revised in 2002.

32. Over the same period many other national statistical offices were involved in similar quality initiatives, especially the production of quality guidelines. Examples are the United Kingdom Office for National Statistics *Guidelines for Measuring Statistical Quality*, Statistics Finland’s *Quality Guidelines for Official Statistics* and the Australian Bureau of Statistics’ *National Statistical Service Handbook*. In the United States of America, statistical agencies have been obliged to comply with the Office of Management and Budget’s *2001 Quality Guidelines* and *2006 Standards and Guidelines for Statistical Surveys*. The resulting quality documentation includes:

(a) The Bureau of Labor Statistics’ “Guidelines for Informing Users of Information Quality and Methodology”;

(b) The Census Bureau’s “Quality Standards” and “Quality Performance Principles”;

(c) The National Center for Health Statistics’ “Guidelines for Ensuring the Quality of Information Disseminated to the Public”.

33. Statistics Canada’s Quality Assurance Framework (2002) is descriptive in the sense that it situates existing quality-related policies and practices within a common framework. It notes that the various measures it describes do not necessarily apply uniformly to every survey and that it is the responsibility of managers to determine which measures are appropriate. The framework is intended for reference and training purposes. The document provides valuable insights into what can be included in a National Quality Assurance Framework. More details are provided in annex II to the present report.

III. Benefits, content and structure of a national quality assurance framework

A. Benefits of a national quality assurance framework

34. Many national statistical offices are involved in a comprehensive range of quality initiatives and activities but without an overarching framework to give them context or explain relationships between them and the various quality tools. For this reason some national statistical offices have adopted the ISO 9001 standard on quality management systems as the umbrella for their quality work. As demonstrated by Statistics Canada, a national quality assurance framework constitutes just such an umbrella, providing a single place to record or reference the full range of quality concepts, policies and practices:

(a) It provides a systematic mechanism for ongoing identification and resolution of quality problems, maximizing the interaction between staff throughout the national office;

(b) It gives greater transparency to the processes by which quality is assured and reinforces the image of the office as a credible provider of good quality statistics;

(c) It provides a basis for creating and maintaining a quality culture within the office and is a valuable source of reference material for training;

(d) It is a mechanism for exchanging ideas on quality management with other producers of statistics within the national statistical system and with other national and international statistical organizations.

35. The process of developing a national quality assurance framework is typically best carried out by a task force within a national statistical office, with experienced staff drawn from a range of areas: programme planning; survey design; survey operations; dissemination; infrastructure development; and support. The development process has intrinsic benefits in its own right since it obliges staff to come together from their various disciplines to confront quality issues and think through requirements.

B. Scope of a national quality assurance framework

36. There is a good deal of overlap, even confusion, between the various terms such as quality management, total quality management, quality management systems, quality assurance frameworks, quality assurance, quality guidelines, quality evaluation, quality measurement, quality assessment and quality reporting. This report takes the view that a national quality assurance framework:

(a) Is targeted at roughly the same organizational level as the quality management system described in the ISO 9000 series, and with similar objectives, but tailored to the specific context of a national statistical office, whose role is to collect data and produce statistics;

(b) Refers to the complete statistical programme of a national statistical office, including the supporting infrastructure, rather than to an individual survey or group of surveys;

- (c) Focuses on all aspects of the management of core statistical functions;
- (d) Is forward looking, proposing current and future organization of quality assurance, rather than being an assessment of quality;
- (e) Is less detailed than quality guidelines in that it references good practices, rather than describing them;
- (f) Is at a higher level than quality guidelines in that it describes the mechanisms by which good practices can be implemented.

37. The review of quality policies, models, procedures and guidelines summarized in section II suggests that a national quality assurance framework should contain the following elements:

- (a) **Context:** the situation in which the document has been developed, its purpose and its relationship to other policies, frameworks and procedures, sometimes referencing or incorporated in the mission, vision and values of the national statistical office;
- (b) **Quality policy:** a short statement by senior management indicating the nature and extent of its commitment to quality management;
- (c) **Quality model:** a definition of what is meant by quality, elaborated in terms of output quality and process dimensions/components;
- (d) **Quality objectives, standards and guidelines:** target quality objectives together with international or local standards and guidelines adopted by the organization;
- (e) **Quality assurance procedures:** part of, or embedded in, the production processes to the extent possible;
- (f) **Quality measurement procedures:** specifically including a set of quality and performance indicators, with procedures for collecting the data required to calculate the quality indicators being embedded in the production processes, to the extent possible;
- (g) **Quality assessment procedures:** sometimes incorporated in the quality assurance procedures, more frequently conducted on a periodic basis, for example, based on a self-assessment checklist, such as the European DESAP checklist;
- (h) **Quality improvement procedures:** continual improvement and re-engineering initiatives specific to the national statistical office.

C. Development of a generic national quality assurance framework template

38. The *ESS Standard for Quality Reports* provides an example of a fairly detailed standard that can be applied by national statistical offices. It is relatively easy to imagine a generic set of quality guidelines being constructed along the same lines. However, whereas a quality reporting standard and quality guidelines deal largely with statistical techniques, a national quality assurance framework focuses more on the organization of a national statistical office and the environment within which the techniques are applied. The organizational set-up and environment are likely to differ far more from one national statistical office to another than a set of statistical

techniques. Thus, as noted in Eurostat's "Guidelines for the implementation of quality assurance frameworks for international and supranational organizations compiling statistics", it is quite difficult to imagine a generic, one-size-fits-all framework.

39. A less ambitious but more realistic target is to produce a generic national quality assurance framework template that provides the general structure within which individual frameworks can be developed, and to accompany it with guidelines that provide guidance on how to formulate and operationalize a framework and give practical examples of what might be included.

40. The arguments in favour of developing and promoting a generic template and guidelines are that they would:

(a) Provide a stimulus to national statistical offices that do not have an overarching quality framework to introduce one;

(b) Provide a basis for national statistical offices that have such a framework to consider ways in which it could be enhanced;

(c) Reduce the amount of time and efforts required by national statistical offices to create and operationalize their frameworks;

(d) Be a means of sharing good quality assurance practices.

41. The template may be more or less detailed depending upon how much material can reasonably be assumed to be common to all national statistical offices. To be useful and to avoid putting unnecessary burden on the organizations, it should allow them to map their quality approaches easily under the various headings. It should also follow any relevant quality standards and best practices to the fullest extent possible. In particular, alignment with the IMF Data Quality Assessment Framework and/or the European Statistics Code of Practice is desirable.

42. Three alternative proposals for a generic national quality assurance framework template are presented in annex I to the present report. All three proposals share the same basic structure but differ in the way of presenting quality assurance practices.

43. The first proposal is based on the quality assurance framework used by Statistics Canada. The section covering quality assurance practices is predominantly output-oriented, focusing on the output quality dimensions, but also specifically including respondent considerations, coordination of the national statistical system and institutional issues.

44. The second proposal is oriented along the same lines as the IMF Data Quality Assessment Framework, the section covering quality assurance practices being presented in terms of the prerequisites of quality and the five quality dimensions of the IMF framework at the second (element) level of its hierarchy. The additional levels of the framework would provide guidance on what might be included under each heading and the template would enable easy mapping of assessments.

45. The third proposal is oriented along the same lines as the European Statistics Code of Practice, the section covering quality assurance practices being presented in terms of the 15 principles in the three groups (institutional environment, statistical processes quality and statistical outputs). As in the case of the IMF framework, additional guidance on what might be included under each heading would be available, in this instance in the form of indicators associated with each of the

principles, and the template would also enable easy mapping of audits or assessments.

46. It is envisaged that the national quality assurance framework guidelines will contain real examples drawn from quality frameworks and assessments used by national statistical offices (see annex II) to illustrate the possible content of a framework. The content may vary considerably from one statistical office to another, depending upon its stage of development, its resources, the environment within which it operates and its current concerns from the quality perspective. For instance, the need for improvement in legislation might be a major issue affecting quality in one statistical office but not in another. This example serves to illustrate why a generic template for a national quality assurance framework with guidelines is a more realistic option than attempting to create a generic framework.

47. The guidelines for a national quality assurance framework should also provide guidance on how it can be operationalized, for example, ensuring the commitment of senior management, viewing a framework as a long-term commitment (an ongoing programme not a project), defining roles and responsibilities, setting quality targets and making quality tools readily available. In addition, to be of continuing use, national frameworks should be revised periodically to reflect newly arising quality concerns.

48. In advancing the concept of developing a generic template and guidelines for national quality assurance frameworks it is necessary, first, to determine if there is general agreement on their benefits, and, if so, to set up an expert group to:

- (a) Define the scope and content of the template;
- (b) Develop the template taking existing frameworks into account and establishing a mapping for them;
- (c) In doing so, formulate a standard terminology on quality;
- (d) Develop a training and knowledge transfer strategy, including guidelines with real examples drawn from national statistical offices working in different environments.

IV. Points for discussion

49. **The Statistical Commission is invited to discuss:**

- (a) **The cost-benefit to national statistical offices of having a national quality assurance framework;**
- (b) **The benefits of developing a generic national quality assurance framework template and accompanying guidelines as an aid to national statistical offices in developing their individual frameworks;**
- (c) **The appropriate mechanism for developing a standard generic national quality assurance framework template and accompanying guidelines for presentation to the Statistical Commission for adoption at its forty-second session in March 2011.**

Annex I

Templates for a generic national quality assurance framework

The following three proposed templates share a basic structure but differ in the way in which quality assurance procedures are presented (see sect. 3 of each template).

Proposal 1 Based on the Quality Assurance Framework of Statistics Canada

1. Introduction

- Current circumstances and key issues driving need for quality management
- Benefits of a quality assurance framework
- Relationship to other statistical office policies, strategies and frameworks
- Content of a quality assurance framework (see below)

2. Quality concepts and instruments

- Existing quality policies, models, objectives and procedures
- Role of a quality assurance framework: where it fits into the quality toolkit

3. Quality assurance procedures

- Managing user and stakeholder relationships: user satisfaction surveys, feedback mechanisms and councils
- Coordinating the national statistical system: protocols and standards
- Managing relevance: programme review, planning processes and data analysis
- Managing accuracy: design, accuracy assessment, quality control and revision policy
- Managing timeliness and punctuality: advanced release dates, preliminary and final releases
- Managing accessibility: product definition, dissemination practices and search facilities
- Managing interpretability/clarity: concepts, sources, methods and informing users of quality
- Managing coherence and comparability: standards, harmonized concepts and methods
- Managing output quality tradeoffs: especially relevance, accuracy and timeliness
- Managing provider relationships: response burden measurement and reduction, and response rate maintenance
- Managing statistical infrastructure: standards, registers and policies

- Managing institutional infrastructure: confidentiality, security, transparency, professional independence, impartiality and objectivity
- Managing metadata: relating to quality

4. Quality assessment

- Quality indicators: defining, collecting, analysing and synthesizing composite indicators, quality barometer/dashboard
- Quality targets: setting and monitoring
- Quality assessment programme: self-assessment, peer review, quality audit, quality audit and certification

5. Quality and performance management and improvement

- Performance management: planning, cost and efficiency, sharing good practices, change management and risk management
- Recruitment and training: resource planning, determining recruitment and training needs and developing and conducting training courses
- Continuous improvement programme: quality culture, ongoing within operating budgets
- Governance structure: for quality and performance trade-offs and re-engineering initiatives, based on results of quality assessments

6. Conclusion

- Summary of benefits
- Reference to guidelines and implementation plans

Proposal 2

Based on the International Monetary Fund (IMF) Data Quality Assessment Framework (DQAF)

1. Introduction

- Current circumstances and key issues driving need for quality management
- Benefits of a quality assurance framework
- Relationship to other statistical office policies, strategies and frameworks
- Content of a quality assurance framework (see below)

2. Quality concepts and instruments

- Existing quality policies, models, objectives and procedures
- Role of quality assurance framework: where it fits into the quality toolkit

3. Quality Assurance Procedures^a

• Prerequisites of quality

- Legal and institutional environment
- Resources
- Relevance

• Assurances of integrity

- Professionalism
- Transparency
- Ethical standards

• Methodological soundness

- Concepts and definitions
- Scope
- Classification and sectorization
- Basis for recording

• Accuracy and reliability

- Data sources
- Statistical techniques
- Assessment and validation of intermediate data and statistical outputs
- Revision studies

^a More guidance on the possible content of this section can be obtained from the IMF Data Quality Assessment Framework.

- **Serviceability**
 - Periodicity and timeliness
 - Consistency
 - Revision policy and practice

- **Accessibility**
 - Data accessibility
 - Metadata accessibility
 - Assistance to users

4. Quality assessment

- Quality indicators: defining, collecting, analysing and synthesizing composite indicators, quality barometer/dashboard
- Quality targets: setting and monitoring
- Quality assessment programme: self-assessment, peer review, quality audit and certification
- User satisfaction surveys

5. Quality and performance management and improvement

- Performance management: planning, cost and efficiency, sharing good practices, change management and risk management
- Recruitment and training: resource planning, determining recruitment and training needs and developing and conducting training courses
- Continuous improvement programme: quality culture, enhancements within operating budgets
- Governance structure: for quality and performance trade-offs and re-engineering initiatives, based on results of quality assessments

6. Conclusion

- Summary of benefits
- Reference to guidelines and implementation plans

Proposal 3

Based on European Statistics Code of Practice

1. Introduction

- Current circumstances and key issues driving need for quality management
- Benefits of a quality assurance framework
- Relationship to other statistical office policies, strategies and frameworks
- Content of a quality assurance framework (see below)

2. Quality concepts and instruments

- Existing quality policies, models, objectives and procedures
- Role of a quality assurance framework: where it fits into the quality toolkit

3. Quality assurance procedures^b

• Managing the institutional environment

- Professional independence
- Mandate for data collection
- Adequacy of resources
- Statistical confidentiality and security
- Impartiality and objectivity

• Managing statistical processes

- Sound methodology
- Appropriate statistical procedures
- Respondent considerations
- Effective use of resources

• Managing statistical outputs

- Relevance
- Accuracy and reliability
- Timeliness and punctuality
- Coherence and comparability
- Accessibility and clarity

4. Quality assessment

- Quality indicators: defining, collecting, analysing and synthesizing composite indicators, quality barometer/dashboard

^b More guidance on the possible content of this section can be obtained from the European Statistics Code of Practice.

- Quality targets: setting and monitoring
- Quality assessment programme: self-assessment, peer review, quality audit and certification
- User satisfaction surveys

5. Quality and performance management and improvement

- Performance management: planning, cost and efficiency, sharing good practices, change management and risk management
- Recruitment and training: resource planning, determining recruitment and training needs, developing and conducting training courses
- Continuous improvement programme: quality culture, ongoing enhancements within operating budgets
- Governance structure: for quality and performance trade-offs and re-engineering initiatives, based on results of quality assessments

6. Conclusion

- Summary of benefits
- Reference to guidelines and implementation plans

Annex II

The Quality Assurance Framework at Statistics Canada

I. Introduction

1. Quality is the hallmark of Statistics Canada. If its information becomes suspect, the credibility of the agency would be called into question and its reputation as an independent, objective source of trustworthy information undermined. Thus, quality management plays a central role. It is an important component of corporate management and an integral part of the management of every programme. It is not a separate function, but, like financial management, an aspect of the management of the agency that has to be addressed across all programmes.

2. Managing quality comprises a wide variety of mechanisms and processes acting at various levels throughout the agency's programmes and throughout the organization. The effectiveness of the framework does not depend upon a single mechanism or process but on the collective effect of, and synergy between, many interdependent measures. These build on the professional interests and motivation of the staff. They reinforce each other as means to serve client needs. They emphasize the agency's objective professionalism and concern for data quality.

3. Underlying are eight guiding principles (further described in the quality guidelines):

- Quality is relative, not an absolute
- Quality is multidimensional
- Every employee has a role to play in assuring quality
- Balancing of the dimensions of quality is best achieved through a project team approach
- Quality must be built in at each phase of the process
- Quality assurance measures must be adapted to the specific programme
- Users must be informed of data quality
- Quality must be at the forefront of all activities.

4. Key factors in quality management are the knowledge, experience and motivation of staff. Staff must not only be technically expert but also be aware of quality issues and be able to develop and implement procedures to meet quality objectives. Thus, particular emphasis is placed on staff recruitment and development, including entry level recruitment and development programmes for major occupational groups, mentoring, career stream plans for major groups, a training policy and framework, including specialized courses, certificate programmes, a corporate assignment programme, development programmes for managers and an awards and recognition programme offered by the Statistics Canada Training Institute.

5. The six dimensions of quality that Statistics Canada has promulgated for many years can be characterized as static in the sense that they tend to change relatively

slowly and are always a consideration in managing quality (see sect. 2). Certain aspects of quality are more dynamic, being intimately linked to the external environment within which the agency operates and subject to quick changes as the environment evolves. Such elements are given special attention (see sect. 3).

II. Static elements of quality

A. Relevance

6. Statistical information is relevant to the degree to which it meets the needs of users. It can be viewed at two levels: relevance of the overall statistical programme (global relevance) and relevance of each survey. The agency's challenge is to weigh and balance the possibly conflicting needs of current and potential users in designing the statistical programme and the individual surveys, given the resources available. Management of relevance means determining the information that the agency as a whole, and through each individual survey, will produce and deciding the resources to be allocated to each survey programme. In addition, since needs evolve over time, survey programmes must be continuously monitored through user and stakeholder feedback, programme review and data analysis, during which appropriate adjustments must be made.

7. The principal feedback mechanisms include the National Statistics Council, professional advisory committees in major subject areas, bilateral arrangements with key senior federal departments and agencies, policy and programme discussions with Deputy Ministers, the Federal-Provincial Consultative Council on Statistical Policy and its subsidiary committees, liaison with business associations, market research and monitoring of product sales and requests and discussions with potential users, other national statistical offices and international organizations.

8. Data analysis is a valuable tool in assessment of relevance. Identifying questions that data products cannot answer pinpoints gaps and weaknesses in outputs. The use of analytic frameworks such as the *System of National Accounts* to integrate and reconcile data coming from different sources is an important element. The agency's active internal analysis programme is supported through fellowship programmes, joint analytic work with external authors, subject-oriented data review and reconciliation committees and research data centres.

9. Given information on user needs and programme weaknesses, the long-term planning process provides the framework for deciding what changes will be made to the agency's programme from one year to the next. However, there are constraints as 90 per cent of the agency's budget is devoted to non-discretionary ongoing surveys providing basic information and/or meeting the legislative and regulatory needs specified in some two dozen acts of Parliament. The agency's responses to newly emerging information needs must thus be found through efficiencies within non-discretionary surveys, the redirection of resources from discretionary surveys and/or by persuading users (particularly federal Government clients) to provide financing.

B. Accuracy

10. Statistical information is accurate to the degree to which the information correctly describes the phenomena it was designed to measure. Accuracy is usually

characterized in terms of error in statistical estimates and is traditionally separated into bias (systematic error) and variance (random error) components and is described in terms of the major potential sources of error. Management of accuracy requires particular attention during design, implementation, and assessment stages of a survey.

11. As regards design, measures taken to promote accuracy include:

(a) Establishing a project management environment with participation of staff members specializing in subject matter, methodology, operations and systems;

(b) Specialized resource and support centres for certain functions, in particular, questionnaire design and testing, seasonal adjustment and data analysis;

(c) Centralized headquarters operations staff and a regional network of field staff for conducting collection and processing;

(d) Internal cost recovery, to reflect real costs in making design decisions;

(e) Peer and institutional design reviews.

12. The agency's *Quality Guidelines* (2003) detail its policies, standards and best practices, covering concepts and definitions, questionnaire design, survey frames and use of the business register, sampling and estimation, securing response and dealing with non-response, seasonal adjustment, dissemination and evaluation.

13. Mechanisms for monitoring implementation are built into survey processes at the design stage. Two types of information are required: (a) to monitor and correct, in real time, any problems arising during survey implementation; and (b) to assess whether the design was implemented as planned, whether some aspects were problematic and what lessons were learned from the operational standpoint.

14. Assessment of accuracy is also an important consideration at the design stage since much of the information required must be recorded while the survey is taking place. As accuracy is multidimensional, choices have to be made regarding the most important indicators for each individual survey. In addition, since each survey produces thousands of different estimates, either a generic method of indicating the accuracy of large numbers of estimates is used or the indicators are confined to certain key estimates.

15. As many design issues are highly technical, independent review is vital. Options include:

- Referral of technical issues to internal advisory committees
- Review of practices of other national statistical offices and exchanges of experiences with them
- Participation in working groups of international organizations
- Presentation of technical issues and proposed solutions at professional meetings.

16. While the measures outlined above are described in the context of accuracy, they also help to enhance other aspects of quality, especially timeliness and coherence.

C. Timeliness

17. Timeliness of information refers to the length of time between the reference point (or end of the reference period) to which the information relates and its availability to users. Timeliness targets are derived from relevance considerations, in particular the period for which the information remains useful for its main purposes. This varies with the rate of change of the phenomena being measured, the frequency of measurement and the immediacy of user response to the latest data.

18. Timeliness is a design decision, often involving trade-offs with accuracy and cost. Thus, improved timeliness is not an unconditional objective, but rather an important characteristic that is monitored over time to provide a warning of deterioration. Furthermore, timeliness expectations are likely to heighten as users become accustomed to immediacy in all forms of service delivery, thanks to the pervasive impact of technology.

19. Mechanisms for managing timeliness include announcing release dates well in advance, issuing preliminary estimates and making the best use of modern technology.

D. Accessibility

20. Accessibility of information refers to the ease with which users can learn of its existence, locate it and import it into their own working environment. It includes the suitability of the form or medium through which the information can be accessed and its cost.

21. Corporate-wide dissemination policies and delivery systems determine most aspects of accessibility (policies include informing users of data quality and methodology and reviews of informational products). The dissemination strategy is to make information of broad interest available free of charge through several media (including the press, the Internet, research data centres and libraries) while charging for products and services that go beyond satisfying general public demand for basic information. The primary dissemination vehicles are:

(a) *The Daily*, which is the agency's official release bulletin and first line of communication with the media and the public, providing a comprehensive, one-stop overview of new information available;

(b) The Statistics Canada database (CANSIM), which is the repository of all publicly available data;

(c) The Statistics Canada website as the primary entry point;

(d) An extensive programme of publications and analytical reports for specific client groups.

22. The Government's depository libraries programme ensures that all products are available to libraries across the country. The information needs of the analytical community receive special attention as they often require access to individual data records. Given that the Statistics Act prevents the agency from making individual records available in any form that might identify individuals, the following options are open:

- Production of public-use microdata files, screened to protect confidentiality

- Provision of a custom retrieval service through which external analysts can submit special requests for retrievals from an internal confidential microdata base
- Contracting with an external analyst sworn in under the Statistics Act
- Sharing of microdata under certain provisions of the Statistics Act.

E. Interpretability

23. Statistical information that users cannot understand, or can easily misunderstand, has no value and may be a liability. The interpretability of statistical information reflects the availability of the supplementary information, referred to as metadata, necessary to interpret and utilize the information appropriately. This includes the underlying concepts, variables and classifications used, the data collection and processing methods, and indications or measures of the accuracy of the statistical information. The methodology descriptions also serve as surrogate accuracy indicators, enabling the user to assess whether the methods used were scientific, objective and carefully implemented.

24. Statistics Canada's policy on informing users of data quality and methodology provides guidelines for provision of quality and methodology metadata. A particular effort is required to ensure that the metadata are comprehensible, unobscured by internal jargon and up-to-date.

25. Additional aid to users is provided by the commentaries accompanying information releases, which focus on the primary message that the new release contains and increase the probability that the first level of interpretation by the media to the public will be clear and correct. Conversely, the agency publicly answers or refutes serious misinterpretation of its data.

F. Coherence

26. The coherence of statistical information reflects the degree to which it can be successfully brought together with other statistical information within a broad analytic framework. Coherence of statistical data includes coherence between different variables pertaining to the same point in time, coherence between the same variables for different points in time and international coherence. Coherence does not necessarily imply full numerical consistency.

27. Three complementary approaches are used for managing coherence. The first is the development and use of standard frameworks, concepts, variables and classifications. The aim is to ensure that the measurement targets are consistent across programmes, that terminology is consistent and that the quantities being estimated have known relationships to each other. International comparability is addressed by adopting international standards, where they exist.

28. The second approach is to ensure that the measurement processes do not introduce inconsistency between data sources when the quantities being measured are defined in a consistent way. The development and use of common frames, methodologies and systems for data collection and processing contribute to this aim. Examples include use of standard question modules when the same variables are being collected in different surveys.

29. The third approach involves analysis of the data themselves and comparisons/integration of data from different sources and/or over time. The aim is to recognize and explain situations where inconsistencies exceed levels expected as a result of random errors. Conceptual frameworks covering particular subject-matter areas, such as national accounts, play an important role by providing a basis for recognizing incoherence.

III. Dynamic aspects of quality

A. Non-response

30. One of the biggest challenges in maintaining quality at current levels is declining response rates, particularly in social surveys, resulting from changes in social attitudes and technology. The modern lifestyle in Canada makes it increasingly difficult to contact families at home. Through caller display and call screening, Canadians can avoid a deluge of telephone solicitations, including calls from Statistics Canada. More households use only cell or Internet phones, which are more vulnerable to eavesdropping than traditional landlines. In some neighbourhoods, Canadians feel less secure and are less willing to open doors to strangers, including Statistics Canada interviewers. Increasing levels of Internet penetration bring opportunities for gains in efficiency and effectiveness through Internet-based data collection. However, this requires investment by the agency, and, where this option has not yet been put in place, businesses and households may decline to respond by other means.

31. Statistics Canada pursues cooperative arrangements with data suppliers through its respondent relations programme, response burden management programme, engagement with the small business community and small business ombudsman, electronic reporting initiatives and recognition of respondents in publications. Particular attention is paid to the complaints of respondents and to ensuring that questionnaires are tested to warrant minimal intrusion on privacy and to respect public sensitivities.

32. In the longer term, decreasing response rates and increasing costs of traditional data-collection methods will require development of more cost-effective follow-up and improved methods for reducing non-response bias at the estimation stage. New collection modes and increasing availability of operational metadata (paradata) are enabling more efficient and effective methods for dealing with non-response. Likewise, the agency can take advantage of increasing availability of administrative data to create more complete frames with better contact information, to help impute data in the case of partial non-response or incomplete data and to adjust for non-response bias errors at aggregate level.

B. Coverage

33. Coverage is determined by the quality of survey frames. Over the past 25 years, the agency has been slowly but steadily replacing area frames by list frames as more administrative data become available. It no longer uses area frames for its agricultural surveys and even the “Labour Force Survey” is increasingly based on addresses from the address register rather than from a traditional field listing. However, there are some emerging issues with which to deal.

34. First, the agency is more dependent on administrative data and thus vulnerable to changes in, or cancellation of, the corresponding administrative programmes. Thus, good relations are vital to ensure that the agency's needs are considered. Second, when administrative agencies do not pay the same attention to classification of units as the agency would like, intervention is required. Third, businesses are constantly forming and disappearing, merging and divesting, entering and exiting industries and adding and dropping products and services. There is often a time lag in detecting these changes from administrative data. Thus the agency must be prepared to supplement administrative data by investing in its own maintenance mechanisms.

C. Sampling

35. Over time, survey design deteriorates in that the data used to stratify and select units become out of date and the sample becomes less efficient. Furthermore, demand for data on specific sub-populations may emerge that the sample was not designed to support. Ongoing surveys thus require periodic redesign. For example, the Labour Force Survey sample is redesigned after every decennial census. Redesigns of business surveys are carried out more frequently to keep up with changes in the world of business.

36. Sample redesign is an opportunity to introduce new techniques, for example, multiple frames and adaptive sampling, and to spread the respondent burden more evenly. The challenge is how to fund these redesigns, which often include a parallel run of the old and new samples in order to ensure that the redesign does not introduce breaks in the statistical series. Since survey quality deteriorates slowly, it is difficult to convince funding agencies to finance redesigns. For these reasons, Statistics Canada funds most from its own budget.

IV. Priority areas for coming years

A. Implementation of ongoing quality review programme

37. In response to three critical errors in data released in 2005 and 2006, Statistics Canada undertook a review of quality assurance practices in nine key programmes. The objectives of the quality review were twofold: (a) to identify any specific weaknesses, and the factors behind them; and (b) to identify best practices that should be promoted in other programmes. Among the key findings (published in *The Daily* in 2007) the review concluded that human resources-related issues dominated all other risk factors. In particular, the need for a strong research and analysis capacity separate from production was identified as key in ensuring quality.

38. The quality review is now an ongoing annual operation, starting in the fall with identification of programmes that would benefit most from such a review. These programmes are the ones that are either more at risk than others, and have issues to address, or have recently undergone significant changes in order to successfully address such risks and thus have good practices to share. The actual reviews take place in the spring. Reports are written during the summer and finalized early in the fall so that they are available in time for the annual planning cycle and the allocation of corporate resources.

B. Adapting quality training

39. In a rapidly changing environment a quality training programme is vital to the sharing of best practices and a culture of excellence. Quality training programmes and tools are being adapted to staff at all levels, roles and work experience, including employees in regional offices. There are training courses at three levels, quality awareness, quality practices and specialized courses, and these are being integrated into a framework that covers and standardizes the presentation of risk management, project management, documentation and quality assurance.

40. The Agency's *Quality Guidelines* are currently being revised and the fifth edition containing more up-to-date best practices and a new section on seasonal adjustment will be released in the fall of 2009.

C. Building and maintaining a quality culture

41. A quality culture depends upon setting clear expectations for every employee, providing the tools and training needed to meet those expectations and assessing and providing feedback on performance against those expectations. Managers are responsible for reinforcing the message that quality is an integral part of everyone's job. The agency is considering how to build quality expectations more explicitly into employees' annual performance objectives and learning plans while assuring employees that they can raise quality issues without fear.

42. In addition to training courses, quality procedures are being broadened to include walk-throughs of actual survey processes, case studies on quality issues and initiatives such as the agency's alumni programme, whereby retired staff work in the office on a part-time basis and contribute to the passing on of good quality practices.

D. Strengthening project management and documentation practices

43. Project management and documentation have emerged as elements needing reinforcement, particularly as crucial decisions involving trade-offs between the various quality dimensions, costs and response burden often take place within a project team environment. Thus, as well as improving its quality assurance training, the agency plans to revisit its project management training programme. Issues to be addressed include the lack of uniformity in the application of project management methods, the absence of an effective mechanism for sharing best project management practices, project team roles and responsibilities and documentation.

44. While the agency has well-developed policies and guidelines regarding the information that must be provided to data users, the documentation of survey processes is less well prescribed. Furthermore, as resources become increasingly scarce, there is a risk that documentation will suffer, and the current exodus of experienced personnel through retirement means that good documentation is more critical than ever.

E. Developing a broader view of a quality assurance framework

45. Notwithstanding recent developments, the current quality assurance framework leaves something to be desired. A fundamental question that is not well answered is how the agency should reallocate its resources in order to address emerging relevance and quality gaps. The quality assurance framework tends to focus on individual programmes and needs to provide more guidance at the

corporate level. In appendix A of its 2009 corporate business plan, Statistics Canada discusses the three interdependent factors to be taken into account in resource reallocation: (a) the extent of the use of the data (relevance); (b) the quality of the data (accuracy, timeliness, accessibility, etc.); and (c) the data production costs relative to the benefits to citizens and policymakers. In making trade-offs between these factors, the agency needs better quantitative measures of the performance of the statistical programme as a whole and more effective change governance mechanisms.

46. As regards quality measurement, the concept of total survey error and efforts to estimate it are relevant, as is development of the Eurostat quality barometer. While research to find a small number of quality indicator proceeds, the agency will continue to address issues such as:

- (a) How the existing attributes of quality are best quantified/measured, even if subjectively;
 - (b) How the various measures should be weighted, even if subjectively, to arrive at a meaningful, reduced set of composite quality measures;
 - (c) How individual and composite measures of quality should be used in making comparisons between programme options;
 - (d) What the appropriate governance mechanisms are.
-