# Certifying the Quality & Information Security Management Systems of the NSO according to the international standards ISO 9001, 20252 and 27001

Segui, Federico
*National Statistical Institute, Quality Management Department*
*Río Negro 1520*
*Montevideo (11.100), Uruguay*
*E-mail: fsegui@ine.gub.uy*

## Introduction

On January 22nd 2009, NSI [1] of Uruguay obtained a quality certification according to the international standard ISO 20252:2006 "Market, opinion and social research – Vocabulary and service requirements". It establishes quality service requirements of statistical producers, either official ones or business enterprises.

NSI of Uruguay is the unique national statistical office which gets this certificate (ISO 20252) - no information known about any other realisation so far. Furthermore, it achieved simultaneously two certifications of its Quality Management System (QMS), in accordance with international standards ISO 9001:2008 and ISO 20252:2006.

A pilot experience in the Construction Cost Index (CCI) survey was the starting point of a bigger project that has already started and involves all NSI areas. Documentation, standards, politics and know-how were produced and will be used in other surveys in an easy way and at a lower cost.

## Antecedents

There are many quality frameworks and QMS models like ISO 9000, EFQM [2], TQM [3], DQAF [4] or a combination of them being used in statistical offices.

Handbook on "Data Quality Assessment Methods and Tools" has been one of our main references during planning phase of our implementation plan. It describes in detail each quality framework available.

NSI of Uruguay has adopted the ISO 9000 model because there are some employees trained as ISO 9000 QMS experts. Some of them are Certified Consultants by ISO subsidiary in Uruguay and experienced in ISO certifications in private organisations.

ISO 9000 norms are widely-known international standards that establish guides and requirements of a Quality Management System (QMS) in any kind of organisation. They have been studied and exposed in many other papers and publications before, so we shall proceed to the next subject.

ISO 20252 is a Process Quality Standard that is specific to the carrying out of survey research *[Blyth, Bill 2006]*. It does not cover issues of design quality because it is almost certainly impossible to define by consensus what composes good design quality. Furthermore, this is a global standard suitable for use in any statistics production organisation, so dealing with design quality, cost and timeliness to provide fitness for purpose may vary from one organisation to another. The core content is: QMS requirements, executive elements, data collection, data management and processing, project documentation.

ISO 9001 or ISO 20252? Both standards are not exclusive, but they are complementary. In fact, ISO 9001 certification has facilitated ISO 20252 certification process at NSI of Uruguay. We strongly recommend implementing both standards at the same time.

---

1 NSI – National Statistical Institute or National Statistical Office (NSO)
2 EFQM – European Foundation for Quality Management
3 TQM – Total Quality Management
4 DQAF – Data Quality Assessment Framework – International Monetary Fund

## Organisational structure

A Quality Management Department has been created during a project of organisational restructure.

QM Department depends on Director General Office and it is an independent Department that works like an advisory and support office.

It is strongly recommended to create a working group (quality committee) leaded or moderated by the coordinator of Quality Manager Department and integrated by key employees inside the organisation. Top Managers and those employees who have natural leadership qualities and big influence on their fellows, even if they do not have a management position.

This working group has the responsibilities of proposing continuous quality improvements and establishing the action plan for implementation ISO 20252.

## Pilot experience

A quality improvement project started on February 2008, when NSI decided to begin a pilot experience in a small survey (Construction Cost Index, CCI). This pilot project was developed in a record time of about 10 months. On November 2008 CCI survey was ready to ask an external audit to certificate its QMS according to ISO 9001:2008 and ISO 20252:2006 standards. LSQA (associated to Quality Austria) was the accredited organisation contracted [5] to lead the certification audits.

Beginning by a pilot project in a small survey gives us all necessary feedback to make adjustments and generate know-how to implement easily the ISO 20252 into all NSI surveys.

## Implementation plan

We have developed an implementation plan whose success was truly proved into the pilot experience during 2008. This plan is currently used to implement a QMS into five statistical operations. Key features of the implementation plan are exposed as follows:

Annually NSI spends about 100 hours of quality training. Basically, training activities are: workshops on Quality in Statistics for all staff involved; courses of Introduction to ISO 9000 and ISO 20252 standards specially designed for quality facilitators and Course of Quality Management for managers.

Initial situation diagnosis was conducted based on DESAP [6]. The questionnaire was filled not like Eurostat proposes, but the answers were discussed and accorded by consensus into all survey staff. It helped to integrate people, transfer know-how between them and give different points of view about the survey issues.

A SWOT [7] analysis was done based on DESAP results and evaluations from survey employees.

Evaluation about gap between initial scenario and ISO 20252 requirements was followed up to make adjustments into the implementation plan.

## Quality Indicators & Reports

The Quality Indicators have been defined mainly based on Eurostat's SQI. In fact, they are a linkage of the quantitative quality indicators and DESAP key assessment questions using scales like DESAP approach.

An example of these quality indicators is the following scale defined to CV for key variables: more than 50% is 1) unacceptable accuracy – between 20% and 50% is 2) little accurate – between 10% and 20% is 3) reasonably accurate – between 5% and 10% is 4) accurate – less than 5% is 5) very accurate. Other example is the Rate of completeness of metadata information. Each component of metadata information has the following weight:

| | |
|---|---|
| Complete methodology of survey | 40% |
| Summary methodology and Metadata in SDDS format | 20% |
| Metadata in SDMX format | 20% |

5 Selected by public bidding
6 DESAP – European self-assessment check-list for survey managers (Development of a Self-Assessment Programme)
7 SWOT – Strengths Weaknesses Opportunities and Threats

Summary of Quality Report 10%

Quality Report (full version) 10%

Final percentage of completeness of these components is transformed to a 5 grade scale where 1 is less than 20%, 2 is more or equal than 20% and less than 40%, 3 is more or equal than 40% and less than 60%, 4 is more or equal than 60% and less than 80%, 5 is more or equal than 80%.

A Standard Quality Report was developed including detailed information about product and process quality and a table of quality indicators (Table 1) as summary.

***Table 1: Quality Indicators***

| DIMENSION | INDICATOR | WEIGHT | VALUE (*) |
|---|---|---|---|
| **Relevance** | Information available on user satisfaction (DESAP: V/2) | 0.10 | |
| | Overall relevance (DESAP: V/3) | 0.10 | |
| | User satisfaction index (survey) | 0.60 | |
| | Rate of available statistics | 0.20 | |
| | **Relevance (Total)** | **1** | |
| **Accuracy** | Over-coverage (DESAP: II/6) | 0.10 | |
| | Under-coverage (DESAP: II/7) | 0.10 | |
| | Misclassification (DESAP: II/8) | 0.05 | |
| | Necessity of editing (DESAP: IV/4) | 0.05 | |
| | Unit non-response (DESAP: V/15) | 0.20 | |
| | Item non-response (DESAP: V/18) | 0.10 | |
| | Appraise the coefficients of variation (DESAP: V/6) | 0.10 | |
| | Coefficient of variation (estimated for key variables) | 0.20 | |
| | Imputation rate | 0.10 | |
| | **Accuracy (Total)** | **1** | |
| **Timeliness & Punctuality** | Time lag between the reference period and the first publication of the preliminary or final results (DESAP: V/21) | 0.50 | |
| | Punctuality of time schedule of effective publication (DESAP: V/22) | 0.50 | |
| | **Timeliness & Punctuality (Total)** | **1** | |
| **Accessibility & Clarity** | Rate of completeness of metadata information for released statistics | 0.70 | |
| | Number of publications disseminated and/ or sold | 0.10 | |
| | Number of accesses to Web Site / Databases | 0.20 | |
| | **Accessibility & Clarity (Total)** | **1** | |
| **Comparability** | Comparability across non-geographical domains (DESAP: V/24) | 0.25 | |
| | Comparability over time (DESAP: V/25) | 0.25 | |
| | Length of comparable time-series | 0.50 | |
| | **Comparability (Total)** | **1** | |
| **Coherence** | Coherence of results of different frequencies (DESAP: V/27) | 0.50 | |
| | Coherence within same socio–economic area (DESAP: V/28) | 0.50 | |
| | **Coherence (Total)** | **1** | |

(*) 1-No at all satisfactory; 2-No satisfactory; 3-Satisfactory; 4-Very satisfactory; 5-Extremely satisfactory

## Quality Policy

Once quality indicators were defined a set of quality objectives were established based on them. Quality objectives (Table 2) are like quality requirements established by internal and, in some cases, external users that NSI must comply.

***Table 2: Matrix of quality policy deployment***

| SUBJECT | INDICATOR | MEASUREMENT | OBJECTIVES | ACTIONS TO BE TAKEN |
|---|---|---|---|---|
| User satisfaction | Satisfaction survey | Average of responses. | >= 4, before Aug-2009. | Make a Handbook and dictate seminars to explain users how to use the Index (CCI). Change the methodology and include more constructions typologies. |
| | Complains | No. solved complains / Total complains | >= 90%, before Aug-2009. | |
| Training | Training activities | Training hours / Total working hours | >= 5%, before Aug-2009. | Dictate introduction courses to new staff. Design new courses. |
| | Courses evaluation | No. Satisfied trainees / Total trainees | >=80%, before Aug-2009. | Conduct courses to trainers. |
| | Staff evaluation | Average of evaluations | >= 70%, before Aug-2009. | |
| Product & Process Quality | Relevance | Weighted Sum of Quality Indicators from Quality Report | >= 4, before Aug-2009. | Include more constructions typologies. Expand geographic scope. |
| | Accuracy | | >= 4, before Aug-2009. | Upgrade the base period and products. |
| | Timeliness & Punctuality | | >= 4, before Aug-2009. | Enhance processes in order to improve Timeliness and Punctuality. |
| | Accessibility & Clarity | | >= 3, before Aug-2009. | Improve NSI's Web page to allow a better access to the CCI information. |

| | | | | |
|---|---|---|---|---|
| | Comparability | | >= 4, before Aug-2009. | Keep comparability with time-series when methodology will change. |
| | Coherence | No apply in the CCI pilot experience. | | |

NSI Quality Policy is a general quality framework defined by Top Management based on mission and vision of NSI, laws, codes of practice, codes of ethics and ISO standards. Furthermore, a matrix of quality policy deployment (Table 2) was established to explain how quality objectives will be reached. So the aim is to assure that quality indicators are monitored and the achievement of quality objectives is assessed.

### Documentation of the Quality Management System

Excessive documentation required by ISO 9001 is a myth, since it is not necessary to document absolutely every process of the NSI. In fact, NSI itself should require its employees to prepare documents of each process with a detail level in accordance with activities to be done and who will execute them.

Survey Metadata are published based on standard SDDS [8] and SDMX [8] (ISO 17369) and DDI [8] standards are also used to document microdata information. A methodology document has been standardized to facilitate its use into all NSI surveys. This document has the same structure of ISO 20252 in order to assure that each element of the standard is taken into account. In accordance to ISO 9001 and ISO 20252 requirements, following documents have been prepared: document control procedure, records control procedure, processes documentation, control of non-conformance procedure, corrective and preventive actions procedure, internal audits procedure, quality policy and quality manual.

### Processes analysis and quality improvement

A macro processes map was drawn to visualize all main processes and its interactions. In deep analysis were carried out supported by processes flow-charts. Also, a basic set of key process variables for quality improvement was selected. Process control charts were systematically used to notice critical points and determine if process is in statistical control or out of control. Only three key variables were charted: non-response, coding accuracy rate and editing rate, but we aim to study more variables as a standard procedure in the future. Process redesign was finally developed in order to improve its efficiency and effectiveness.

### Quality Management System

Records of the QMS are the evidence that activities have been done and its results have been recorded. They are a key component of any QMS and are used to analyse results with the intention of improve the QMS and also to assure QMS is able to be audited. Quality Indicators are a special type of QMS records that are very important to monitor supported by software tools.

Other key elements of the QMS are: process control based on documentation, software tools and control charts. Measuring user satisfaction (user satisfaction survey, user complaints, user feedback). Management reviews. Every year, Top Management must review the QMS to ensure that it remains suitable, adequate and effective. Opportunities to improve and the need to change the QMS, quality policy and quality objectives are assessed during the review. Assessments of quality objectives achievement must be done during management review phase and internal audits.

Continuous improvement is not only conducted by Managers, but by all staff through analysing information contained in the records of the QMS.

### Internal Quality Audits

Once a year internal audits are conducted by three statisticians from other Units trained in quality audits. They assess conformity with ISO 9001 and ISO 20252, but not only that. Auditors also evaluate responses of DESAP questionnaire and any other opportunities to improve product and process quality.

### Certification

External Certification Audits do not assess if, for example, survey methodology (product design) is

8 SDDS – Special Data Dissemination Standard (FMI); SDMX – Statistical Data and Metadata Exchange; DDI – Data Documentation Initiative

appropriate, but do assess if any exists and it was defined following a procedure. External audits evaluate, for instance, if quality objectives (product quality requirements) have been already reached or there are proper plans that lead to achieve those quality objectives in an established period of time. ISO 20252:2006 allows certificating a QMS (survey process quality) but not the product quality itself. Indirectly, it certificates the quality of statistical product by assessment of quality objectives achievement as it was mentioned before.

## Software tools

We have used free software tools that gave us support to the implementation process:

Microdata Management Toolkit is a microdata & metadata documentation tool from International Household Survey Network. eGroupWare (egroupware.org) is an open source software useful to manage non-conformity product and some others ISO 9001 and ISO 20252 requirements. e-Form (e-Form Solutions: www.eform.com.uy) is a powerful software that integrates all survey processes like questionnaire design, data capture tool, data processing, questions bank, metadata & microdata documentation, quality indicators management tool, quality reporting, process administration & documentation, QMS support to facilitate ISO 9001 and ISO 20252 certification. It is free for NSIs.

## Conclusions

It is strongly recommendable to start by a pilot experience in a small survey which allows the project to be managed easily. Then Top Management should define the action plan to be followed based on results gained from the pilot test. Extrapolating pilot project to the rest of NSI surveys has involved writing a handbook on how to implement ISO 20252:2006 in the NSI *[Segui, Federico 2009]*. It has already begun on March 2009 and the rest of NSI areas will be incorporated in the next two years. On the other hand, it has a con that can be easily solved when extrapolating to the whole NSI or if you decide to include other areas in the certification scope. The disadvantage is that pilot survey must be treated like a complete organisation in order to comply with ISO 9001 and ISO 20252 requirements. Thus some support activities should be included as part of survey area duties like: training planning, employee profiles management, user satisfaction measurement and more, that generally concern to other NSI areas.

Towards certification in whole NSI at the first time may fail the project completely and disincline employees. It is very important that certification scope of that first survey covers all phases of survey productive process. In this way, it will be easily replicable into other NSI surveys.

We suggest implementing ISO 9001, ISO 20252 and ISO 27001 at the same time. ISO 20252 does not require an implementation or certification of QMS according to ISO 9001, but establishes as requirement implementing some kind of QMS into the organisation. Hence, implementing ISO 9001 is the best way to assure NSI has a QMS well implemented into the organisation. On the other hand, ISO 27001 is aligned with ISO 9001; both are complementary. They are focused on management systems. Both standards buscan la mejora continua de los sistemas de gestión de la organización a través de la eficiencia de los procesos mediante la prevención de errores, ya sean relacionados con la calidad o referidos a la seguridad de la información (integridad, disponibilidad y confidencialidad). Quality and information security are extremely related subjects into the organization's management system. Besides information confidentiality, information integrity and availability are key points of any management system. The organization's efficiency could be affected if the information is not available at the place and time that it is necessary. This situation may cause to re-process some tasks losing time and resources. The same scenario would be present if the information integrity is affected.

## REFERENCES

*Blyth, Bill (2006):* Independent, Transparent, Externally Audited: The ISO Approach to Survey Process Quality Control. Paper presented at the European Conference on Quality in Survey Statistics (Q2006), Cardiff, United Kingdom, 24-26 April 2006.

*Ehling, M. and Körner, T. (eds.)(2007):* Handbook on Data Quality Assessment Methods and Tools. Eurostat.

*Eurostat (2003a):* DESAP – Development of a Self Assessment Programme, The European Self Assessment Checklist for Survey Managers.

*Eurostat (2003b*): Standard Quality Indicators. ESS Working Group "Assessment of quality in statistics", Luxembourg, 23-24 May 2005.

*Eurostat (2009):* ESS Handbook for Quality Reports. Methodologies and working papers, Eurostat.

*ISO (2006):* Market, opinion and social research – Vocabulary and service requirements (ISO 20256:2006).

*ISO (2008):* Quality management systems – Requirements (ISO 9001:2008).

*ISO (2005):* Information security management systems – Requirements (ISO 27001: 2005).

*Segui, Federico (2009):* Handbook on how to implement ISO 20252:2006 in the NSI.