



Discussion paper

# Methodological audits at NSIs

Survey of international practice

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## **Summary**

Statistics Netherlands is going to implement so-called methodological audits of statistical processes. These audits will look at whether a statistical process uses the right methodology and whether improvements can be made. They are a complement to our more general audits for ISO-9001, which look at the whole structure and documentation of procedures and processes.

In developing a framework for the new methodological audits, we have conducted a survey about international practice, where we have asked other national statistical institutes (NSIs) whether, and if so how, they do such methodological audits on a permanent or occasional basis. This report presents the results of this survey, as well as some lessons that Statistics Netherlands may draw from these results.

## **Keywords**

statistical methods, quality assurance, statistical institutes

The views expressed in this paper are those of the authors and do not necessarily reflect the policies of Statistics Netherlands. The authors would like to thank all colleagues at other NSIs who responded to our survey; their contributions to this paper are acknowledged individually in the relevant subsections.

# 1. Introduction

Statistics Netherlands is going to implement so-called methodological audits of statistical processes. These audits will look at whether a statistical process uses the right methodology and whether improvements can be made. They are a complement to our more general audits for ISO-9001, which look at the whole structure and documentation of procedures and processes.

In developing a framework for the new methodological audits, we have conducted a survey about international practice, where we have asked NSIs whether, and if so how, they do such methodological audits on a permanent or occasional basis. This report presents the results of this survey (Section 2), as well as some lessons that Statistics Netherlands may draw from these results (Section 3).

We wish to thank the NSIs (Statistics Canada, Statistics Finland, Insee France, ONS United Kingdom, US Bureau of Labor Statistics, and US Bureau of the Census) and their representatives for their cooperation and for generously sharing their experience and documents.

## 2. Description by statistical institute

### 2.1 Statistics Canada<sup>1</sup>

Statistics Canada has a Quality Secretariat. The role of the Quality Secretariat is to:

- support the development and implementation of policies and procedures that promote sound quality-management practices;
- design and manage studies related to quality management;
- provide advice and assistance to programs about managing quality and complying with policies on quality;
- support corporate management in preparing performance reports on quality;
- answer to requests from other agencies for information or assistance related to quality management.

The way chosen to fulfill this mandate is to raise awareness towards good data quality practices via the promotion of key documents on data quality management – Statistics Canada Quality Assurance Framework (QAF), Statistics Canada Quality Guidelines and the Data Quality toolkit – and provide training on good practices.

At the moment, the Quality Secretariat does not conduct methodological audits. It is the manager of each statistical program who is accountable to apply best quality practices as stated in the QAF and the Quality Guidelines and are complying with policies in place. The Quality Secretariat is currently in the process of assessing if programs comply to the policy on informing users on data quality, but no audit on specific programs are in the plans, at least in the short term.

Statistics Canada's Quality Secretariat is also leading a working group on data quality for the whole government. This group was created in the context of the Government of Canada Data Strategy which has recently been put in place with the objective of having departments building policy making evidence-based decisions that rely on data. Multiple facets are part of this Data Strategy, such as data stewardship, data literacy and of course data quality. The goal of the working group will be to develop a Quality Assurance Framework applicable for the whole government. Statistics Canada's QAF is a starting point, but is NSO oriented so it has to be modified to be generic enough to be applicable in other departments. The work of this working group is beginning, timelines are not fully established yet, but it is expected to be ready by the end of 2020.

In addition, when important changes in the methodology of a program are proposed, they are presented to a Scientific Review Committee, which is composed of managers, directors and Director General of the Modern Methods and Data Science Branch at Statistics Canada (used to be called Methodology

<sup>1</sup> Information provided by Martin Beaulieu (emails, 9 October 2019 and 28 January 2020).

Branch), who are all experienced methodologists. The purpose of this committee is to make sure that methods used lead to valid statistical inference, that they comply with the data quality best practices and that they are rigorous. For the most important changes, Statistics Canada also has the Advisory Committee on Statistical Methods. The mandate of this committee is to advise the Chief Statistician on matters relating to the utilization of efficient statistical methods in the Agency's program, and on its program of research and development in statistical methods. The members are not employees of Statistics Canada, they are either academics or methodology experts from other agencies.

## 2.2 Statistics Finland<sup>2</sup>

Statistics Finland conducts statistical audits on a regular basis – they are, however, auditing a single statistical product, such as the Labor Force Survey or Time Use Survey.

Statistics Finland has also done what are called “thematic audits” of certain process phases. These were introduced soon after a handful of internal guidelines were completed. In these audits a team of 2-3 experts goes through a certain process phase of a given statistic. For example, in 2014 the sampling and estimation procedures were audited in three different statistics. The audits compare the existing practices against Statistics Finland's internal recommendations.

This practice started in 2014. In 2019 no thematic audits have yet been completed. The phases that have been audited are:

- Sampling and estimation (2014, 2015, 2016)
- Editing and imputation (2017)
- Seasonal adjustment (2018)

The internal recommendations are typically 2-3 pages long. They are a collection of good (though quite general) practices. The recommendations have been prepared at expert level and endorsed by the director general. All documents related to this are in Finnish.

The internal audits result in a short (usually 2-3 pages) report reflecting the existing practices and giving recommendations for making things better. The aim of thematic audits was to recognize process phases (and not separate statistics) that could be improved. Hence, the idea came from the need to move away from silos.

<sup>2</sup> Information provided by Faiz Alsuhail (emails, 10 and 18 September 2019).

## 2.3 Insee (France)<sup>3</sup>

At Insee, there is no general framework for all methodological audits. For the time being, Insee (covering also all ONAs) has implemented a systematic ex-ante review/audit of the statistical quality of surveys (households and businesses), which is conducted by a dedicated independent Committee (the French Label Committee). This Committee delivers a label of general interest and statistical quality for these surveys.

Six main criteria are being studied:

- general context;
- statistical methodology (sampling, post data collection treatments);
- data collection process;
- study of the questionnaire and examination of test reports;
- costs and burdens on respondents;
- data dissemination.

More details on this Label Committee can be found in Christine (2016).

For other statistical processes (for example administrative data), Insee does not yet have such a systematic methodological audit. Insee is thinking about this question and the way to possibly widen the scope of the Label Committee to also embrace administrative and private data, processed by the French statistical system. The reflection is still ongoing.

## 2.4 Statistics New Zealand<sup>4</sup>

Statistics New Zealand (Stats NZ) do not do formal methodological audits as such. In terms of related activities they do undertake the following.

In the Stats NZ management model, the Statistical Methods unit provides advice about methodology. In most contexts their design recommendations are accepted and so, for better or worse the methods are ones that methodologists have chosen. Depending on how new or innovative the approach being implemented is, a methodologist may seek external peer review.

A recent review of response problems in 2018 has recommended that Stats NZ revitalize a design authority to provide assurance of the design and monitor that the intended design was implemented.

Occasionally, statistical products undergo in-depth reviews by external experts. In terms of ongoing monitoring of statistical quality, Stats NZ have adapted the ASPIRE model. ASPIRE stands for *A System for Product Improvement, Review and Evaluation*. It is a quality assessment framework that was developed by Statistics Sweden, Paul Biemer, and Dennis Trewin. ASPIRE produces a set of numerical

<sup>3</sup> Information provided by Sylvie Lagarde (email, 16 September 2019).

<sup>4</sup> Information provided by Vince Galvin (email, 11 September 2019) and Jeroen Kole (emails, 16 September 2019 and 31 January 2020).

indicators with the focus on accuracy that, over time, shows quality and risk changes in key statistical products.

The ASPIRE reviews at Stats NZ involve the entire subject matter team, plus a methodologist. The reviews have the form of a facilitated periodic self-assessment by working through a standardised checklist. This results in a written report featuring recommendations and areas for improvement for the next 12 months.

ASPIRE has been in place for the last four years and resulted in a stronger focus on risk and quality management at Stats NZ. The assessments offer team managers a structured approach to assess risks and quality in their end-to-end production process. It has been applied to a wide range of products in economic, social, and environmental statistics, including some products from other government agencies. ASPIRE can be a catalyst for knowledge sharing – within and across teams – and continuous improvement in statistical products and processes.

## 2.5 ONS (United Kingdom)<sup>5</sup>

ONS carry out methodological audits, known as quality reviews.

ONS' high-level quality framework is the [Code of Practice for Statistics](#). The principles within this incorporate the ESS dimensions of quality, and compliance with them is mandatory for outputs designated as National Statistics.

With the Code of Practice in mind – in terms of more specific quality frameworks, ONS have moved towards producing shorter pieces of guidance accompanied by training courses, as opposed to more detailed/prescriptive documents which can lead to a 'tick box' approach. This is also easier to roll out in a highly decentralized system like the UK. The [Quality Statistics in Government guidance](#) is structured around the ESS dimensions of quality with practical examples.

In terms of reviews/audits, the main approaches at ONS are as follows:

- Regular Quality Reviews: these use value engineering to take a risk based approach to quality management. Each output owner in the ONS will assess their area against a range of categories such as methodology/data sources/quality. The higher-risk outputs will then be reviewed by specialists from outside of that output area, and recommendations will be made for improvement. The intention behind this is to allow identification of cross-cutting issues, and provide a regular check point for output managers to review their products. It is worth bearing in mind that ONS will be reviewing this process to determine its effectiveness.
- National Statistician's Quality Reviews (NSQR): Historically, these were a deep dive into ONS outputs. In 2018, a new approach was introduced, and they now focus on thematic issues affecting the statistical system at large. The first

<sup>5</sup> Information provided by Sarah Henry (email, 10 September 2019) and James Tucker (email, 1st October 2019).



- review focused on [privacy and confidentiality](#). A second review is currently being developed on data linking challenges.
- Local approaches: A range of approaches are taken locally in addition to the above. For example, consumer prices has an external technical advisory panel and complies with ISO standards.

## 2.6 Bureau of Labor Statistics (BLS; United States)<sup>6</sup>

At BLS, programs go through a quality review process periodically. The core components are framed around the Office of Management and Budget (OMB) Statistical Guidelines and BLS best practices. The first component of the BLS review is on measurement objectives and methodology, and that component is always required. There are other components in the review that cover planning, data processing systems and dissemination, and programs get some choice on which of those three they will pursue.

This quality review process is relatively new – older reviews used to be a long, extensive process, taking up a lot of program staff time, and covered all four components. After every program went through one of these reviews, the process was changed, and now involves self-assessment by the program and more targeted reviews by non-program staff. For example, staff from BLS' Office of Survey Methods Research are always involved in the review of component 1.

The administrative office that coordinates the reviews describes them as follows:

- The goal of the quality review process is to identify opportunities for improvement of the methods, resource allocations, and products of BLS statistical programs.
- The review focuses on analyzing evidence provided by the program for each principle for the core component being reviewed. Recommendations are developed when a core component principle is not being met.
- The program staff complete the quality review self-assessment checklist. Program staff provide a presentation to the outside review staff that covers all aspects of their program. The program reviews and explains the completed checklist to the reviewers.
- Reviewers (other program management experts within the BLS) work on reviewing program-supplied evidence for the individual core components. After their review of the program supplied evidence, outside reviewers provide their concurrence or non-concurrence and validate recommendations or provide additional recommendations for the program.

The principles used for the old review process were reviewed and updated when BLS moved to the Quality Review process. Many of the principles remained the same but there are a few new or updated ones. A summary highlighting the differences and similarities between the old and the new process is below.

<sup>6</sup> Information provided by Polly Phipps (emails, 11 September 2019 and 24 January 2020) and Nora Kincaid (email, 12 September 2019).

- The quality review process maintains prior program review concepts of:
  - a. Outside (non-program) reviewers to ensure critical evaluation continues.
  - b. Review by core component areas (there are four: 1- measurement objectives/program methodology, 2- planning, 3- data processing systems, and 4- information dissemination/customer service).
  - c. Developing actionable recommendations or best practices based on program evidence supplied.
- The Quality Review process instituted several changes in methodology:
  - a. More program ownership of the process, ensuring an opportunity for the program to self-assess where areas of improvement are needed.
  - b. A more streamlined approach to assessment using a checklist documentation format and evaluation against sets of BLS principles that map to OMB standards and guidelines for statistical surveys.
  - c. Smaller review team and reduced meeting time.

## 2.7 Census Bureau (United States)<sup>7</sup>

The Statistical Quality Standards of the Census Bureau are set out in Census Bureau (2013). They were originally developed in 2008 and revised periodically. All programs at the Bureau must adhere to these standards and must maintain a program plan that describes how the program will comply with any and all applicable standards.

The Office of Management & Budget (OMB) has managerial oversight of all Federal statistical agencies. The OMB Statistical Quality Standards (OMB, 2006) were developed in 2006 and are updated rarely. All statistical programs produced by the U.S. Government must adhere to these. The Census Bureau standards are considered more detailed and if a program is compliant with the Census standards they are by default compliant with the OMB standards. The reverse is not true.

The Census Bureau has conducted internal audits with formal programs in its Economic & Demographic Directorates.

## 2.8 Statistics Netherlands<sup>8</sup>

### 2.8.1 Quality management

At the corporate level, quality management is geared towards compliance with the European Statistics Code of Practice (EU, 2017). All statistical processes at Statistics Netherlands (CBS) are certified according to ISO-9001.<sup>9</sup> To maintain this

<sup>7</sup> Information provided by Steven Klement (email, 16 September 2019).

<sup>8</sup> Based on Booleman and Zeelenberg (2019).

<sup>9</sup> <https://www.cbs.nl/en-gb/about-us/organisation/privacy/iso-certification-and-privacy-certification>

certification, there is an audit program where once in every three years, a process is audited by an external auditor. To support these external audits, CBS has decided to introduce *methodological audits* and *in-depth audits*.

### **2.8.2 Methodological audits**

Methodological audits are brief audits that check whether a statistical process leads to the intended result, i.e. whether the correct statistical methods have been used and whether these methods have been applied correctly. Such an audit looks at two types of documentation: the methodological documentation and the process documentation, supported by an interview with the statistical management and staff involved in the process. The purpose of the audit is to reduce the risk of incorrect statistics caused by incorrect methodology or incorrect application of methodology.

There are about 250 statistical processes at CBS. About 70 are deemed crucial, because they produce the approximately 20 corporate statistics, such as GDP, CPI and unemployment, or because they are essential inputs to these corporate statistics.

For each of the statistical processes, a risk profile is drawn up, based on a self-assessment questionnaire; for the crucial processes, every year and for the other processes, once in every 3 years. The scores from the questionnaires may be adjusted by the Chief Audit Officer and by the Chief Methodological Officer.

The audit itself takes about 1 week, and is done by a team consisting of one methodologist and one business analyst, both from the Research & Development (R&D) Department; it is supervised and organized by the Quality Department.

### **2.8.3 In-depth audits**

One possible outcome of a methodological audit is that risks or problems are such that a further investigation, called *in-depth audit*, is necessary. These audits are carried out by the R&D Department, on terms agreed between the statistical department and the R&D Department. These audits take place outside the regular audit program, and they may also be requested directly, without a previous methodological audit.

# 3. Conclusion

## 3.1 Summary of practices

The NSIs that responded to our survey use a wide variety of approaches for quality assurance and auditing of statistical processes. Some common features do occur. Most NSIs have a quality framework in place, as well as a separate department within their organization that monitors compliance of statistical processes with quality standards. Several respondents noted that such a department also has a role in promoting the use of standard methodology and quality standards within the organization. Another common feature is the use of self-assessment reports by owners of statistical processes to identify processes with high risk and/or impact.

In terms of the organization of actual audits, the approaches differ between NSIs. Methodological audits as currently proposed by CBS are not very common (yet), although a few NSIs reported that they are thinking about implementing such audits or have conducted them in the past. In addition to auditing individual statistical processes, some NSIs (Statistics Finland, ONS) have also conducted thematic audits of process steps that occur in different processes.

## 3.2 Lessons for CBS<sup>10</sup>

- Data quality within the government sector is important. By participating in, or even taking responsibility for, a quality framework for all official data, an NSI may at the same time contribute to improving its own input data from administrative sources.
- External peer reviews may be a useful complement to internal audits, not only for audits of subject-matter statistics, but also for reviews of the methodological framework itself.
- Audits by theme, e.g. by process stage or by methodological topic, may be a useful complement to audits by statistical processes. An examples would be an audits of sampling procedures across all survey-based statistics.
- Keep reports brief, e.g. 2 or 3 pages with recommendations.
- Keep audits brief in time, e.g. 2 or 3 weeks.
- Provide explanatory notes and guidelines for completing the self-assessment questionnaire.
- Participation in the audit by the subject-matter staff is essential to create support for the recommendations. A workshop where auditors and auditees jointly analyze problems and search solutions, may be useful.
- Prepare a comprehensive list for activities during the audit: who does what, steps, time schedule.

<sup>10</sup> This section contains solely the opinions of the authors and does not necessarily reflect the opinions or policies of the other NSIs mentioned in this report.

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## Explanation of symbols

Empty cell	Figure not applicable
.	Figure is unknown, insufficiently reliable or confidential
*	Provisional figure
**	Revised provisional figure
2017–2018	2017 to 2018 inclusive
2017/2018	Average for 2017 to 2018 inclusive
2017/'18	Crop year, financial year, school year, etc., beginning in 2017 and ending in 2018
2013/'14–2017/'18	Crop year, financial year, etc., 2015/'16 to 2017/'18 inclusive

Due to rounding, some totals may not correspond to the sum of the separate figures.

## Colophon

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