Quality in the european statistical system —
The way forward

eurostat

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1. Final Report of the Leadership Expert Group (LEG) on Quality

1.1. Introduction

We have witnessed a quality revolution in society during the last two decades. Successful organisations realize that continuous improvement is necessary to stay in business. Improvement implies change and successful organisations have developed measures that help them change. Statistical organisations are no exception. They, too, must have a number of quality strategies in place that are related to such factors as style of management, customer orientation, employee empowerment, scientific approach, understanding variation and distinguishing its causes, teamwork, and experimentation. Quality as an important concept is not new to statistical organisations. Quality in terms of accuracy is imperative and part of what statistics is all about. Many people working in statistical organisations have had problems appreciating the need for focusing on improving quality beyond accuracy, which is typically defined as the mean squared error of an estimate. However, like other businesses, statistical organisations need to work with a broader definition of quality since users are interested in more than the mean squared error. Users also need, in varying degrees, relevant, timely, coherent, accessible and comparable data as inexpensively as possible.

In 1999, Statistics Sweden proposed the formation of a Leadership Group (LEG) on Quality to attain improved quality in the European Statistical System (ESS). The ESS comprises Eurostat and the National Statistical Institutes (NSIs) associated with Eurostat, i.e. those organisations that are responsible for producing official statistics in the European Union. NSIs are organised differently in different countries, but to simplify the presentation we will refer to one NSI per country even though the responsibility for producing official statistics in some countries and for some areas is shared with other agencies and organisations. Two issues were explicitly mentioned in the proposal: Total Quality Management philosophies and Current Best Methods (CBM). Statistics Sweden had worked extensively in these areas for a number of years; other countries had shown interest in these areas as well. The main purpose of the proposal was, however, to let the LEG define its task in more detail and to provide a number of recommendations for the ESS regarding its quality work. The LEG was given such a relatively vague mandate because there was no self-contained overall description of quality work in the NSIs and Eurostat at the time of the proposal. It was felt that the LEG should make the choice of issues following discussions in the group and with other countries and after collecting data on quality initiatives in the NSIs and Eurostat. The LEG mandate also included a compilation of its main findings in the final summary report.

The SPC decided to set up a LEG on Quality along the lines outlined above at its meeting in Brussels on 11 March 1999. The LEG provided an interim report in Oporto on 31 May 2000, where the decision was taken that a draft final report should be presented at an International Conference on Quality in Official Statistics to be held in Stockholm on 14-15 May 2001. This would enable a discussion of the recommendations and other findings by a large international audience where other contributions on quality in official statistics would also be presented.

The LEG has met nine times. It has produced background chapters on:

☒ The Quality Framework

☒ The Position of Quality Work in the eight LEG countries and eight other so-called "network" countries

☒ Quality and Users

☒ Strengths and Weaknesses of the European Statistical System

☒ Data Quality

☒ Different Quality Management Models and their Interrelationships

☒ Assessment Tools

☒ Current Best Methods and Minimum Standards

☒ Documentation

☒ Dissemination of Information

☒ Implementation of Quality Management Models in NSIs.

During the course of its work, the LEG has felt the need for the ESS to agree on a common set of values and ideas on how to work with quality-related matters. Some NSIs have developed policy statements for their quality work, but there are no statements pertaining to the entire ESS. The LEG believes that policy might be too strong a notion for such a common set of values and ideas. Instead, the LEG has drafted a Quality Declaration consisting of a mission statement and a vision for ESS together with a number of principles or values for quality work in the ESS. *The LEG proposes that the SPC sign the declaration.* It is understood, of course, that the Declaration will be subjected to revision from time to time.

The background chapters were discussed at the above noted conference. The Summary Report and the Quality Declaration were discussed at a high-level meeting preceding the conference. All documents were subsequently revised and the final documentation of the LEG consisted of five parts: (1) The Summary Report, (2) the Quality Declaration (Annex 1), (3) the terms of reference proposed to an Implementation Group with the task of co-ordinating the implementation of the LEG recommendations (Annex 2), (4) a separate list of the LEG recommendations (Annex 3) and (5) the detailed background chapters covering the listed topics. The latter will be assembled in a separate volume.

The LEG was chaired by Statistics Sweden and included the other LEG member NSIs France, Germany, Italy, Greece, The Netherlands, Portugal and

the U.K. Two members from Eurostat attended. The remaining EU countries, together with Norway and Iceland, formed a "network" that was consulted at a LEG seminar held in October 2000. Network countries also had opportunities to comment on the LEG work on a more continuing basis. Their main information sources were the minutes from the LEG meetings and the discussions from the October seminar.

1.2.   Terms of Reference

The first task for the LEG was to establish the terms of reference. These were:

☒   to establish a framework for considering quality issues

☒   to identify key elements to be considered

☒   to obtain information on the status of these elements in the ESS

☒   to demonstrate with examples how improvements in NSIs and in the ESS could be made, and

☒   to propose future actions for the ESS.

One important part of the mandate given to the LEG by the SPC was to define its task in more detail. The LEG defined a total list of key elements that was much more extensive than foreseen in the original proposal by Statistics Sweden. A first list of key elements was produced at the first LEG meeting. This list was eventually supplemented with information from a survey that the LEG conducted among all EU countries (except Luxembourg) plus Norway and Iceland. In connection with the survey all network countries were visited by a LEG member to make sure that quality activities were reported as intended by the LEG. Each LEG meeting also devoted considerable time to detailed presentations of quality work in each LEG country. Thus, the list of key elements and good practices was gradually extended and discussed in the background chapters.

The survey and the presentations have revealed that important quality work is conducted in many of the countries. It is obvious that many examples of how improvements can be made are available from that information. The LEG has summarized knowledge on the key elements in the background papers and provided recommendations based on some of the findings. It is important to realize that there is a need for future actions associated with the recommendations. Therefore, the LEG proposes the creation of an implementation group (see Section 11).

1.3.   The Quality Framework

1.3.1.   The meaning of quality statistics

Quality has many meanings. In everyday speech, its synonyms range from luxury and merit to excellence and value. It is by no means easy to define, and any definition is likely to change over time as new aspects gain importance.

Brackstone (1999) points out that the quality concept has been overused to some extent and questioned because of its vagueness.

A few years ago, quality in the statistical context would usually have referred to the accuracy of the statistical product, which might have been measured by the "mean squared error". It may still have this meaning in some contexts. But this view of quality has gradually changed to encompass a wider set of attributes: relevance, accuracy, timeliness and accessibility. Comparability, coherence and completeness have been added following discussions in the context of the European Statistical System and other statistical systems.

This extended view of quality stems from a more general definition, in which quality is "the totality of features and characteristics of a product or service that bear on its ability to satisfy a given need" (ISO 8402 from 1986). This definition could imply covering the "service aspects" of quality, for instance, the extent and type of commentaries, analyses, helpful diagrams, and the agreeableness of the relationship with the NSI. Here the focus is even more on satisfying the user. Of course, different users have different needs and this complicates quality assessment.

Another often-quoted quality concept is "fit for purpose". This implies that the product need not be perfect in every way to meet a particular need. This is important since many desirable attributes are mutually exclusive in practice, especially where cost is a major consideration, as in services paid from tax revenues. Cost and "compliance cost" (the burden on respondents) are not usually considered to be quality attributes, but they need to be taken into account in the broader sense of "total" quality (see below).

The bottom line is that the concept of quality in statistical organisations has changed during the last decade. Thus, accuracy is no longer the sole measure of quality. Quality consists of a number of features reflecting user needs. In this setting, quality can be defined along a number of dimensions of which accuracy is one. All these dimensions constitute the product quality. Generally, the products we have in mind here are all types of statistics. For example, Eurostat's quality vector has the following components:

☒ Relevance of statistical concept
   A statistical product is relevant if it meets users' needs. Thus, users' needs must be established at the outset.

☒ Accuracy of estimates
   Accuracy is the difference between the estimate and the true parameter value. Assessing accuracy is not always possible due to financial and methodological constraints.

☒ Timeliness and punctuality in disseminating results
   This is an important dimension for many users, since it is so obviously linked to an efficient use of the results.

☒ Accessibility and clarity of information
   Results have high value when they are easily accessible and available in forms suitable to users. The data provider should also assist users in interpreting the results.

☒ Comparability
Reliable comparisons across space and time are often crucial. Recently, new demands for cross-national comparability have become common. This in turn puts new demands on developing methods for adjusting for cultural differences. Obviously, comparability is a necessary prerequisite for harmonised statistics.

☒ Coherence
Statistics originating from a single source are coherent in the sense that elementary concepts can be combined in more complex ways. Statistics originating from different sources, and in particular from studies of different periodicities, are coherent insofar as they are based on common definitions, classifications and methodological standards.

☒ Completeness
Domains for which statistics are available should reflect the needs and priorities expressed by users as a collective.

The documents describing this ESS quality vector in more detail are Eurostat (2000a, b).

Other organisations use slightly different sets of dimensions. Statistics Canada uses relevance, accuracy, timeliness, accessibility, interpretability and coherence, i.e. six dimensions (Brackstone 1999). Statistics Sweden uses five (Rosén and Elvers 1999). Typically, each dimension is further divided into a number of sub-dimensions. Recently, the International Monetary Fund has also started development of a framework for data quality assessment (see Carson 2001). There is, however, a very good convergence among these alternative frameworks.

It is quite obvious that the dimensions conflict with each other, as discussed by Holt and Jones (1998). For instance, timeliness is in conflict with accuracy since good accuracy generally takes time to achieve. Consequently, the various dimensions cannot be treated as if they were independent.

One important purpose of a quality vector is that it should make it easier for users to judge and compare the quality of statistical products. It is difficult to describe the status of each dimension so that this goal is accomplished.

Recommendation no. 1: Each NSI should report product quality according to the ESS quality dimensions and sub-dimensions.

1.3.2. How to achieve good product quality

The dimensions of <u>product quality</u> are discussed above. These dimensions are not always measurable in an objective and direct way. Often, proxy measures or qualitative assessments must be used. Thus, if we accept the existence of a set of dimensions and sub-dimensions, we inevitably have a vector where some components are quantitative and others are qualitative. Accuracy is quantitative but most other components are qualitative. A component such as timeliness and punctuality can be measured in quantitative terms, such as "three days late" or "estimates concern the population state eight months prior to the release date", but in essence, this component is also qualitative in nature. As far as we know,

there have been no successful attempts at calculating a total quality index. Instead, quality reports or quality declarations have been used that provide information on each dimension. For instance, a quality report might provide a description and assessment of quality based on information on user satisfaction, sampling and non-sampling errors, key production dates, forms of dissemination, availability and contents of documentation, changes in methodology or other circumstances, differences between preliminary results and final results, annual and short-term results, and annual statistics and censuses. Such descriptions typically cover the various dimensions with a varying degree of success. It is very common that quality reports emphasise what is known rather than what is not known. The calculation of a total quality index presupposes that quality components can be measured in a quantitative way and that weights can be assigned to the resulting assessments. Therefore, one should strive for the development of more quantitative measures for each component.

Work on standard quality reports is underway in several countries. Some examples are the development of business survey reports for French official statistics, the development of model quality report in business statistics in a SUPCOM project led by ONS, Sweden's rule stating that every survey in official statistics should be accompanied by a quality declaration, and the so-called quality profiles produced for some surveys and survey systems in the U.S. A quality profile is a collection of all that is known about the quality of the system. Quality profiles have been developed for U.S. surveys, such as the Survey of Income and Program Participation, the Annual Housing Survey, and the Schools and Staffing Surveys. The purpose of a quality profile is to summarize knowledge on the quality of data from the surveys and to provide information about design and procedures. Rather than following a standard set of quality dimensions, one simply lists what is known. The summary character is user-friendly in that the interested reader would otherwise have to research a large body of literature, some of it not readily accessible. References are provided for the interested reader (National Center for Education Statistics 2000 and Jabine et al. 1990). The problem with a quality profile is that it cannot be particularly timely since it compiles the results from studies of the quality. As noted above, such post-survey activities take time. The profile on U.S. school surveys concerns surveys carried out during 1987-1995. The profile strongly emphasises the accuracy dimension. A similar emphasis is found in the profile on the U.S. Survey of Income and Program Participation.

Knowledge of the quality level of products is imperative both for informing users and as a basis for prioritising improvement activities and measuring the effects of improvements. However, as noted above, measuring quality dimensions or components can be very difficult in many respects. For some components (e.g. coherence), there is currently a lack of adequate measures while for other components (e.g. accuracy) measures do exist but are difficult to calculate on a continuing basis. Despite the ongoing work noted above and the extensive work conducted by the Working Group on "Assessment of quality in statistics", we must conclude that the current level of measurement capability regarding quality dimensions is low. Recommendation no.1 is therefore justified only if it is linked with further development of the quality measures.

Recommendation no. 2: The measurability of each ESS quality dimension and sub-dimension should be improved.

Thus, the starting point is to measure. But in order to achieve good quality, measurement is not enough. We need to distinguish between the different types of quality.

The <u>product quality</u> is the quality of the output. We are referring to data quality and the quality of various kinds of services provided by the NSI. The product quality can be seen as a vector with components that can be measured (quantitatively or qualitatively, easily or with difficulty).

The product is generated by an underlying process. It is unlikely that the product will have good quality if the underlying process is not up to par. Therefore the concept of <u>process quality</u> comes into play. In theory, good product quality can be achieved through evaluations and rework. However, this is not a feasible approach since it is costly and time-consuming. Instead, it is believed that product quality will follow from improvements in process quality. A number of business processes are involved in the production of statistics and the key process variables or attributes generally differ from the key product characteristics. Process quality can be improved by applying, for instance, ONS's process design and continuous improvement cycle in:

- ☒ establishing requirements

- ☒ designing and implementing the production process

- ☒ operating the system

- ☒ disseminating the results

- ☒ re-establishing the requirements

The aims of process quality are to gain efficiency, effectiveness, robustness, flexibility, transparency, and integration. Various processes have an impact on product quality. For instance, user contacts are key aspects of establishing and re-establishing requirements. Processes like recruitment and development of staff skills can be viewed as parts of the operating system process. Concepts such as current best methods and minimum standards are part of the design stage. The process quality is improved by identifying key process variables (i.e. those variables with the greatest effect on product quality), measuring these variables, adjusting the process based on the measurements, and checking what happens to product quality. If improvements do not materialize, alternative adjustments are made or new key variables are identified and measured. This is an example of the so-called PDCA (Plan, Do, Check, Act) cycle advocated by the late Edwards Deming in the spirit of continuous improvement. The ONS cycle is clearly an adaptation of the PDCA cycle.

Recommendation no. 3: Process measurements are vital for all improvement work. A handbook on the identification of key process variables, their measurement, and measurement analysis should be developed.

The concept of Total Quality Management (TQM) takes these ideas a step further. It emphasises processes but covers wider aspects of the business, for example, customer focus, leadership and the importance of involving all staff. The objective of TQM and other quality systems is to enable the organisation to deliver products with a continuously improving quality.

There are numerous quality systems where an assessment of organisational performance provides a basis for improvement. TQM is a management philosophy, or way of working, based on a number of core values, such as customer orientation, leadership, participation of all staff, process orientation, teamwork, staff development, and continuous improvement. Different organisations emphasise different core values (as noted above). The main point is that organisations should abandon fragmented approaches for achieving good quality and embark on a more systematic approach.

All ESS members do not accept TQM as a concept. Furthermore, TQM does not offer any guidance to its practical implementation. But the idea of delivering good quality is, of course, universally accepted as is continuous improvement, measurements, experiments and user involvement. All NSIs must deliver products at low cost that can be used with confidence. Therefore, organisations must perform self-assessments in one way or another. One way is to use a business excellence model. Examples of such models are the Malcolm Balridge National Quality Award, the Swedish Quality Award and the European EFQM. These have been developed so that organisations can assess themselves according to these models' criteria. Examples of criteria include leadership, strategic planning, customer and market focus, information and analysis, human resources focus, process management, and business results.

In this assessment, the organisation must respond to three basic questions for each criterion: (1) Which approach or method is in place? (2) To what extent is this approach used throughout the entire organisation? (3) How is the approach evaluated and continuously improved? These might appear to be innocent questions, but that is not the case. The typical scenario is that all organisations have some activity that they use for each criterion, but it is not uniformly or even almost uniformly applied throughout the organisation, and it is evaluated very seldom. Instead, many organisations use ad hoc and local approaches with respect to improvements. Good procedures are not always transferred throughout the entire organisation. The good example does not spread automatically. As noted above, there must be a process of change. The assessments help reveal weak and strong points in the organisation. All business excellence models are based on a set of core values similar to those for TQM.

Other assessment tools are available, such as ISO certification, the balanced scorecard, and business process reengineering (BPR). Note that these tools vary greatly from each other, as discussed in the background chapter on this topic.

The LEG considered several models and concluded that there was little difference between them (with the exception of BPR). One business excellence model is EFQM, which is used by some statistical organisations and many

public administrations in Europe. The model consists of enablers (what the organisation does) and results (what the organisation achieves). The criteria for enablers are leadership, people, policy and strategy, partnership and resources, and processes. The results are people results, customer results, society results and key performance results. The fundamental concepts of the model are very similar to those in other excellence models, i.e. the organisation should strive for results orientation, customer focus, leadership and constancy of purpose, management by processes and facts, people development and involvement, continuous learning, innovation and improvement, partnership development, and public responsibility.

Recommendation no. 4: All organisations in the ESS should adopt a systematic approach to quality improvement. ESS members should use the EFQM excellence model as a basis for their improvement work except for those already using a similar model.

1.3.3. Relationship with respondents and other data suppliers

Producers of official statistics cannot do their job unless they have a good relationship with those who supply the data. There are two kinds of data suppliers in official statistics production, namely regular respondents and intermediaries. Suppliers of data for official statistics usually differ from suppliers in most other businesses. In most other businesses, suppliers compete and are compensated for their efforts. This is not the case in official statistics. Respondents are not standing in line offering their input. Instead, producers of official statistics must take measures to compel suppliers to cooperate and participate. The reluctance of the suppliers has three general consequences: non-response, late response, and measurement errors.

All three consequences affect data quality, but to some extent, they can be dealt with in similar ways. Many statistical organisations emphasise the importance of building trust by providing confidentiality pledges, by creating Statistical Acts that regulate the relationships with the suppliers, and by adhering to existing ethical guidelines (for instance, those developed by the International Statistical Institute, see International Statistical Institute (1986) and Jowell 1986)). It is important not to unnecessarily burden the suppliers. This can be done by being restrictive when investigating sensitive topics and by keeping the number of questions to a reasonable level. Sometimes society's interest is so strong that sensitive topics and a large number of questions cannot be avoided. In these cases, various forms of incentives can be used to encourage response; thereby creating an environment that resembles that found in other businesses where effort is compensated. There are also other ways to stimulate survey participation that are worth exploring (see Groves and Couper 1998).

In recent decades, most NSIs have experienced increasing problems gaining cooperation from respondents. The non-response rate is the most visible indicator of this state of affairs. Non-response rates have increased considerably in many countries and for various products, but the increase is not solely an effect of a decreased willingness to participate. Much non-response is a result of increased difficulties in establishing contact at all due to the increased mobility in human populations and rapid and complex changes in

business populations. It is probably fair to say that people and businesses are less survey-minded than they were 20 years ago. For most suppliers, the pressure to supply information has increased greatly since then and statistics are just a small part of that pressure. Nevertheless, some businesses have a rule not to engage in non-mandatory statistical data collections. Obviously there is a need to strengthen ties with our data suppliers by emphasising the role of statistics in society, but we should also make sure that they receive feedback to this effect after data collection is finished. It is important that we make life as easy as possible for suppliers by reducing the burden and ensuring that data are used in the ways previously conveyed to them. There are also a number of practical design steps that can be taken to reduce burden. Examples are efficient sample design, effective questionnaire design, avoiding redundant data collection, and sharing the respondent burden fairly among data suppliers. It is also important to offer, if possible, collection modes that fit the suppliers' preferences. However, to build trust we need to know more about how suppliers view their roles in the production of official statistics.

Recommendation no.5: NSIs should strive to improve their relationships with data suppliers, and research should be conducted on how data suppliers perceive their task. A special emphasis should be placed on issues that involve a decrease of the respondent burden and enhance suppliers' awareness of the role of statistics in society.

1.4. Quality and Users

One of the key principles of quality management in official statistics is user orientation (Brackstone 1993). The types of users are, however, manifold and the relationship between users and producers is very complex. This is particularly true for official statistics. Therefore, user orientation requires much greater attention and will certainly be one of the main fields of interest in coming years.

One important reason for the great variety of user types lies in the fact that statistical information (as the main product of NSIs) must be provided as a public good (informational infrastructure for democratic societies) and as a private good (tailor-made analyses demanded by individual customers). Different types of users with different and (partly) conflicting requirements correspond to this distinction (Linacre 2001). In this respect, statistical products differ from many other products on the market.

In addition to the diverse and partly conflicting needs of users, the relationship of the producer with each single user is very complex. An intensive dialogue between user and producer must be established to achieve an optimal solution. In this user-producer dialogue, the user and producer negotiate and define the statistical system comprising the statistical programme as well as the product characteristics and processes. The user-producer dialogue should also cover the interpretation of statistical figures.

Despite the inherent difficulties, an enhanced direct or indirect integration of users in the planning process is imperative to increased quality. Various

instruments can be used to establish an effective user-producer dialogue so that users can play a more prominent role in the planning and development of surveys. These instruments include the following:

- ☒ statistical councils, i.e. institutions where experts external to the statistical institution discuss the general development of the statistical programmes;

- ☒ user-producer groups (e.g. sub-committees of statistical councils that treat problems in specific statistical areas);

- ☒ customer surveys exploring the needs of a large group of users;

- ☒ formalised agreements between producers and important key users of statistics (e.g. Service Level Agreements in the UK Office for National Statistics);

- ☒ research in the social sciences on the different uses of statistics;

- ☒ cooperation with partners in the social sciences and economics, as well as in market research;

- ☒ programmes promoting user awareness of quality characteristics and possible uses of statistical figures.

In the ESS, the statistical councils and their sub-committees are currently the most important institutions seeking to integrate users in the process of review and improvement of statistics. Statistical councils exist in nearly all European NSIs as well as at Eurostat. They have often existed for decades.

Typically, two types of councils can be distinguished: the "independent expert" type and the "interest group" type. The functions assumed by the councils can vary. Of course, the overall task is to review a statistical programme. But councils can have responsibilities beyond that, including priority setting, the auditing of product quality and establishing quality requirements.

The customer satisfaction survey is an important tool to detect user needs, and potentially user feedback could be integrated into the planning process of official statistics. A brief look at the current situation in Europe shows that very few NSIs use customer satisfaction surveys on a systematic and regular basis. A large majority of NSIs use customer satisfaction surveys occasionally, but many indicate a desire to introduce them on a larger scale in the future. The methodology for these surveys is still in its infancy, and there are severe methodological problems relating to frames, satisfaction concepts, scales, and non-response.

Another instrument worth noting in this context is the so-called Service Level Agreement used by the Office for National Statistics in the United Kingdom. The ONS has put into place a set of "concordats" and "service level agreements" to describe the roles and responsibilities in the customer - supplier relationships. Concordats operate as comprehensive agreements regarding statistical services and products covered by several service level agreements. Such a concordat exists, e.g. between the ONS and Her Majesty's Treasury.

As an example, the Service Level Agreement between ONS and the Bank of England describes the services, performance standards and arrangements

governing the supply of information by the ONS to the Bank of England and the UK Monetary Policy Committee. The agreement is not a legally binding contract. Rather, it seeks to present a clear understanding of the services that the ONS will provide and specific performance levels to be achieved. The agreement is publicly available and includes issues related to coverage, parties and contact points, consultation and review, services provided by the ONS, obligations of the Bank of England, targets and indicators, costs, and signatories. This agreement will automatically serve as a quality checklist.

A recurring problem in the user-producer dialogue is the general lack of a good understanding among users of the quality problems associated with the production of official statistics and survey data. Many sources of error and their effects are not well understood by users. ESS members should promote an enhanced awareness of the quality characteristics and the strengths and weaknesses of statistics produced in the ESS.

Recommendation no. 6: ESS members should develop service level agreements for their main programmes.

Recommendation no. 7: A development project regarding the design, implementation and analysis of customer satisfaction surveys should be initiated.

Recommendation no. 8: Each ESS member should provide a report regarding the present status of its user – producer dialogue including descriptions of any user involvement in the planning process. Good practices in promoting user awareness of quality problems should be collected and made available to ESS members.

1.5. Strengths and Weaknesses of the ESS

The LEG has conducted an inventory of strengths and weaknesses of the ESS. The purpose was to advise on any areas in need of improvement. It might seem odd that the conclusions include some of the strengths as areas in need of improvement. However, sometimes it is vital to develop the strengths of a system further, which is the case here. All the identified strengths and weaknesses do not carry the same weight. The most important ones should be dealt with first, and the Pareto principle applies in this context.

The LEG has provided an extensive listing in the background chapter dealing with strengths and weaknesses of the ESS. The LEG has chosen a number of areas that it finds to be most important <u>and</u> which are under the control of the ESS, at least to a large extent. These are:

☒ Strengths that need further improvement:
. The ESS encourages a culture of partnership and willingness to learn from others.
. Systematic quality work has started in Eurostat and most NSIs.

☒ Weaknesses that need immediate attention:

. There is no overall and consistent long-run set of priorities in the system
. The effectiveness and coordination of working parties and task forces at the European level must improve.
. There are deficiencies in coordination in Eurostat and in the NSIs
. Timetables for data production at the national level are sometimes unrealistic.
. There are difficulties related to the exchange of staff between NSIs and Eurostat and between NSIs.

The work undertaken by the LEG suggests that further in-depth analysis is needed to reach firm conclusions and to serve as a basis for a future plan of action.

Recommendation no. 9: An in-depth analysis of the most important ESS strengths and weaknesses should be conducted. An action programme should be developed based on the findings of this analysis.

1.6. Current Best Methods and other Standardisation Tools

The initial LEG proposal contained a specific mandate to recommend practices regarding the development of CBMs on a large scale in the ESS. The basic thought was, and still is, that CBMs help reduce the unnecessary variation associated with the performance of many processes.

Variation in approach leads to variation in product characteristics or to some variants becoming more expensive than others. An increased standardisation has many advantages. It facilitates documentation, the induction of new employees, internal rotation of staff, the introduction of process changes, and the adoption of new solutions developed by those who share the same process. The obvious effect is an efficiency gain in quality assurance.

The initial proposal simply stated that the LEG should identify which processes were suitable targets for CBM development and how such development work should be organised. The proposal also emphasised the need for minimum standards for survey work in the ESS.

While acknowledging the large variation in the quality of statistical products and processes in the ESS, the LEG quickly recognized some formidable challenges in tackling the issues in the proposal. The LEG agreed that it was presently not feasible to construct and maintain CBMs at the ESS level, partly because "best" would be too restrictive. Minimum Standards presented similar difficulties and the prospect of unproductive controversy. Instead, the LEG decided to discuss two other concepts, Quality Guidelines and Recommended Practices. These concepts seemed to be more feasible on an ESS level. The Quality Guidelines constitute what to consider doing, while Recommended Practices state how to do it. CBMs and Minimum Standards still have their place, but on a more local NSI level.

These concepts are defined below:

- ☒ CBM is a description of the best methods available for a specific process, such as editing or non-response reduction. Administrative processes are also eligible.

- ☒ Minimum Standards specify the absolutely necessary criteria to be met when performing a certain part of the production process. They are defined in terms of design requirements rather than product characteristics. Examples of minimum standards include known selection probabilities and lower and upper limits for an average interviewer workload.

- ☒ Quality Guidelines represent generally accepted principles for the production of statistics. They also provide guidance as to what is considered important and less important regarding effects on the product quality. But the programme manager and his/her team are free to make the final choices.

- ☒ Recommended Practices are a collection of good methods from which the planning team can choose. Clearly, the methods of a CBM would be a subset of recommended practices.

These concepts provide guidance on how to best produce the statistics. Experience tells us that there is a great need for these kinds of documents. In the past, this need has manifested itself in various ways. For instance, organisations like the UN and FAO have produced handbooks on design aspects. Another example is the need for technological transfer between countries, i.e. one country helps another improve its production and methodological skills. A third example is the minimum standards that have been developed for some international surveys to enable country comparisons with reasonable quality. The set of agreed minimum standards takes a form that resembles a service level agreement.

In our survey of LEG and network countries we noted that some methodology areas are less developed than others in terms of tools being in place to assure quality. Our survey particularly revealed that tools for reduction of measurement errors, testing questions, conducting customer surveys, and reducing coverage errors are lacking. Therefore these problem areas seem to be good candidates for the development of Recommended Practices on the ESS level.

Recommendation no. 10: NSIs should develop CBMs for their most common processes. A handbook for developing CBMs covering construction, dissemination, implementation and revision of CBMs should be developed. Existing and relevant CBMs should be collected and distributed in the ESS.

Recommendation no. 11: A set of recommended practices for statistics production should be developed. The work should start by developing recommended practices for a few areas followed by a test of their feasibility in the ESS.

1.7. Dissemination of Information

Better dissemination of information is a crucial element of quality improvement in the ESS. It is clearly important that information is managed well. The LEG has compiled a set of good practices for use at different levels, such as within and between statistical agencies (in a broad sense), between NSIs and Eurostat, between NSIs and international organisations such as the UN, OECD, ILO, IMF and FAO, between Eurostat and the same international organisations, and between NSIs (including Eurostat) on the one hand and data providers, users, academic institutions and statistical firms on the other.

A summary of the different types of information with a particular view to the needs of the ESS has been compiled in the background chapter on dissemination of information.

The current ESS database should be supplemented with information on all Eurostat working parties and task forces, their members, terms of reference, starting date, meeting dates, agendas and minutes and perhaps other documentation.

The LEG has found that there are no European statistical meetings devoted to official statistics that resemble the meetings organised by the American Statistical Association. Meetings organised by ESS and organisations working for ESS tend to be ad-hoc. There is a need for a regular forum that
can bring together people from all relevant statistical disciplines to the ESS. Short courses could be offered in connection with such a conference. This activity could preferably be linked with existing European conferences such as DGINS.

Recommendation no. 12: ESS members should use the list of current good information management and dissemination practices compiled by the LEG and consider actions for internal use.

Recommendation no. 13: The user needs of the current ESS information system should be reviewed and Eurostat's current database expanded accordingly. Guidelines regarding the future management of the information system should be developed.

Recommendation no. 14: A biennial conference covering any methodological and quality-related topics of relevance to the ESS should be organised.

1.8. Assessment Tools

The LEG has recommended NSIs to use the EFQM model as one way of assessing the performance of the organisation. EFQM is a tool for self-assessment, even though help from experienced quality award examiners will enhance the quality of the assessment. Another type of self-assessment is to use simple quality checklists. This is an approach used, for instance, by Statistics Netherlands, by the ONS, and by Statistics New Zealand. Such checklists are typically focused on the statistical processes and products. Working with the actual processes and products increases the awareness of quality issues and

reveals areas in need of improvement. Examples of items that can be part of such a checklist are (examples taken from Statistics New Zealand):

- ☒ The programme has a good understanding of who the key users are and emerging new stakeholders.

- ☒ Documentation is complete and accessible

- ☒ Data definitions are consistent

- ☒ The sample is regularly redesigned

- ☒ Seasonal adjustment analysis is performed

- ☒ Release dates are advertised in advance

- ☒ Standards for time taken to meet requests are met

- ☒ Releases are checked for confidentiality

- ☒ Indicators of quality are regularly measured and monitored

- ☒ Requirements of the Statistics Act are met

This kind of checklist can be developed by introducing follow-up questions containing such key words as when, how, etc. These follow-up questions make it almost impossible to provide too bright a picture of the current situation. Typically, checklists of the kind described above are suited for specific products or programmes, while EFQM or other models are suitable for assessing the whole or parts of the organisation.

Self-assessment is a first step. The second step is to bring in assessors from the outside, either from other parts of the NSI or external experts. Internal audits are also becoming more frequent as are external audits. Statistics Netherlands uses a system of audits for evaluating the quality of the statistical production process and its results. The standard for these audits is a provisional quality guideline. Every five years, each programme in the agency will undergo such an audit by special independent audit teams taken from a pool of approximately 40 trained auditors. The programme must present a plan of improvements to the Director General based on the audit. Not surprisingly, the audits have revealed a number of common shortcomings that are probably fairly familiar to other agencies as well. For instance, there is inadequate interagency cooperation and communication, insufficient methodological skills, unclear tasks and responsibilities, and doubts about the overall quality of the products.

External reviews have taken place, for example in Statistics Netherlands and in the Swiss National Office. Typically, such reviews must be concentrated to a few days. Nevertheless, an external scrutiny can quickly reveal the most problematic areas and come with proposals. A suitable review period can be three days up to a week.

It is important to involve staff in the assessment process. Continuing staff surveys can be used to assess changes in the "climate" of the organisation. They can also shed light on how well the corporate plan and other initiatives are functioning. Furthermore, staff suggestions for improvements can be sought via the questionnaire and other indicators. It is important that management undertakes such action and reacts to any staff perceptions.

Recommendation no. 15: A generic checklist should be developed for a simple self-assessment programme for survey managers in the ESS.

Recommendation no. 16: The methods for auditing on different levels and for different purposes such as internal, external, one point in time, continuing or rolling, rapid, and more extensive (such as EFQM assessment) should be reviewed and recommendations should be provided to the ESS.

Recommendation no. 17: ESS members should study staff perception. One way to do this is to conduct staff perception surveys.

1.9. Documentation

Documentation has two main purposes: (i) to ensure and improve quality and (ii) to facilitate the understanding and use of data.

It should be noted that documentation concerns all activities carried out in the ESS, among which we distinguish the production of statistical information and other processes that support this activity (e.g. administrative procedures). With regard to statistical activity, it is important to have adequate documentation concerning the production process and data. Documenting the production process involves documenting all steps of the activity from the planning phase to the data dissemination phase.

Producers need detailed documentation so that an alternate staff can reproduce a process. In general, users are particularly interested in the information content of the statistical product. Extensive documentation is required to satisfy the different levels of information needs since there are different kinds of users and even producers. The actual documentation should consist of metadata on the production process and the information content, quality measures and indicators concerning the product, and data on the producing organisation's strategies, policies and user relationships.

Most NSIs have problems finding resources for documentation and its associated costs. Thus, there is a need to find means for facilitating the documentation activity, such as information systems that enable the reuse of produced information, providing support to people in this activity and helping standardise the documentation activity. These tools will also make the documenting process cheaper in the long run.

Learning from failures is also valuable to avoid repeating the same mistakes even if there might be a certain resistance towards documenting negative experiences.

Recommendation no. 18: ESS members should analyse their documentation status in a report. The report should include an action plan with clear priorities for improvement and a timetable.

Recommendation no. 19: Each ESS member should make publicly available documents describing its mission statement, dissemination policy and quality policy.

1.10. Implementation of Quality Management Systems

All NSIs and Eurostat need to work with quality issues in a systematic way. The LEG has indicated a number of methods and strategies that can be used. These methods and strategies cannot be uniformly applied across the ESS. The varying circumstances in terms of legal frameworks, funding, methodological resources and cultural differences make a uniform approach impossible. But there are some aspects that apply to all ESS members despite these differences. These aspects are:

☒ The existence of customers or users. They should be more involved in the planning and production of statistics. Their involvement automatically leads to an increased relevance of what is being produced. The LEG has indicated a number of ways to improve user-producer relationships.

☒ There is a process behind each product. Streamlining and standardising processes lead to increased product quality. The LEG has pointed to methods like CBMs, measurements, documentation, and experiments to achieve this.

☒ Quality work is relevant for all levels of the organisation. Everybody, from top management down, must be committed to quality.

☒ Continuous improvement is a survival issue for the ESS. If quality, in a broad sense, is not achieved, then others will take over or statistics will lose their role as a basis for decisions.

Studies find that the implementation of a quality management system, which can take many different forms depending on each organisation, is a long-term commitment. The status report on activities in NSIs and the examples provided in the background LEG chapters show that most NSIs already have more or less developed quality assurance systems in place. What is lacking is a systematic approach. In addition, there are obstacles to excellence such as staff resistance, reluctance or reservations on the part of top or middle management (top or middle management might have delegated all quality work), insufficient resources devoted to change, insufficient communication in the organisation, or lack of clarity in the organisation's goals and objectives.

The following are important steps for setting up and implementing a quality management system.

☒ Leadership defines objectives for the organisation. Objectives should be supported by a vision, a mission statement and a number of core values.

☒ Staff is well motivated and committed to the main quality ideas. An infrastructure allowing staff to actively contribute to increased quality is established.

☒ The implementation must be viewed as an investment. Investments are expected to pay off, but initially they are costly. The organisation must be willing to find resources to make the initial investment.

☒ There must be an organisation for the quality work.

☒ There is a need for an initial evaluation of the quality status in the organisations. The LEG has described a number of tools for an evaluation. The evaluation is necessary to establish the starting point (the benchmark) and to identify areas with the most urgent need for improvement.

☒ The organisation's main processes must be identified and subjected to evaluation and improvement.

☒ All staff should be trained in quality issues. Some staff should receive more specific training so they can serve as quality facilitators.

☒ The effects of the quality efforts should be monitored and evaluated. As a result, changes in 1-7 above might become necessary.

Recommendation no. 20: All staff should be trained in quality work with different types of training programmes for different types of staff. Each ESS member should develop a training programme. Training on a European level should be enhanced.

Recommendation no. 21: A biennial quality award in official statistics should be established. The award could be given to a single improvement project team, for an innovative idea, to a well-performing ESS organisation or to a statistical programme team.

1.11. Implementation

The LEG has provided a number of recommendations. The recommendations are of two types. One set of recommendations is directed to individual ESS members. The other consists of recommendations where some kind of development work or common action is needed. There is a need for an Implementation Group with the task of collecting information and coordinating recommendation activities. The LEG has drafted terms of reference for the Implementation Group and these are found in Annex 2. The Implementation Group can be viewed as a Quality Advisory Group to the SPC and should be chaired by Eurostat. The Implementation Group should cooperate, when necessary, with the Working Group on "Assessment of quality in statistics". It should be stressed that the success of implementation depends on active participation from ESS members. For the first type of recommendations, the Implementation Group merely collects information on activities undertaken; but for the second type, the group will lead and coordinate the recommended work.

Recommendation no. 22: There is a need to establish a LEG Implementation Group that coordinates the activities generated by recommendations approved by the SPC.

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Quality Declaration of the European Statistical System

The mission of the European Statistical System

"We provide the European Union and the world with high quality information on the economy and society at the European, national and regional levels and make the information available to everyone for decision-making purposes, research and debate."

The vision of the European Statistical System

"The ESS will be a world leader in statistical information services and the most important information provider for the European Union and its member states. Based on scientific principles and methods, the ESS will offer and continuously improve a programme of harmonised European statistics that constitutes an essential basis for democratic processes and progress in society."

To realize this mission and vision, the members of the European Statistical System strive for joint cooperation according to the following principles:

☒ User focus
   We provide our users with products and services that meet their needs. The articulated and non-articulated needs, demands and expectations of external and internal users will guide the ESS, its members, their employees and operations.

☒ Continuous improvement
   The needs and demands of users will change as will the environment we operate in. Globalisation and advances in methods and technology will avail new possibilities. It is imperative that we actively strive to improve our work methods to take advantage of the new possibilities and to better meet the demands of our users.

☒ Product quality commitment
   We produce high quality statistical information according to scientific methods in accordance with objectivity and confidentiality. We provide information on the main quality characteristics of each product so that users are able to assess product quality.

☒ Accessibility of information
   We provide statistical results in a user-friendly and accessible form. Utilizing the possibilities of new media ensures easy access to the information. As far as possible, we will enhance user awareness of the

strengths and limitations of the produced statistics. Consulting on how to use data is an integral part of dissemination.

☒ Partnership within and beyond the European Statistical System
The cooperation between current and future members of the ESS as well as with other organisations will be encouraged. Only by working together, can we learn from others and gradually develop our system. The broad knowledge of staff and our users, suppliers, partners and other parties must be combined for us to excel in our purpose.

☒ Respect for the needs of data suppliers
The suppliers of data for statistics – the respondents – are an especially important group with which a mutually rewarding partnership must be established. The producers of statistics should strive to always minimise the respondent burden, both the objective and the perceived burden.

☒ Commitment of leadership
The leaders of the organisations in the ESS exercise a personal, active, and visible leadership to create and sustain a culture of quality. By providing a clear overall direction, prioritising improvement activities and stimulating empowerment and innovation, leaders enable the staff to perform a successful job and to continuously strive for improvement.

☒ Systematic quality management
We systematically and regularly identify strengths and weaknesses in all relevant areas to continuously identify and implement improvements where needed. A long-term strategic orientation is vital for the development of the ESS. The long-term effects in all situations must be considered with the more obvious short-term effects.

☒ Effective and efficient processes
ESS activities should be seen as processes that create value for the users. We work efficiently to produce output with as little resources as possible and to prevent errors in the processes and products. The processes and their quality are continuously reviewed and improved.

☒ Staff satisfaction and staff development
To attract and keep competent staff, it is vital to satisfy staff needs. The ESS members should treat their employees as the key resources they are.

Terms of References for the LEG Quality Implementation Group

1. Introduction

The Leadership Group (LEG) on quality has produced its final report. The core of the report consists of some 20 recommendations, which refer to individual ESS members and to further studies with possible implications for the ESS as a whole. The LEG Quality Implementation Group will closely follow the implementation of the recommendations and particularly concentrate on the recommendations that require study.

2. Features of the LEG Quality Implementation Group

☒ In order to guarantee the continuation of the LEG work, the members of the implementation group should consist mainly of LEG members. A few new members might come from the LEG network group and perhaps from a regional statistical office to cover this aspect of the ESS. The overall size of the implementation group should not exceed 10 members.

☒ The group reports once a year to the SPC on progress in the implementation of the recommendations developed by the LEG.

☒ The group exists for two years. The SPC can prolong its mandate.

☒ The group tries to work through virtual meetings.

☒ English is the working language of the group.

☒ The group closely follows the implementation of all recommendations of the LEG as finally agreed to by the SPC in its meeting of September 2001, hereby following in particular the proposed study work. This task includes in particular:

- Development of an overall action plan for all studies, including a timetable. The action plan should establish priorities in case not enough resources are available to conduct all studies at the same time;
- Preparation of task descriptions for individual studies, including a time table and cost estimates;
- Follow-up of the study results;
- Preparation of the annual report to the SPC;
- Collection of necessary information for the annual report to the SPC;
- Support in the dissemination of LEG work results.

☒ The NSIs carry out the study work as far as possible with financial support from the European Commission (Eurostat). The financial opportunities of each budget year of the European Commission limit the extent and number of the studies.

Annex 3

List of LEG on Quality Recommendations

Recommendation no. 1: Each NSI should report product quality according to the ESS quality dimensions and sub-dimensions.

Recommendation no. 2: The measurability of each ESS quality dimension and sub-dimension should be improved.

Recommendation no. 3: Process measurements are vital for all improvement work. A handbook on the identification of key process variables, their measurement, and measurement analysis should be developed.

Recommendation no. 4: All organisations in the ESS should adopt a systematic approach to quality improvement. ESS members should use the EFQM excellence model as a basis for their improvement work except for those already using a similar model.

Recommendation no.5: NSIs should strive to improve their relationships with data suppliers, and research should be conducted on how data suppliers perceive their task. A special emphasis should be placed on issues that involve a decrease of the respondent burden and enhance suppliers' awareness of the role of statistics in society.

Recommendation no. 6: ESS members should develop service level agreements for their main programmes.

Recommendation no. 7: A development project regarding the design, implementation and analysis of customer satisfaction surveys should be initiated.

Recommendation no. 8: Each ESS member should provide a report regarding the present status of its user – producer dialogue including descriptions of any user involvement in the planning process. Good practices in promoting user awareness of quality problems should be collected and made available to ESS members.

Recommendation no. 9: An in-depth analysis of the most important ESS strengths and weaknesses should be conducted. An action programme should be developed based on the findings of this analysis.

Recommendation no. 10: NSIs should develop CBMs for their most common processes. A handbook for developing CBMs covering construction, dissemination, implementation and revision of CBMs should be developed. Existing and relevant CBMs should be collected and distributed in the ESS.

Recommendation no. 11: A set of recommended practices for statistics production should be developed. The work should start by developing recommended practices for a few areas followed by a test of their feasibility in the ESS.

Recommendation no. 12: ESS members should use the list of current good information management and dissemination practices compiled by the LEG and consider actions for internal use.

Recommendation no. 13: The user needs of the current ESS information system should be reviewed and Eurostat's current database expanded accordingly. Guidelines regarding the future management of the information system should be developed.

Recommendation no. 14: A biennial conference covering any methodological and quality-related topics of relevance to the ESS should be organised.

Recommendation no. 15: A generic checklist should be developed for a simple self-assessment programme for survey managers in the ESS.

Recommendation no. 16: The methods for auditing on different levels and for different purposes such as internal, external, one point in time, continuing or rolling, rapid, and more extensive (such as EFQM assessment) should be reviewed and recommendations should be provided to the ESS.

Recommendation no. 17: ESS members should study staff perception. One way to do this is to conduct staff perception surveys.

Recommendation no. 18: ESS members should analyse their documentation status in a report. The report should include an action plan with clear priorities for improvement and a timetable.

Recommendation no. 19: Each ESS member should make publicly available documents describing its mission statement, dissemination policy and quality policy.

Recommendation no. 20: All staff should be trained in quality work with different types of training programmes for different types of staff. Each ESS member should develop a training programme. Training on a European level should be enhanced.

Recommendation no. 21: A biennial quality award in official statistics should be established. The award could be given to a single improvement project team, for an innovative idea, to a well-performing ESS organisation or to a statistical programme team.

Recommendation no. 22: There is a need to establish a LEG Implementation Group that coordinates the activities generated by recommendations approved by the SPC.

2. Quality Framework for the European Statistical System (ESS)

Summary

The purpose of this Chapter is to set out the quality management framework for the European Statistical System (ESS). The Chapter covers concepts and definitions relevant to quality and quality management. It discusses total quality management, process and data quality management and also quality measurement and reporting. Continuous improvement in statistics and services, measurement of data quality standards against the criteria of relevance, accuracy, timeliness and punctuality in disseminating results, accessibility and clarity of results, comparability, coherence and completeness are also discussed. It also discusses how model frameworks such as the European Foundation for Quality Management Model (EFQM) can be used in statistical organisations and what benefits this approach brings about.

2.1. Introduction

Any organisation committed to delivering quality and business excellence in its products and services needs to have not only a strong commitment to its goals but also a practicable quality management framework for achieving the objective of becoming recognised as a quality organisation. This paper discusses such a framework for the European Statistical System (ESS). The paper serves as a point of reference for describing the relevant concepts, definitions, models and other elements of the future quality management framework.

2.2. The Meaning of Quality

'Quality' has many meanings. Its perceptions range from luxury and merit to excellence, good value for money or convenience and even practicability. It is clear that quality is not easy to define. Perceptions and needs are likely to change over time, as new aspects gain importance. Quality is also a multi-faceted concept. The attributes of quality which are particularly relevant often depend on user needs and priorities and can vary between users or user groups, even within the same organisation.

The concept of quality is frequently described as 'fitness for purpose'. A better understanding of the term is essential if quality is to have a strategic role. This is difficult to achieve with absolute precision, as there is a very wide range of competing perspectives, supported by different analytical frameworks, terminologies and definitions. Nevertheless, there is agreement on some important points. These include consensus that quality has to be related to user needs and satisfaction, recognising that different users may

have different needs and perspectives. It is also possible to identify key dimensions or attributes of quality as a framework for analysis.

A list of such attributes has been developed by National Statistical Institutes (NSIs) in Member States and by Eurostat in relation to <u>data quality</u> in the ESS. The list comprises relevance, accuracy, timeliness, accessibility, comparability, coherence and completeness. In the international context comparability may be more important than some of the other attributes. This definition of attributes of quality relates to '<u>data quality</u>', that is <u>quality of the statistical products</u>.

2.3. Definitions of Quality

In the context of official statistics, some years ago 'quality' would usually have meant the accuracy of statistical products (i.e. data outputs) which might be measured by the mean squared error. In some contexts it still can have this meaning. However, this view of quality of statistical products has broadened in recent years.

The Leadership Expert Group has reviewed the existing literature on definitions of quality and considered the merits of different approaches and their applicability to the work of National Statistical Institutes (NSIs). It concluded that customer focus, expertise in statistical methodology, particular aspects and attributes of the statistics and customer satisfaction are especially relevant in this context.

Among the formal definitions of quality, which currently exist, the Group considered the International Standards Office (ISO) approach to be most appropriate. This defines quality as "the totality of features or characteristics of a product or service that bear on its ability to satisfy stated or implied needs of customers". The Group considers that this definition is appropriate both to statistical products and to statistical services.

2.4. Total Quality Management

Total quality Management (TQM) can be considered as a management philosophy, aiming at managing a business with a focus on the overall quality of its products and services. It is defined through a number of core values. It is not defined in absolute terms, and forms the conceptual basis for a variety of derived models. Models like the European Foundation for Quality Management (EFQM) model (Chart A) and awards like the Malcolm Baldridge Award and the Japanese Quality Award have origins in the TQM philosophy. A weakness of the general TQM approach is that it does not specify how total quality might be achieved. Different organisations typically apply this philosophy in ways particularly suited to their needs and circumstances. Annex A describes the basic features of TQM as adopted by Statistics Sweden. (TQM at Statistics Sweden, 1998).

2.5. Total Quality Management in the ESS

The Leadership Expert Group considers that the application of Total Quality Management in the ESS should encompass both <u>data quality</u> and <u>process quality</u> as well as wider aspects of quality. The Group agreed that the TQM concept is very relevant to its work on formulating proposals for the future. Customer focus, leadership and development and involvement of all staff were seen as particularly important for statistical organisations. In such a system quality is achieved by focusing on both product and process quality in the statistical context.

The Group's view is that the main strength of TQM lies in the overall approach of processes aiming at adding value through continuous improvement, in which all members of the organisation have to be involved. The delivery of total quality can be grouped under several key phases: establishing requirements of users, assessing the gap between existing standards of delivery and user requirements, designing and implementing the necessary changes in the production processes, operating the new system, disseminating the results and re-assessing the gap between requirements and standards achieved. The objective should be to enable to deliver quality that is <u>improving continuously</u>. This is summarised in Chart B. (Kaufman, 1992)

Many organisations inside and outside the statistical world use the TQM philosophy within frameworks such as the EFQM which encompasses all aspects of systems which feed into delivery of quality products and services (the data quality management operates at this level). This model reflects a non-prescriptive approach which recognises that there are many approaches to achieving quality. It is a practical tool for enabling organisations to undertake a self-assessment of their current position and a useful framework for the implementation of specific quality management systems suited to organisational needs and circumstances. External assessments can also be used. Different assessment tools are applied in different organisations. In the context of strategic planning, it is particularly useful for setting priorities and identifying areas for action.

The key concepts of this model are results orientation, customer focus, leadership and direction, information management, people development and involvement, continuous learning, innovation and improvement, partnership and public responsibility.

The model uses nine criteria - five "enablers" (leadership, policy and strategy, people management, resources and processes) and four "results" (customer satisfaction, people/employee satisfaction, impact on society and key results). It is based on the premise that 'Excellent results with respect to performance, customers, people and society are achieved through leadership driving policy and strategy, people and resources, and processes.'

2.6. Quality Management in National Statistical Institutes in Member States

When considering the plans for the future framework for quality management in the ESS, the Leadership Group took note of the quality frameworks currently in existence in NSIs in Member States. These have been surveyed by the Group in the course of its work. The survey results indicated that:

☒ The most commonly adopted quality framework components included focus on users, staff, efficiency, reliable and impartial data;

☒ Quality reports or declarations in relation to statistical products were prepared in the majority of Member States;

☒ The quality declarations were seen as means to communicate to users quality standards reached and any limitations which users need to be aware of;

☒ Such statements most commonly related to relevance, accuracy, timeliness and accessibility; the inclusion of the remaining quality attributes included in the ESS check list - comparability, coherence and completeness was less common;

☒ One in two member states were using quality management models; amongst others, some were considering the use of such models for the future;

☒ There were varying approaches to quality planning - some NSIs had specific quality plans, others included such plans as part of business planning;

☒ Most NSIs had user groups; some also undertake user satisfaction surveys. Other arrangements for user consultation and service delivery management included Statistical Councils and Service Level Agreements.

☒ Process data, self-assessment and auditing, user guidance, documentation of systems and standardisation tools were among other components of existing quality frameworks.

2.7. Key Framework Components for ESS Quality Management

For future Quality Management in the ESS, the following are the key components:

☒ Consulting about user needs - establishing user needs and priorities and developing strategies and actions for meeting them;

☒ Addressing user needs in designing and delivering products and processes: this includes putting in place the necessary resources, expertise and skills, methods and tools;

☒ Focus on both data quality and process quality;

☒ Respect for suppliers, confidentiality and integrity of statistics;

☒ Assessing the quality standard reached, measuring quality, quality reporting;

☒ Disseminating results and metadata, providing documentation and user support;

☒ Assessing user feedback and implementing continuous improvement;

☒ For output data quality reporting, the ESS quality attributes list provides a framework:

. relevance: concepts, measurements and statistical products reflecting user needs;
. accuracy: usually measured as the average distance between the true parameter value and the statistical estimate;
. timeliness and punctuality in disseminating results: responsiveness to user needs;
. accessibility and clarity of results: results accessible in a user-friendly manner. Users provided with information about quality of the statistics and about methods used to derive the figures;
. comparability: allowing reliable comparisons over time and space;
. coherence: consistent standards;
. completeness: coverage reflecting user need;

☒ For process quality, the aims are:

. efficiency: produces the desired outcomes cost effectively
. effectiveness: successful in delivering the desired outcomes
. robustness delivers results against challenging demands
. flexibility: readily adaptable to changing needs and demands;
. transparency: open, visible and easily understood;
. integration: complementary and consistent, both with other processes, and with meeting business needs.

☒ Measuring outputs of activities relevant to quality is also important - for example, development of competencies, recruitment, corporate services including communications.

The framework may or may not be taken forward in the context of a model such as EFQM.

2.8. Measuring Quality

Measuring quality is important in order to establish whether statistical products and services meet the required standard, to evaluate progress and effectiveness of new developments and quality improvement programmes. It is also a valuable tool for ensuring that statistical processes meet user needs and priorities and deliver quality results. Quality reports and declarations are important as means of communicating the quality standard of statistics, their strengths and limitations.

Measuring quality across statistics is a complex undertaking. There are no commonly accepted guidelines or standards in this area. However, the ESS list of data quality attributes provides a framework for data quality measurement, although for some of the attributes this poses considerable difficulties. Documenting aspects of survey processes is a valuable

component of quality reporting - some ESS members use 'Quality Checklists'. (Statistical Quality Checklist by ONS, 1997)

A research project on Model Quality Reports in Business Statistics has been set up to develop guidelines for producing quality reports for business survey outputs. (Davies/Smith (1999a); Davies/Smith (1999b); Davies/Smith (1999c); Davies/Smith (1999d)). It was funded by Eurostat. The study concluded that quality reports should be organised into three sections: a summary of the quality assessment; the more detailed quality report and a description of the survey and its processes. Other recommendations that were made included the following points:

- ☒ Both survey managers and methodologists should be involved in the quality assessment work;

- ☒ The tools for quality assessment need to be available and shared, to save resources and to ensure that users of different surveys are presented with a similar approach to quality assessment;

- ☒ Availability of data is critical. Careful planning is needed to ensure that all of the necessary datasets are available when needed;

- ☒ Quality assessment should be part of the result process to ensure that maximum use is made of the information on quality.

2.9. Framework for Managing Quality in the ESS: Vision for the Future

Quality management models are helpful in supporting total quality management and that such an approach would bring benefits both to NSIs and to the ESS as a whole. Within the overall ESS quality management framework, specific quality management systems should focus on continuous improvement of data and statistical services quality, through quality processes, tools and methods. There should be a strong focus on customer needs and on the delivery of user-responsive statistical services and products, accessible in a user-friendly manner. Quality management should be supported by quality measurement and quality reporting, within an overall system targeted at delivering continuous improvement.

In order to continuously improve quality, there needs to be a systematic and regular assessment of strengths and weaknesses in all the relevant areas. Systems must be efficient and effective. The prevention of errors and effective risk management is also an important part of quality management. The processes and products and their quality should be continuously reviewed and improved to deliver high quality statistical products and services meeting user needs and commanding public confidence.

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Application of Total Quality Management by Statistics Sweden

As an example of applying the core values of the TQM approach, the following list comprises the basic features of TQM as interpreted by Statistics Sweden for the purpose of its own quality approach. These are:

☒ Customer orientation: Staff should see it as their task to fulfil the needs of both external and internal customers. This is at the centre of TQM. Each organisation, part of organisation and employee should be focused on customers' needs. It is important to note that internal customers are included in this definition.

☒ Leadership and the participation of all: An organisational culture which sets the customer in the centre requires that every leader shall have a sense of commitment to take the quality work forward. Each leader should establish clear objectives and make it possible for staff to feel that they are making a valuable contribution. This approach encourages teamwork, develops the competence of all staff, and participation of all in the process of change.

☒ Process orientation: Operations are considered as being made up of a large number of processes. Adopting this point of view, power and responsibility have to be shared. Management should foster improvement of workflows, final products and work organisation. Focusing on quality processes creating products is necessary in order to achieve efficiency and high quality output.

☒ Measurements and understanding of variation: By continually measuring key process variables, and also the effects of different lines of approach, organisations can obtain a basis for action and can determine whether there have been improvements in quality. The concepts of special and common causes of variation are of central importance, since they have a direct bearing on the line of action.

☒ Continuous improvement: In order to maintain and develop efficiency and competitive ability, organisations must continuously improve processes and products. Change in the form of improvement is the normal state of affairs to be striven for. Reality and the currently available possibilities are constantly changing. This must be taken into account in order to continue to provide good value to users.
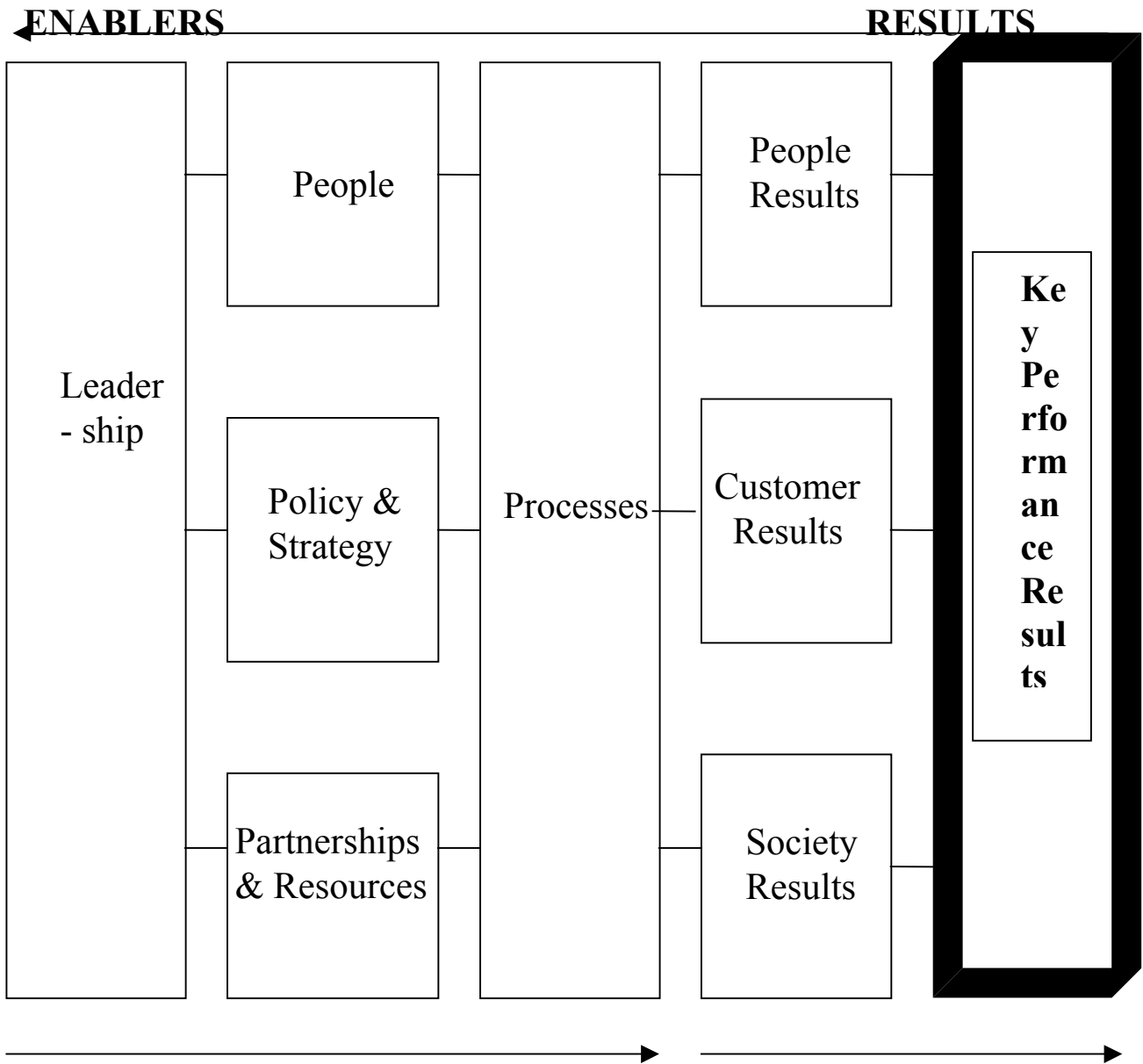
Annex B

A Brief Description of the Sup-Com Project *"Model Quality Report in Business Statistics"*

The project was set up to develop a detailed description of the methods for assessing the quality of surveys, with particular application in the context of business surveys. The approach was to apply these methods in some example surveys to evaluate their quality, and then to produce guidelines for producing quality reports for business survey outputs more generally. The work was specified and initiated by Eurostat following on from the Working Group on Quality of Business Statistics. It was funded by Eurostat under SUP-COM 1997, lot 6, and has been undertaken by a consortium of the UK Office for National Statistics, Statistics Sweden, the University of Southampton and the University of Bath, with the Office for National Statistics managing the contract. To ensure that the project conclusions would have wide applicability across a range of EU countries, members of the project team visited Ireland, Spain and Germany to discuss quality measurement and reporting.

The full report is divided into four volumes, as follows:

☒ Theory and methods for assessing quality in business surveys (volume I);

☒ A comparison of the software methods and packages available for variance estimation in sample surveys (volume II);

☒ Example assessments of quality for an annual and a monthly business survey from Sweden and the UK (volume III);

☒ Guidelines for and experiences of implementing the methods (volume IV).

Chart A
TOTAL QUALITY MANAGEMENT:
EFQM MODEL

ENABLERS   **RESULTS**

Leader - ship	People	Processes	People Results	**Key Performance Results**
	Policy & Strategy		Customer Results	
	Partnerships & Resources		Society Results	

3. Survey of Quality Practices in National Statistical Institutes

Summary

As part of the work in the Leadership Group on Quality, interviews were carried out during 2000 with 16 National Statistical Institutes (NSI) to find out about quality practices used. This paper summarises the main findings from this survey. The paper will cover issues such as management models, quality reports, leadership and staff, customer/user orientation, strengths and weaknesses of the European Statistical System (ESS), and methods used to ensure data quality in statistics. It will also discuss some of the problems that the ESS is faced with in its ambition to achieve high quality.

All NSIs have some kind of quality effort going on. Most of these efforts are conducted on an ad-hoc basis. Only a few NSIs have adopted a systematic approach. There is, however, a growing awareness that quality is something that we have to worry about and actively work on to achieve. It will not come automatically. Today eight NSIs within the ESS have adopted a management model for their quality work, but most of them have just started. Despite cultural differences within the ESS there are many areas in which the whole system would gain from more cooperation. The paper will discuss some of those areas.

Even in areas where NSIs and the ESS have a history of quality thinking such as data quality, there are many unsolved issues to address. In some areas there is already work going on, e.g., quality reports on the ESS level are underway. In other areas however, such as methodological handbooks or recommended practices, there is a great demand from the NSIs for further development. The results from the survey give some useful insights regarding which areas to start this work.

3.1. Introduction

One feature of the LEG work has been to collect information on the quality work that is carried out in agencies that are members of the LEG group. At each meeting of the LEG group the hosting National Statistical Institute (NSI) has presented its quality work and distributed written material associated with that work. In an attempt to broaden the scope of this data collection it was decided that also the so called network countries should be approached so that the LEG could find out about procedures used in those NSIs. Network countries are those that belong to the EU (except Luxembourg) but are not members of the LEG plus Norway and Iceland. Network countries have had the opportunity to comment on the LEG's work on a continuing basis. A questionnaire was developed to support the visits to the European countries that are part of the network of the LEG on Quality. The main purpose of the visits and the questionnaire was to gather information about how network NSIs view and work with different aspects of quality. The visits were carried out in February 2000-June 2000 by different LEG-members. Eight countries

were visited and information was provided from Director Generals, statisticians, quality co-ordinators, and survey managers. In order to get a standardised body of information it was decided that also the eight LEG-countries should fill in the questionnaire as a complement to the presentations provided at the meetings. The countries surveyed are therefore: Austria, Belgium, Denmark, France, Finland, Germany, Greece, Ireland, Iceland, Italy, Norway, Netherlands, Portugal, Spain, Sweden, and United Kingdom.

The questionnaire covered the following quality areas:

- ☒ framework for quality

- ☒ organisation of quality

- ☒ leadership

- ☒ users, customers, and relevance

- ☒ staff

- ☒ teamwork

- ☒ process-orientation

- ☒ strengths and weaknesses of the European Statistical System

- ☒ problematic areas for NSIs

- ☒ data quality in surveys in general

- ☒ data quality in some specific surveys: the Labour Force Survey, Survey of Living Conditions, Consumer Price Index, National Accounts, and Structural Business Statistics.

In this paper I will highlight some of the results from this survey. For a more detailed analysis, see Japec L. (2001). Similar surveys have been carried out in other areas e.g., on quality policies, standards, guidelines and recommended practices at NSIs (Colledge, M. and March, M., 1997) and on issues in surveying businesses (Christianson, A. and Tortora, R. D. 1995).

3.2. The roles and visions of NSIs, Eurostat, and the ESS

Today the main actors within the ESS, on the producing side, are NSIs and Eurostat, even though in some countries there are other government agencies responsible for some areas of official statistics. Historically the role of NSIs has been to produce statistics on a national level to describe the situation in that specific country. The role of Eurostat has been to put together statistics that the NSIs produce and make adjustments to make the statistics comparable. However with the expansion of EU and the increased importance of statistics in some areas, such as economic statistics, new demands on the ESS are arising. Comparability and timeliness are two quality components that have gained more and more importance on the ESS-level. Should the role on the ESS-level change from mainly adjusting statistics at the output stage to focus more on harmonising the input side, e.g., methods for data collection? There is definitely such a tendency and demand from NSIs regarding e.g., methodological handbooks. Another quality demand that we will have to address is how do we get one step ahead of the development and become

better at identifying the need for new statistics that reflects important phenomena in society that can have serious affects on e.g. the European economy?

Considering these factors it becomes very clear that a common vision and goal for the whole ESS is necessary. Visions and goals are important in an organisation. Without them staff will not strive in the same direction. The ESS is no exception to this rule. On the contrary, it is much more complex than an ordinary organisation since the ESS consists of different national statistical systems with their own goals and visions.

In our survey we found that the majority of the NSIs have an extensive description of their tasks. However, there are only four NSIs that have a clear, short, and explicit vision and/or mission statement e.g., the vision (encapsulated in the mission statement) of the NSI in Ireland is: "Statistics for a modern Ireland --The efficient and timely provision of high quality information needed by a changing society." Eurostat is an agency, although not covered in our survey, where the mission statement and vision are currently being discussed and revised. The current mission statement of Eurostat is "To provide the European Union with high-quality statistical information service".

3.3. Adopting a systematic approach to quality – different quality management models

It is clear that many times when talking about quality in an NSI, it is seen as equivalent to data quality. This can probably be explained by the long tradition in many NSIs to discuss and define quality as *data quality* and not in the broader sense described in quality management literature. In the latter the importance of not only the actual product quality is stressed but also the way to get good quality addressing issues such as e.g., customer orientation, leadership, staff, process orientation, and standardisation. It is believed that improved product quality can be achieved through improved process quality.

Our survey shows that within the ESS there is a growing awareness of the importance of adopting a systematic approach towards quality issues. Eurostat has started a systematic quality effort and so have a number of the NSIs. The NSIs could be divided into three different groups in terms of using or considering using a quality management model in their organisation:

- ☒ NSIs that are using a management model, 8/16 (eight of the 16 agencies studied)

- ☒ NSIs that consider using a management model, 3/16

- ☒ NSIs that do not use a model and have not considered using one, 5/16

Six NSIs have specially trained quality facilitators. The number of facilitators in these NSIs varies from 4 to 80. Two NSIs are in the process of starting a training of facilitators. The rest of the NSIs (8/16) do not have any specific quality facilitators.

The management models used by the NSIs are in most cases a mixture of different models, such as TQM, the National Quality Award Criteria, EFQM, Balanced Score Cards and ISO. This is perhaps not very surprising since many of the models share the same core values. The experiences in terms of costs, staff satisfaction and improvements are many. To adopt a model could be rather costly in terms of time and labour. However, as one NSI put it, "considering other costs in an organisation the cost for quality is merely irrelevant". One NSI describes its experience as reasonably good explaining that staff is directly involved in determining the office's strategic plan, its constituent goals and objectives, and local business plans for achieving them. Another NSI explains that 65% of the staff say in a staff opinion survey that they believe that the TQM-approach is the right way to go. Yet another NSI describes that adopting a management model has helped identify problems and find solutions at reasonable costs. The same NSI also describes the "management jargon" as problematic, although the staff is all for adopting a new modern management model. To summarise the experiences one could say that there are costs involved although in relation to what is gained in terms of staff satisfaction, improvements and customer satisfaction it is worth the effort.

A few NSIs have made self-assessment efforts according to some quality management model. The general results of these are basically the same for all those organisations, i.e., some good quality procedures are in place, but there is still a long way to go before the organisation could say that a systematic quality approach is in place. Looking at the whole ESS we would probably be able to create a very impressive quality organisation if we were able to put together all the good practices we have found in our study. This fact should be an important incentive for the NSIs to share experiences and increase cooperation in different fields.

3.4. Reporting data quality

Traditionally data quality has been synonymous to accuracy. During the last decades, however, this view has become considerably less narrow. A number of new components have been developed in this area and some NSIs and Eurostat have identified their own expanded sets of quality components to form a "data quality declaration." In our study we found that most (14/16) NSIs have a quality declaration or are preparing one. The most common components to be part of a quality declaration are:

- ☒ relevance   (14/16)
- ☒ accuracy   (13/16)
- ☒ timeliness   (13/16)
- ☒ availability (13/16)
- ☒ comparability (10/16)
- ☒ coherence   (9/16)
- ☒ completeness (8/16)

It is important to acknowledge that some of the components mentioned are not easy to measure. The role of quality declarations should be seen as a means to visualise quality components that an organisation view as the most important ones and which need to be specified to the customer/user of a product. It can also be seen as a start for improvement work. A declaration of the status of a product shows where improvements are needed.

Work is underway on the ESS level to report quality according to Eurostat's set of quality components. There is still a need to develop the measurability of the components. In our survey we found that the request from Eurostat regarding a standardised quality reporting on the part of the NSIs is viewed positively by the NSIs. The reports are deemed as both useful and necessary although some NSIs also expressed concerns about the costs involved.

3.5. Users, customers, and their needs

Focussing on customers is an important component in quality management. The emphasis is on customer needs and satisfaction. In an NSI the concept of customer can be extended to user of statistics on the ESS and national level. Finding out who the customers/users are is not always straight forward and finding out their needs is not an easy task. Many NSIs have "solved" part of this problem by thinking in terms of main users.

The dialog between producers of statistics and users varies. Many NSIs meet with user groups on the product level. To find out what customers/users think about the NSI, customer satisfaction surveys (9/16) and complaint analysis (4/16) are carried out in some NSIs. The results from customer satisfaction surveys are mainly used to improve the dissemination process rather than e.g., the data collection process. Many countries also have a Statistical Council. In general one could say that compared to user groups the role of a statistical council is much broader and does not only deal with data quality aspects of surveys but also more strategic NSI issues. Other ways to ensure customer satisfaction mentioned by the NSIs are via e.g., Internet feedback channels, regional and national statistical information centres, ad hoc meetings with individual important institutes, and Service Level Agreements with major customers.

There is a need to learn more about e.g., the producer and user dialog, both on the ESS and NSI level and how to promote customer orientation in an organisation.

3.6. Staff

The staff is the main and most expensive resource in an NSI. Therefore skills, training, and motivation become very important. It is clear that in many NSI there is no system for motivating staff, instead it is done on an ad-hoc basis.

The most common way to motivate staff in NSIs is to encourage training by allowing staff to study as part of their work, 14/16 NSIs allow this. In one country for example everyone is allowed to use 40h/year for training. More responsibility and promotion are other ways used in NSIs to motivate staff. Salary increases and bonuses are still relatively unexplored tools, though. Only 8/16 NSIs use salary increases to motivate staff.

Another important success factor for quality work is the participation of all staff. In some NSIs this is encouraged through e.g., participation in special improvement projects, the opportunity to submit ideas for improvement and the opportunity to participate in staff advisor groups on different topics such as dissemination, marketing, and training.

3.7. Process-orientation

The philosophy behind process-orientation is that each specific process should be carried out in the same way or with as little variation as possible no matter who is running the process. At the same time we should adjust our processes based on new facts and research. This will lead to improved process quality and eventually in improved product quality. To achieve this we need tools.

The most common tools used in NSIs to assure quality are documentation systems (12/16) and quality guidelines (10/16). Even NSIs that have these tools say that the use of the tools is only partial, i.e. there is still a lot of space for improvement. It is also clear from our survey that very few NSIs carry out benchmarking or customer studies. Other tools used by NSIs to assure quality in processes are:

- ☒ standard quality reports

- ☒ auditing of products

- ☒ computer editing/validation procedures

- ☒ on-the-job training and supervision

- ☒ methodological handbooks concerning e.g. survey planning, questionnaire design, nonresponse rate reduction, editing, interviewing techniques, sampling design, variance estimation, data quality control system, and graphical representation.

As mentioned many of the NSIs say that there are a lot of weaknesses even though they might have some of the tools in place. The problems mentioned are:

- ☒ more systematic tools are needed such as e.g. checklists

- ☒ the tools that exist are not used systematically in the NSI

- ☒ there is no quality assurance function

- ☒ evaluations and improvement of data quality is sometimes considered an external rather than internal factor in relation to the data production process.

Many NSIs express an interest in the development of Recommended Practices on the ESS-level for the main survey processes. This would mean changing the focus from harmonisation of the output side (adjustment) to harmonisation of the input side (data collection).

In our survey we found that the areas that are most underdeveloped in NSIs with regards to tools being in place to ensure quality are: the use of methods to reduce measurement errors, testing questionnaires, carrying out customer surveys, and reducing and estimating coverage errors. Only a minority of the surveys in NSIs have these tools. These areas are therefore good candidates for the development of Recommended Practices on the ESS-level. As for user influence, user groups are more common when it comes to economic statistics compared to social statistics.

The standard quality components are more complex for statistical systems such as e.g. the National Accounts. Here work is underway to look into the measurability of some of the components.

3.8. Strengths and weaknesses of the European Statistical System

It is important to know the strengths and weaknesses of the ESS to be able to improve. It is easy to see why one should work on the weaknesses. However even the strengths need attention. An example from the ESS to why we should not only consider the weaknesses but also look at the strengths is the case of harmonisation. A lot of harmonisation work has been carried out but there is still a lot of work left in this area.

In our survey we asked the NSIs about the strengths and weaknesses of the ESS. The following list is a summary of these.

- Strengths

Legal framework. The Legal enforcement of new statistical developments agreed at the European Council is considered a strength.

SPC meetings. This is considered to be a good forum for the Director Generals to discuss important issues that concerns the ESS.

Harmonisation was mentioned by almost all NSIs. Concrete examples of harmonisation areas are co-ordination of concepts, methods, documentation, common rules, and good handbooks.

The possibility to *learn from each other*. The great potential to benchmark within the ESS was also mentioned by many NSIs as a strength, e.g., cooperation on technical matter, methods, standards, and exchange of information.

Resources and experience available from 15 EU and EEA statistical services and Eurostat. There are EU resources available to seed-fund new developments and research/development.

The *increased importance* of statistics in the EU.

- Weaknesses

A long range inspiring *vision* is missing for the ESS.

The lack of *resources* is mentioned by many NSIs. Many NSIs think that the whole ESS is poorly financed e.g. there are new EU statistical demands without any cut-backs on existing demands in the context of national resources constraints.

A lack of communication between *users* and producers at the European level is mentioned by some NSIs. In particular the Commission and the ECB are too often considered as the sole users of the European Statistics.

Methods that are used are not actually designed for the ESS. In fact the ESS consists of a number of different heterogeneous statistical systems of the member states. Other methodological weaknesses mentioned are that there is no standardised metadata system and very few post-production studies are carried out.

There is a lack of an overall *co-ordination of priorities.* The priorities are changed too frequently according to priorities of the Commission.

The *lack of coordination* of working groups and task forces on all levels, both on the national and ESS-level.

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4. Quality and Users

Summary

One of the key principles of quality management in official statistics is user orientation. The types of users are manifold and the relationship between users and producers very complex. This difficult situation requires much attention and will be one of the main fields of interest in the next years.

One important reason for the great variety of user types lies in the fact that statistical information (as the main product of NSIs) has to be provided both as public good (informational infrastructure for democratic societies) and as a private good (tailor-made analyses on the demand of individual customers). Different types of users with different and (partly) conflicting requirements correspond to this distinction. In this respect the statistical product differs from many other products on the market.

In addition to the diverse and partly conflicting user needs, the relationship of the producer with each single user is very complex in itself. A complex interaction between user and producer has to be established in order to achieve an optimum solution. In this user-producer dialogue, user and producer negotiate and define the statistical working system comprising the statistical programme as well as the products and the processes.

4.1. Introduction

When it comes to quality, there are few other statements we could as instantly agree upon as the demand that official statistics has to be "user oriented": "It is for users to decide. They are the people who determine quality criteria" heralds a recent publication on quality in official statistics. Statisticians, it is argued, are "no longer 'number freaks' in a world of their own" but become "managers of statistics" who stay "in constant touch with those who make decisions" (Franchet 1999a: 3).

Staying in touch with the users could, however, be a more difficult assignment than it seems at first sight. Improving user orientation is a complex issue - and this is especially true for official statistics. In few other areas the categories of users are as manifold. Seldom is the interrelationship between users and producers as complex as it is in official statistics. In this contribution, we would like to make this complexity a bit clearer and to show some ways of dealing with user orientation.

Accordingly, the chapter starts with a general outline of the types of users of official statistics, and the characterisation of the interrelationship between users and producers (the user-producer dialogue). In a second step, we will introduce some fundamental concepts on what quality management and quality improvement mean in this context. Quality, we argue, can only be attained in an optimisation process in which an optimum mixture of quality items has to be found. Thirdly, we will name some examples of instruments of

optimisation. As regards statistical councils - important instruments in this respect - the current situation in the European National Statistical Institutes (NSIs) is briefly outlined.

4.2. Characterisation of statistics as an economic production process

If we want to find ways that help us to improve quality (as perceived by the users) first of all some basic considerations have to be made. The general idea of improvement is a good vision. Yet, in order to find concrete measures to improve the quality (again, as expected by the user) we require some specifications.

In this section, we will try to outline those specifications which concern the nature of the products NSIs provide and the types of customers provided with these goods. Finally, the basic components of the interaction between the users and the producers of statistical information will be shown.

4.3. The nature of the product "statistical information"

The main product NSIs provide can roughly and generally be defined as "statistical information". A considerable proportion of the complexity and problems of the relationship between users and producers stems from this initial definition. For "statistical information" can be provided both as a public good and as a private good. In all European NSIs both types are present (yet in different proportions):

☒ As a **public good**, official statistics provides an informational infrastructure for democratic societies and their decision processes. According to the economics of public goods, goods are referred to as public (or "collective") if they (1) cannot, practically, be withheld from one individual consumer without withholding them from others ("nonexcludibility"), and if (2) for them the marginal cost of an additional person consuming them, once they have been produced, is zero ("nonrivalrous consumption"). It is very unlikely that public goods can be profitably provided on a free market for these reasons. This is true of the "infrastructure function" of official statistics as well.

☒ As a **private good,** statistics can be traded on the free information market like any other private good. Besides the informational infrastructure made available to all citizens, NSIs at the same produce time tailor-made analyses for individual customers; to these cases the principles of the economics of public goods do not apply. By producing analyses on the demand of individual customers, NSIs are doing something quite similar as information providers in the private sector.

Statistical information is provided both as a private and as a public good in all European NSIs.[1] Yet, the mix of these alternatives varies according to cultural

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[1] Examples show that both types can very well be integrated in one single comprehensive marketing model. Cf., just to name one, the German case: Knoche/von Oppeln-Bronikowski/Kühn 1999.

differences within the European NSIs. Sketching a very rough picture, one could state that Anglo-Saxon and Nordic countries in a larger proportion provide statistical information as "private good" than the southern and central European member states do. Recent development trends make it seem likely that in general the statistical information provided as "private good" will rather increase in its proportion. In this way, e.g. know-how and potentials of the NSIs can be used more comprehensively than in the past and budget cuts can be partly balanced.

4.4. Types of users of statistics

Taking the distinction between public goods and private goods as a starting point, the main challenge for official statistics in meeting its users needs is to satisfy the public demand and the private demand at the same time. This is not a simple assignment, as the public demand and the private demand differ in many respects (see Figure 1):

☒ Users of the public good "statistics" are (1) the "society" (or state) as a whole and its representatives in (democratic) decision processes including stakeholders of different interests and (2) all the citizens (or, to use the French word, "citoyens") living within the society with their diverse expectations towards official statistics (in many areas probably as vague to the user him or herself as unknown to the statistician). It can easily be seen that the types of users of the public good are already manifold, ranging from a government agency to an academic institute co-operating with an NSI in research to a union and all the way to a single citizen searching for specific statistical information.[2] As diverse as these users of the public good "statistics" seem to be, they nevertheless have some features in common. It is a long-term demand (materialising in statistics laws and regulations), which is expressed not (only) directly by the users but (also) via the political representatives. The infrastructure, the products and the programme provided stem from a complex socio-political dialogue in which the terms are not (and probably cannot fully be) explicitly fixed.

☒ On the contrary, users of the private good are individual customers, as we know them from the private sector. They are free to bargain the conditions of data use, fixing the result of the bargaining in short-term contracts. These contracts contain specific agreements on what will be provided in what time and at what price. The demand and expectations of the individual users can be determined in a direct dialogue.

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[2] An overview of some types of users, public and private, is given by Franchet 1999b: pp. 91-93. Unfortunately, precise knowledge on the different uses of statistical information is still lacking. This would be an important subject for further research in social and political sciences. Some recent changes in the uses of statistics can nevertheless be stated: On the one hand, there is an increasing demand for short-term statistics (e.g., from the ECB) and for a very fast delivery of these statistics (which is not without consequence on "quality mixes", see 2.1). On the other hand the demand for regional and local statistical information has grown in the context of the regional policy of the EU.

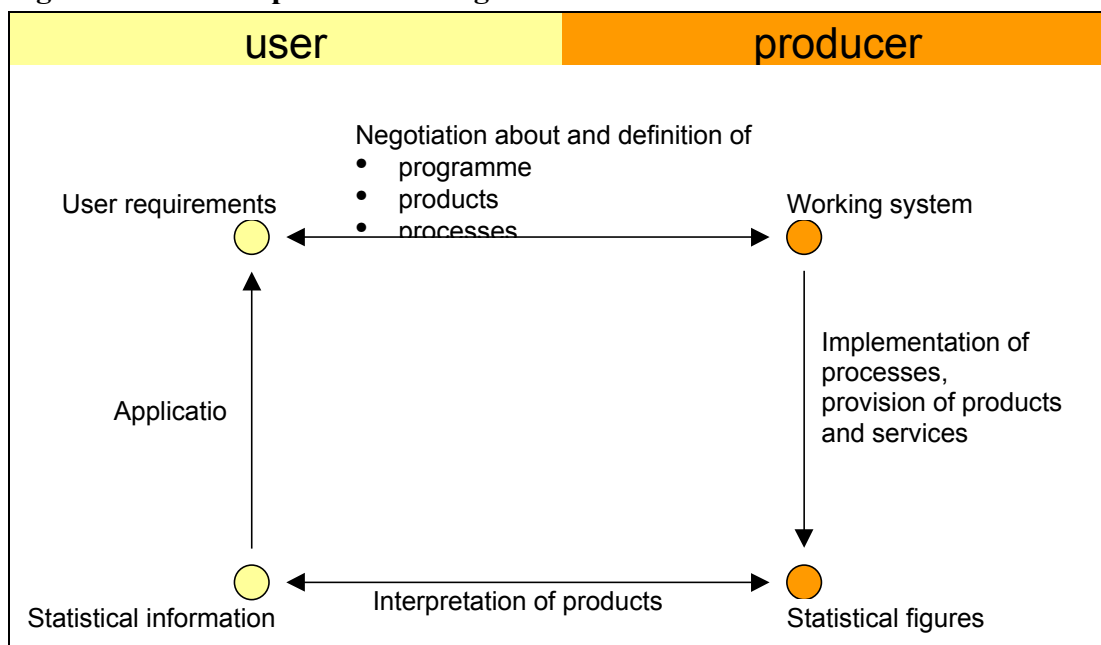**Figure 1: Public demand versus private demand in official statistics**

public/social demand	individual demand
"citizen", "society"	"customer"
long-term demand	short-term contract
expressed by the political representatives	free bargaining (market)
socio-political dialogue; government setting priorities	contract between NSI and individual partner
terms are not (explicitly) specified	terms are explicitly specified

The distinction shows that the way to user orientation in official statistics is far from being an easy one. Beyond the catchword "customer orientation", processes are extremely complex, and the instruments for meeting public demand and private demand cannot always be the same. More generally, in order to be able to improve user satisfaction, it must be clear, first of all, whether we are talking about a public or an individual demand. It is only after this initial step that the instruments for improving user satisfaction (described below) can be used properly.

4.5. The complex relationship of users and producers in statistics

Apart from the diversity of user types, the relationship between users and producers in statistics is in itself a rather complex one. Statistical products cannot be easily defined and "used", as it may be the case with certain types of physical goods. In statistics, more complex arrangements must be made. The four cornerstones in the relationship of users and producers in statistics are summarised in Figure 2.

Figure 2: The user-producer dialogue

user	producer

Negotiation about and definition of
- programme
- products
- processes

User requirements ⟷ Working system

Applicatio

Implementation of processes, provision of products and services

Statistical information ⟷ Interpretation of products ⟷ Statistical figures

Taking the user requirements to be met as the pivot, a complex interaction between user and producer is necessary in order to find an optimum solution. Normally, this optimum solution can not be attained in every respect. A dialogue has to take place in which user and producer agree upon a solution suitable for both the users needs and the producers' capacities. As depicted in Figure 2, we distinguish four steps.

Step 1: User and producer have to carry out negotiations concerning the working system. The statistical work consists of the main characteristics of the statistical products (e.g. the quality characteristics like timeliness, accuracy, comparability and others), the broad framework of processes, organisational structure and methods as well as the statistical programme (and its "relevance") as a whole. In the negotiations, users and producers agree upon a solution, meeting on the one hand the needs of the users and on the other hand the restrictions of the producers (e.g. in terms of budget restrictions, personnel available or other external conditions).

Step 2: The producer puts this statistical working system into practice in order to obtain statistical figures. As this step takes place mainly within the statistical institute, users do not play a crucial role here. Yet, it should be noted that the statistical institutes have to make sure that the statistical working system is put into practice according to the agreement. This realisation does not concern the user directly but can, nevertheless, be made trasparent, e.g. by documentation of quality standards, (internal or external) certification that the standards are met or quality awarding. Audits, peer reviews and internal quality awards (as practised at Statistics Sweden) are cases in point.

Once the statistical figures are produced, the user again enters into the dialogue with the producer. In **step 3**, the raw material (figures) is turned into the ready-to-use product, i. e. statistical information. "Raw" data in almost

every case require interpretation to be applicable by the users. Interpretation of statistical figures is an important assignment of statistical institutes in at least two respects: (1) Metadata must be provided for the data. And (2) connections and comparisons with data from other sources or different areas must be provided if necessary. Finally (**step 4**) the statistical information is applied by the user (let's hope to his or her full satisfaction).

4.6. How to address the question of quality "Quality mixes" and the optimisation process

As we have seen, the meeting of user demands requires negotiations about the statistical working system. In these negotiations, user and producer agree upon a specific "quality mix" for the individual user.

Quality of statistics is a complex item, comprising a differentiated set of user requirements concerning the statistical product. This "quality mix" consists of a wide range of elements. Users and producers of statistics have to agree upon, e.g., a survey design in which the objectives of the users and the external conditions of the statistical institute are balanced. In this context, quality comprises criteria like accuracy of data, timeliness, relevance, comparability.

Which quality elements are comprised and how the concrete requirements are defined is a matter for an optimisation process. In this process, user and producer have to solve the problem that, given the limitation of resources, it is not possible to obtain optimum results in every respect: First of all, the different items of the quality mix are (at least partially) in mutual conflict. An increase in accuracy will, e.g., in many cases cause a deterioration in timeliness. Secondly, several external restrictions have to be taken into account. Besides the limitation of resources in general, the legal framework may prescribe the cornerstones of survey design quite strictly, the personnel available in the statistical office may allow the use of certain methods only etc. The result of this optimisation process is a convention, which we call the "statistical working system".

To summarise: Quality has to be understood as the result of an optimisation process in which:

☒ (firstly) an optimum mixture of quality items with respect to user needs has to be found and in which

☒ (secondly) this quality mix has to be achieved with respect to the current external conditions. An adequate statistical working system is optimal in this double meaning.

4.7.   What can be achieved by statistical "measurements"?

Furthermore, there is a fundamental limit for statistics that should be mentioned in that context: In statistics as well as in social sciences and in economics, concepts have to be translated into measurable terms (see, e.g., Flaskämper 1933; Grohmann 1985; Litz 1990). In the process, called in Germany and France the "process of adequation", users often have to accept "losses".

Take, for example, the term "depreciation", which is rather clear in economic theory. If depreciation has to be calculated a lot of conventions (and simplifications) have to be made in order to achieve measurability. One may argue that this is only true of terms of such a highly theoretical nature. This is, however, not true. Even obviously simple terms like "forest" or "household" are as such only "ideal types" that represent some undefined subsets of an extremely complex reality.

As a consequence it can be stated that the role of statistics is by definition limited to decision support. In a concept of procedural rationality (Radermacher 1999) this means that, on the one hand, decisions should be based on figures. On the other hand, it makes clear that figures normally cannot substitute the decision: in the end there will be room beyond the figures in which decision makers have to find a solution by intuition, bargaining or other elements of their tool box.

A realistic assessment of what statistics can deliver and what not, is crucial for a fruitful dialogue between users and producers. Somewhere in between the extreme positions of statistical scepticism on the one hand and "arithmomania" (Georgescu-Roegen 1971) on the other lies a point of truth. It is one of the major tasks of a statistical service to review the position of this point continuously in the light of new experiences and to promote the user's general understanding of statistics.

4.8.   The measurement of data quality: another "problem of adequation"

Bearing these considerations in mind, it should be evident that the measurement of data quality becomes itself a problem of adequation: Figures used for the measurement of quality are (in analogy with statistical figures) based on a convention in which a quality concept translates theoretical notions into measurable terms. It should be noted that the quality of statistical data is quantifiable only to a certain degree. As in the more general translation of theoretical into statistical concepts, there is a "fallacy of misplaced concreteness" (Daly/Cobb 1989) in this respect as well: Excessive use of quantitative indicators will be misleading. We should - partly - work on a nominal scale on which the quality items stand side by side without any kind of ranking.

4.9. Paths towards the improvement of user satisfaction

As a consequence from these considerations it is evident that the quality of statistical information comprises the following elements:

- ☒ Relevance of the working system: Does the statistical working system define the best realisation of theoretical user requirements within the financial and methodological restrictions?

- ☒ Data quality realised by the working system: Which level of quality should be attained by the (measurable) quality items?

- ☒ Quality in the application of the working system: Does the statistical service properly realise the convention that has been contracted with the users?

- ☒ Interpretation of the statistical figures for the users: Do interpretations supply the information users can expect on the basis of the convention?

These are the features the improvement of user satisfaction has to take into consideration: First of all, as a basis of the user-producer dialogue, statistical concepts have to be constructed that meet the users needs. Secondly, when it comes to the concrete design of a working system, normative settings are perhaps unavoidable (i.e. "timeliness is more important than accuracy"). In order to improve user satisfaction, users and producers should co-operate in the construction of these normative settings. Thirdly, producers should give instructions to the users concerning the interpretation of statistical figures.

In the following section some instruments for these aspects of the user-producer dialogue are described.

4.10. Instruments of optimisation of the user-producer dialogue

For an effective user-producer-dialogue, two stages in the beginning and the end of the production process are pivotal: The **"Alpha"** is the detection of the user's needs in the beginning of the production process in order to integrate users in the planning process of statistics. Here, problems are generated particularly by the heterogeneous interests of user groups. An optimum, hence, can only be expected in the sense of a Pareto optimum, in which the aggregated user needs are maximised. In practice this means: Ensure that key users play a key role! In addition, producers have to maintain an awareness of the future needs of their users. This requires close attention to emerging policy issues, and an assessment of the information needed in the context of these issues (Brackstone 1993, 50-52). Furthermore, it has to be clarified what amount of resources is available for the production of a statistical figure: The level of quality an NSI and the respective resources should be clearly defined. Normally, a higher level of quality requires a relatively higher budget. Hence, there should be a concept for priority setting in budget planning and for the management of resources in the optimisation process (both for statistics provided as public and as private goods).

The **"Omega"** is the control whether the users are satisfied (again, in the sense of a Pareto optimum). Corresponding surveys ("customer satisfaction surveys" etc.) may help to quantify some elements of a feed back from the users. However, not too much should be expected too much from these surveys. They should be complemented through in-depth interviews and reviews of the data in the statistical councils.

In this chapter we give an overview on some instruments and their current use in European NSIs.

4.11. Instruments to integrate users in the planning process of statistics - The current situation in Europe

In order to make users play a central role in the planning and in the development of surveys, various instruments can be used. Such instruments which help discover and specify the needs of the users and implement them successfully include the following:

☒ statistical councils, i.e. institutions in which the general development of the statistical programmes is discussed by experts external to the statistical institution

☒ producer/user groups (e.g., sub-committees of statistical councils which take care of specific problems of individual statistical areas)

☒ customer surveys exploring the needs of a larger group of users

☒ formalised agreements between the producers and especially important users of statistics (e.g., Service Level Agreements in the UK Office for National Statistics)

☒ research in social sciences about the different uses made of statistics

☒ marketing concepts integrating the information gained by the use of the instruments

☒ co-operation with partners in the social sciences and economics as well as in market research

This chapter aims at giving a brief overview of how these instruments are currently used in the European National Statistical Institutes (NSI).[3] In Europe, the use of these instruments shows a remarkable resemblance in the respective statistical systems. But also undeniable differences have to be stated. These differences are, on the one hand, the result of the variety of cultural and institutional backgrounds in European official statistics. On the other hand, they point to different ways of focussing on the relationship between users and producers of statistics.

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[3] The following analysis is based on a questionnaire developed by the LEG on Quality. This questionnaire has been answered by nine European NSIs and Eurostat.

In Europe, the statistical councils are still the most important institutions aiming at an integration of users in the process of reviewing and improving of statistics. Statistical councils exist in almost all European NSIs as well as at Eurostat - and often they have already existed for many decades. Therefore, it can be supposed that they still constitute the most important "channel" in which the demand can be studied and discussed. Despite the existence of statistical councils in many European countries a comparison shows important differences in the way the councils work and how they are organised.

In most countries statistical councils have been created in order to establish a link between users and producers of statistics, to program statistical operations, to justify new surveys and to fulfil tasks that could be referred to as "auditing". In most countries the statistical council does not take binding decisions (with the exception of the Netherlands, Italy and - partly - Portugal). However, it has to be stated that the advice of many councils is usually said to have a considerable influence on changes and developments within the NSIs.

On the institutional level differences are already visible in the composition of the respective councils: the number of members varies from 8 (UK Statistical Commission) to 170 (CNIS[4] of the French INSEE[5]). Especially the larger councils have a differentiated structure of sub-committees dealing with more specific issues. A special position is assumed by the Swedish Programme Councils which are organised on the level of specific statistical areas only (without a centralised overhead body).

Regarding their composition, two types of councils can be distinguished: the "independent expert" type and the "interest group" type. Councils of the first type exist in the UK, the Netherlands and in the Austrian Statistical Council ("Statistikrat"). Here the (few) individual members of the council are (formally) independent from any organisation, they do not explicitly represent the views and interests of a user of statistical information but serve as impartial agents with a high reputation. However, it goes without saying that even "independent" members also represent the organisation in which they have been "socialised" or by which they have been nominated.

Most other statistical councils are of the "interest group" type, i.e. they consist of about 30 to 50 members, each representing a government agency (on the local, regional or national level) or an interest group (e.g., trade associations, trade unions, employers associations, universities, central bank). The Austrian Central Statistical Committee ("Statistisches Zentralkomitee") is a case in point. Most institutions of this type characteristically have of about 20 sub-committees that deal with more specific issues in the various statistical areas. In these sub-committees a user-producer dialogue concerning the further improvement of individual surveys can be put on the agenda.

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[4] Conseil National de l'Information Statistique.
[5] Institut National de la Statistique et des Études Économiques.

The functions assumed by the councils are - in spite of the organisational differences - largely the same. The main task of most councils is to review the statistical programme. However, a closer look at the functions assumed shows interesting differences as well. Figure 3 gives an overview of a range of possible functions of statistical councils.

Figure 3: Possible functions of a statistical council

	Benefits	**Cost / Resources**
Programme	review of the statistical programme setting of priorities	allocation of resources to statistical areas budget control
Products	definition of relevant products setting of quality indicators (e.g. accuracy, timeliness, comparability etc.) auditing of product quality checking user satisfaction	allocation of budgets per product budget control
Processes	setting of quality requirements and indicators, e.g.: - methods and concepts - documentation auditing of process quality	controlling of the processes to achieve cost-effectiveness

According to Figure 3, statistical councils can, on the one hand, work on issues concerning the "benefits" of the production processes (to a lesser or larger extent). Here a further distinction is necessary: The only function assumed by every council is the review of the statistical programme. Nevertheless the majority of the institutions deal with questions of priority setting, definition of relevant products, auditing of product quality and the review of user satisfaction. Only a minority of the councils takes care of quality requirements for processes (methods and documentation) and process auditing.

On the other hand, there is the "cost/resources"-dimension of the production process ("At what expense can the statistics be produced?"). Only a small number of statistical councils deal with issues of this type. The allocation of budget per product and the cost-effectiveness controlling is discussed in none of the statistical councils included in our analysis. Three NSIs have indicated that the allocation of resources within the statistical programme is at least a *de facto* task of their council. An interesting case in point is the Austrian model, where the Statistical Council has the task of resource allocation and for the whole range of cost-related issues a Commercial Council ("Wirtschaftsrat") has been installed analogously to the supervisory board of a joint-stock company.

Apart from the statistical councils, customer surveys constitute another important tool to detect user needs and to integrate users in the planning process of statistics. A brief look at the current situation in Europe shows that only very few NSIs use customer surveys on a systematic and regular basis (among these few are the NSIs of the Netherlands and of Sweden). A great majority of NSIs use customer surveys only occasionally but indicated that the introduction of customer surveys on a larger scale is on their agenda.

Another instrument that merits to be mentioned in this context are the so called Service Level Agreements used in the Office for National Statistics in the United Kingdom. In order to manage well the user-producer dialogue with important key users of statistical information, the ONS has put into place a set of "concordats" and "service level agreements". Concordats describe the relationship between the two organisations, including their respective roles, the avenues of communication, how they will work together and what service level and results they can expect from the ONS. They also include arrangements for consulting on matters of mutual interest. Such a concordat exists, e.g., between the ONS and HM Treasury.

The concordat sets out the general arrangements for a number of Service Level Agreements and provides a list of these agreements. The Service Level Agreements themselves cover a set of issues that are (among other things) relevant to the quality of the respective statistics. These issues may include:

☒ Description of services (detailed in an annex)

☒ Performance targets (the results to be delivered and the delivery timetable)

☒ Steering and management arrangements, also communication mechanisms

☒ Financial arrangements, charges: regular work free, ad hoc analyses at cost

☒ Performance monitoring and reporting arrangements (ONS as responsible for monitoring performance)

☒ Procedures for handling variations and resolution of issues (revisions to annex may be agreed; reference to a higher level committee or top managers in areas of differences)

☒ Review (arrangements for the annual review)

☒ Resolution of disputes and arbitration

☒ Confidentiality (covers the security of individual data)

☒ Ownership of information and intellectual property (ONS to be acknowledged as the source)

These examples show various possible ways how the dialogue between users and producers of statistical data can be organised and carried out. It should be noted that the instruments described in this chapter do not exclude one another, but have their own areas of application. While Service Level Agreements have a strong focus on the specific needs of one key user (e. g. a government department) statistical councils (or their respective sub-committees) help to include a larger number of key users. Customer surveys, finally, make it possible to reach an even greater number of - also non-institutional - users. The question of which instruments are appropriate has to be decided in the context of the statistical system in which they are adopted.

The question of which elements are appropriate for a specific area leads to the problem of how conflicting needs of different user groups can be dealt with.

4.12. Integrating users on the European level

Within the European Statistical System communication between users and producers is as important as on the national level. On the European level additional obstacles make the user-producer dialogue even more difficult. These specific conditions cannot be treated in depth in this contribution. Let us just briefly mention two committees working in analogy to the statistical councils on the national level: The CEIES[6] and the CDIS[7]. In the CEIES and its three sub-committees member states of the EU are represented by two (private) members each. The CEIES is chaired by the Commissioner responsible for statistical information and has the task to "assist the Council and the Commission in the co-ordination of the objectives of the Community's statistical information policy, taking into account user requirements and the costs borne by the information producers." In the CDIS - a committee chaired by Eurostat - the Commission services involved in statistics are represented.

4.13. Enhancing user awareness

Improvements in the user-producer dialogue are, in general, an objective serving to improve the relevance of statistical information. Both sides of this dialogue may cause disturbances and misunderstandings:

- ☒ Statisticians often expect too much know-how and expertise from their users. They are not prepared or simply hesitant to simplify the message in the light of user requirements in specific areas.
- ☒ Users suffer from gaps in the education system. "Innumeracy" (as an analogous phenomenon to illiteracy; for the notion of innumeracy, see, e.g., Paulos 1989; Dewdney 1993; Schneeweiß 2001) contrasts with the trend of making growing use of statistical figures in the media, management, and the public sector. Though not as visible as illiteracy or general cultural ignorance, this type of mathematical illiteracy, it has recently been argued, has a considerable impact on everyday life (e.g., muddled government decisions, media coverage on complex phenomena).

Hence, for an effective user-producer dialogue, the quality characteristics as well as the strengths and limitations of the statistics produced should be clearly communicated to the users. Examples of programmes aiming at the enhancement of user awareness in the ESS include user seminars in the context of the release of figures, meetings for the discussion of key users needs, special press conferences providing background information on the figures released as well as "road shows" on the interpretation regional data.

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[6] Comité consultatif européen de l'information statistique dans les domaines économique et social (European Advisory Committee on Statistical Infromation in the Economic and Social Spheres)
[7] Comité directeur de l'information statistique

4.14. Institutional and cultural differences

The present situation in the statistical systems of different countries has emerged from long-term relationships between users and producers of statistics in specific social environments. Looking at statistics from such a historical perspective makes it possible to identify cultural and institutional conditions as determining factors and as results of those processes (Desrosières 1998). In particular, eight factors can be distinguished in that context:

☒ Dominant culture: probability methodology, national accounts, integration, economic studies, social customs, market outlets... (is the addressee thought of as "customer", "citizen" or simply "user"?).

☒ Relative part and components of statistical methodology. Sharing of the tasks between "methodological experts" and "field specialists".

☒ Perception and re-translation of the expectations of society: dissemination, contractual request, statistical council, part played by university research in economy and social sciences.

☒ The profession of a statistician: training, mobility, prospects.

☒ Centralisation and its various dimensions: inter-administrative and territorial. Part played by the regional and local authorities.

☒ Perception of international relations.

☒ Relations with the market (upstream and downstream).

☒ Management methods and part played by the departments.

Looking at the wide variety of statistical systems in Europe from that angle it can be presumed that each country has elaborated a solution which even if not optimal - at least satisfies the user needs under current restrictions.

Of course, an improvement of these balances has to be a permanent objective. Furthermore, the current task in many countries is: "Find a new solution with less money and more quality!" Evidently, this mission would be impossible if there were no new factors that could provide new degrees of freedom. One of these factors is a systematic management of quality.

In addition to that present-day challenge within the countries requirements are set by the European Union which clearly ask for additional figures or changes in the national working systems. Independently of the question whether these requirements have been negotiated properly with the European Statistical Service it means that country specific solutions partly have to be given up in order to achieve a European optimum. This change process, however, has to be carried out in a reasonable time span. Consequently, if the country solutions have emerged from developments of historical dimensions one should not overestimate the potential for rapid changes, an aspect which is a link between even more heterogeneous user groups on the one hand and a variety of statistical offices on the other. A meaningful adjustment of the eight factors, consequently, is a necessary precondition for a new stable balance in the ESS.

4.15. Conclusions

The concept of quality has to take into account the nature of products that are provided by statistical services.

Quality management can and should help (a) to improve quality in the countries and (b) to achieve a solution for the convention concerning "relevance" on a European level.

User orientation means (a) that user requirements determine de facto the planning process and (b) that there is a need to check user satisfaction.

The ways in which users are integrated into the planning process differ widely. It should be an objective in the long run to empower users in particular in the concrete planning of the statistical programme and main statistical products (= the statistical system). As quality and the variation of quality within the programme is not least a question of resources and their allocation, also the resource side should be explicitly linked to user needs and their (aggregated) willingness-to-pay.

The system of official statistics is more than the sum of individual products. On the contrary, users ask more and more for combinations of products and services of statistical offices. It is therefore important to ensure that statistical systems can develop in a sustainable manner. A "pay & research" policy would be suitable only for isolated statistical products with the character of private goods (what is the exception). As a consequence, the main entrance into a new and better solution of the quality problem is signed with the heading "Relevance of the Statistical System". Whether the present institutional arrangements of the user-producer dialogue are still effective and efficient in that sense has to be carefully reviewed in the countries as well as on the European level.

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5. Strengths and Weaknesses of the European Statistical System (ESS)

Summary

The results of an inventory of current strengths and weaknesses of the European Statistical System (ESS) are presented. The LEG on quality has identified some of them as priority for further investigations.

5.1. Introduction

In its proposal for the Leadership Group (LEG) on quality, Statistics Sweden mentioned a wide range of topics to be covered in the work of the group, amongst others the "Identification of weak points in the current ESS". There is no doubt whatsoever that the ESS still suffers from a series of weaknesses. The day-to-day experience of the LEG members as well as the group discussions, however, showed that the ESS is not only characterised by weaknesses but that it has also gained quite a number of strengths. The group, therefore, decided to widen the scope of the topic and to establish an up-to-date inventory of the strengths and weaknesses of the ESS. The results of the considerations are summarised below. The list is in no specific order. Both strengths and weaknesses are split into "ESS external", "ESS internal" and "Other" aspects. As ESS internal weaknesses dominate, they are further subdivided into "Organisational weaknesses", "Weaknesses in production" and "Weaknesses in people". One topic, "cultural differences", is seen as a strength and a weakness at the same time. It is, therefore, mentioned in both parts.

5.2. Inventory

The LEG on quality has identified the following current strengths and weaknesses of the ESS:

5.2.1. Strengths

5.2.1.1. ESS external strengths

⊠ Ability for legal acts at European level

As Eurostat is part of the European Commission, Eurostat can propose legal acts in the field of statistics for approval by the European Council. The Member States are directly involved in the preparation of the legal acts through the Statistical Programming Committee (SPC) composed of the heads of the National Statistical Institutes (NSIs) and Eurostat.

☒ Existence of the statistical community programme and other legal acts

Legal acts, including the annual and 5 years statistical programmes of Eurostat, form a sound basis for statistical work in the Member States as well as in Eurostat.

☒ Existence of EU (European Union) funding

A fairly large amount of statistical work in the Member States is possible (only) through financial support from Eurostat and other services of the European Commission.

5.2.1.2. ESS internal strengths

☒ Commitment to evolve and continuously improve the ESS

All ESS members represented in the SPC unanimously agree on the usefulness of the ESS and commit themselves to further develop it. Special attention should be devoted to strengthen the idea of a system in contrast to just a network of Member States.

☒ SPC meetings

The SPC meetings are a perfect forum to develop the ESS, to prepare legal acts, to sort out day-to-day problems and to establish personal relations between the SPC members.

☒ *Encouragement of a culture of partnership and willingness to learn from others*

The experience in the development of the ESS so far has shown that staff of all institutions involved appreciate more and more the spirit of the system, including especially the willingness to learn from each other.

☒ Existence of the partnership group

The partnership group, consisting of NSI representatives, has been established to better prepare SPC meetings and to give the NSIs a bigger influence on the SPC agendas. This group will generally contribute to the strengthening of partnership in the ESS.

☒ Broad consensus on principles of professional work

The legal act on Community Statistics summarises the ethical standards and principles of professional work in the ESS, amongst others based on the fundamental ethical standards for statistics developed by the United Nations.

☒ Development and implementation of harmonised methodology

The development and implementation of harmonised methodology in all working areas of the ESS is one of its biggest advantages and achievements. Current harmonisation efforts in the ESS are mainly concentrated on output harmonisation, less on input harmonisation.

☒ *Systematic quality work has started in the ESS*

Quality related activities are going on in all NSIs and in Eurostat. A good start of systematic quality work at ESS level was made through the LEG work and related activities. However, problems still exist, such as the fact that quality requirements are not sufficiently operationalised particularly at European level. One possible solution might be through legal acts.

☒ Existence of training for European statisticians

The fact that training courses on statistical methodology and other ESS related topics are offered supports the development of the system and its goals.

☒ Ability to produce comparable statistics across the EU

The application of harmonised methodology paves the way for comparable statistics across the European Union.

5.2.1.3. Other strengths

☒ Interest in R&D work in the field of statistics

There is an increased interest in Research and Development (R&D) work in the field of statistics in the ESS. One example is the improved participation of NSIs in research programmes of the European Commission.

☒ Increased importance of statistics in the EU

Recent events and activities such as the stability pact, the Maastricht criteria for the Monetary Union or the indicators for the reform of structural policy have increased the importance of statistics at national as well as at European level, and at the same time have raised awareness of statistics from the point of view of policy makers, the media and the general public.

☒ Expert knowledge

An impressive wealth of knowledge in statistics and statistical methodology exists in all ESS member institutions though it is not always optimally exploited.

☒ Cultural differences

Differences in thinking can strongly enrich the production of statistics at national as well as at European level.

5.2.2. Weaknesses

5.2.2.1. ESS external weaknesses

☒ Different organisational structures and conditions in the Member States for the production of data

Different organisational structures and conditions in the Member States, often caused by historic developments, influence the production of data at national and as a consequence also at European level. As a result the current principle of the ESS is to harmonise outputs (results) and not the inputs.

☒ Slowness of the legislative process and decisions in general

It takes too long for a legal act to reach final approval from the time of the first draft. The delay is partly caused by a non-optimal preparation in the ESS but the general legislative rules also contribute significantly. Delays do not only occur with respect to legal acts but decisions at ESS level in general often take too much time.

☒ Heavy bureaucracy

The bureaucracies in the European Commission, including Eurostat, as well as in NSIs are sometimes a hampering factor for the production of statistics. This phenomenon is particularly striking in the management of financial contracts between NSIs and services of the European Commission, and in the reluctance to follow new approaches/paths.

☒ Lack of resources
An ever increasing burden for the production of additional or more detailed statistics is being put on the ESS members. The financial and particularly human resources however are not being increased to reflect this.

5.2.2.2. ESS internal weaknesses

♦ *organisational weaknesses*

☒ Lack of long ranging general vision

A long ranging vision for the ESS is currently missing.

☒ *Lack and general co-ordination of priorities that are not always stable over time*

Despite Eurostat's work programmes, the priorities of statistical work in the ESS are not always clear and stable over time. Established priorities are too often changed when new requests from European users come up.

☒ Unclear and inopportune financial arrangements, not necessarily in line with political priorities

The advantage of special funding for statistical work by the services of the European Commission is sometimes counterbalanced by difficult to understand and unstable rules. In addition, the available funding does not always coincide with the current priorities of the work programme.

☒ *Effectiveness of working parties and task forces at European level with too many meetings and lack of co-ordination between them*

The quality of meetings organised by Eurostat has improved recently, as can be seen from the relevant performance indicators. However, there is still room for improvement in this area. Crucial points are the high numbers of committees, working parties and other types of groups, and their co-ordination at national as well as at Eurostat level. It is also worth mentioning that participants sometimes act more as observers rather than as active group members.

☒ Lack of communication between users and producers at European level

The communication between producers and users at European level offers room for improvements. This is also valid for the communication with users in other services of the European Commission and external users such as confederations of industries, unions etc. This lack of communication is one of the reasons why the anticipation of future needs by the producers is currently far from reality.

☒ *Lack of internal co-ordination in Eurostat and NSIs*

The lack of internal co-ordination in Eurostat and NSIs is not just simply a problem with regard to the co-ordination of meetings. It also includes problems in relations to data requests, data transfers, data dissemination etc.

☒ Development and dissemination of good practices and other information in its infancy

The work of the LEG has shown evidence that a lot of good practices exist within the ESS. The experience of the LEG is however that these good practices and other useful information are not widely spread within the ESS, partly due to linguistic problems. As a consequence, good practices for the ESS as a system need to be developed and disseminated.

♦ *weaknesses in production*

☒ Lack of (harmonised) metadata caused by lack of systematic reporting of quality information

Information about the characteristics of data (metadata) is a key issue of data quality. The work of the LEG has shown that, though a wealth of such information is partly already available, a general reporting framework for metadata is still missing at national and European level. Considerable efforts to improve the situation are currently taking place.

☒ *Partly unrealistic time-tables for the production of data at national level leading to delays at European level/ time lag for the production of new statistics*

Data production at national level sometimes suffers from strict and even unrealistic timetables imposed, leading to delays at European level compared to pre-established dissemination dates. A related problem is the often very short time span available for the production of statistics arising from new requests.

☒ Lack of analyses

The level of analysis of existing data differs between the ESS members. As a consequence, the available information is not exploited to its full potential.

☒ Need for a better marketing

Despite partly strong efforts particularly in the recent past, there is still enough room for a better marketing of the information provided by the ESS and its members.

♦ *weaknesses in people*

☒ Regular change of staff in Eurostat

Eurostat's staff mobility policy is often seen as disruptive by the NSIs.

☒ *Difficulties in the exchange of staff between the Member States and Eurostat, and between the Member States*

A lot of administrative problems have been identified that hamper an exchange of staff between the Member States and Eurostat in both directions and between Member States. Such exchanges are basically considered important for a better understanding of the functioning of the ESS.

☒ (Almost) no research staff in Eurostat

The amount of staff devoted to statistical research in Eurostat is generally considered to be too low.

☒ Need for further (methodological) training in Eurostat and the Member States

Though training on statistics and related matters is already offered, more efforts seem to be necessary in this field.

5.2.2.3. Other weaknesses

☒ Cultural differences

Cultural differences are seen as a strength and a weakness at the same time. A more homogeneous system as it is found in some national systems might make the work of the ESS more efficient.

5.3. Conclusions

The LEG considers the inventory as input to future systematic improvement actions. Before such actions are launched, an in-depth analysis of the current situation is necessary, taking the experience of international organisations such as the UN, OECD or IMF into account.

As not all strengths and weaknesses are considered to be of the same importance for the ESS as a whole, some kind of prioritisation is needed. The following aspects might be considered important in this respect:

☒ The areas for which improvement actions are proposed should not be restricted to weaknesses but might also include strengths, the reason being that some of the strengths are not yet that well developed. However, the main focus should still be on the weaknesses.

☒ The priority areas should be under the control of the ESS, at least to a large extent.

Taking both points together, the priorities should refer to the categories "ESS internal strengths" and "ESS internal weaknesses" of the preceding chapter. As the strengths and weaknesses mentioned under these categories are still too numerous, a further prioritisation seems unavoidable. The proposals of the LEG are highlighted *in italics* and summarised in the final LEG report.

6. Data Quality

Summary

The quality concepts used in statistical organisations have changed during the last decade, and the most dominant approach today is based on the ISO8402 norm from 1986 which states that quality is "the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs". Even if different statistical organisations use a different breakdown of quality into components, there is globally a very good convergence around the main themes.

However, the different aspects of data quality are not easily measured. Some can be direct measures of error of sources (for example response bias) and indicators of process quality (for example response rate), but often one is forced to use proxy measures or qualitative assessments. This is due to lack of available methodology and software, and time and cost constraints.

The increased needs of survey comparability, comparability between National Statistical Institutes, and for better descriptions of the European Statistical System, stress the importance of standard sets of measures and indicators for reporting product quality. Work on such standardised quality reports is underway in several countries.

Furthermore, there are different ways of implementing quality reports, and this depends most of the time on the purpose of the reports. For example, some NSIs use the reports internally as quality assessment tools, and others use short reports with main indicators for informing users about the quality of the results. However, it is becoming more and more common that Regulations are concerned with the criteria for the evaluation of quality of specific subject domains.

Thus, the starting point is to measure and report, but the quality of the output can only be guaranteed if there is good quality in all the underlying processes. By improving the process quality the product quality will follow.

6.1. Introduction

The quality concepts used in statistical organisations have changed during the last decades. From having focused on the measurement of accuracy (in terms of sampling and non-sampling errors) some forerunners among the NSIs begun during the 80's to broaden the quality concept on the aspects related to information and satisfaction of users. Nowadays, many producers of statistics have adopted the total quality model, and the most dominating approach today is based on the ISO8402 norm from 1986 which states that:

"Quality is the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs".

This approach to quality focuses on the users, and implies that the quality concept should reflect all aspects of a product that affect users' views on how well the product meets their needs and expectations.

6.2. The definition of quality

An all-encompassing definition is given in the regulation 322/97 on Community Statistics where quality is defined from an *ethical* and from a *professional* point of view as made of the following principles: *reliability, relevance, value for money, impartiality, confidentiality of individual data and transparency*. Some of these components are of a very ethical nature and are in general outside of the scope of the quality issues in the sense it has in many organisations.

Several of the statistical institutes have adopted more operational definitions of quality. The Eurostat quality concept (Eurostat 2000a) is based on the ISO 8402 –1986 norm, and defined with reference to several criteria:

. *relevance;*
. *accuracy;*
. *timeliness and punctuality;*
. *accessibility and clarity;*
. *comparability;*
. *coherence;*
. *completeness.*

⊠ Relevance
A statistical product is relevant if it meets users' needs. The identification of users and their expectations is therefore necessary.

⊠ Accuracy
Accuracy is defined as the closeness between the estimated value and the (unknown) true population value. Assessing the accuracy of an estimate involves analysing the total error associated with the estimate.

⊠ Timeliness and punctuality
Most users want up-to-date figures, which are published frequently and on time at pre-established dates.

⊠ Accessibility and clarity
Statistical data have most value when they are easily accessible by users, are available in a format users desire and are adequately documented. Assistance in using and interpreting the statistics should also be forthcoming from the providers.

⊠ Comparability of statistics
Statistics for a given characteristic are most useful when they enable reliable comparisons of values taken by the characteristic across space and over time. The comparability component stresses the comparison of similar statistics between countries in order to evaluate the meaning of aggregated statistics at the European level.

☒ Coherence

When originating from a single source, statistics are coherent in that elementary concepts can be combined reliably in more complex ways. When originating from different sources, and in particular from statistical surveys of different frequencies, statistics are coherent insofar as they are based on common definitions, classifications and methodological standards. The messages that statistics convey to users will then clearly relate to each other, or at least will not contradict each other. The coherence between statistics is orientated towards the comparison of different statistics, which are generally produced in different ways and for different primary uses.

☒ Completeness

Domains for which statistics are available should reflect the needs and priorities expressed by the users of the European Statistical System.

When making the quality concept concrete, it is natural to break down each main component into a number of sub-components.

6.3. Comments on the quality concept

Since harmonisation and co-ordination of statistical systems are important activities in international statistical work aiming at good comparability and coherence of statistics, these quality components are emphasised in the UN guidelines and in the Eurostat quality concept.

Other organisations use slightly different sets of dimensions. For instance, Statistics Canada (1998) uses *relevance, accuracy, timeliness, accessibility, interpretability and coherence*, i.e. six dimensions. Statistics Sweden uses five (Rosén and Elvers (forthcoming)). There is, however, a very good convergence among them.

Sometimes even a broader quality concept is used, which also takes into consideration more aspects related to the data suppliers. If so, aspects such as response burden, confidentiality, and integrity might be taken into account.

There is a trade-off between the different components of quality, especially: timeliness/accuracy, accuracy/comparability through space, relevance/comparability over time, relevance/accuracy, and coherence for large domains/relevance for sub-domains. A concrete example of conflict is timeliness and accuracy, since good accuracy general takes time to achieve. This is discussed more by Holt and Jones (1998).

Some writers use the term "content" instead of "relevance", for the reason that the relevance is too much on the assessing side of the quality (which should be left to the users). By using the term "relevance", aspects of users needs and results from user satisfaction surveys should also be taken into account.

Sometimes "reliability" is used as a synonym to "accuracy". This is wrong since "reliability" is more linked to "consistency", and even if a process/system is consistent, it doesn't have to be accurate.

There is clearly a strong link between the quality of statistics and the resources available to produce them. An assessment of costs should be kept in mind during the quality evaluation process. Cost should then be considered both as a burden on respondents and as a certain budget available in the statistical organisations.

6.4. Measurement of Quality

Thus, if we accept the existence of a set of dimensions and sub-dimensions we end up with a vector where some components are quantitative and others are qualitative. Accuracy and some aspects of comparability are quantitative but most other components are qualitative. A component such as timeliness and punctuality can indeed be measured in quantitative terms, such as "three days late" or "estimates concern the population state eight months prior to the release date," but in essence this component is also qualitative in nature.

Some aspects of the data quality can be direct measures of errors (for example response bias) and indicators of process quality (for example response rate). The first one belongs to the category of evaluating measures. These measures are produced in order to give quantitative information of the bias. Normally, special evaluation studies have to be conducted where information about the "true values" are collected with better methods and concepts than are used in the ordinary survey. The difference between the estimated value and the "true value" can then be quantified. However, these studies are often expensive to carry out and are only motivated to conduct on a *multi-yearly basis*. The second one belongs to the category of screening indicators (or derived indicators). These are indicators that can more or less be taken directly from the production process, and should be calculated on a *regular basis*. These indicators can then be used to detect where further research is necessary for evaluating eventual bias.

A lot of process information can be gathered and used for descriptions and indicators when evaluating the quality. From the International Quality Questionnaire, that was sent out within the framework of the LEG on Quality (Eurostat, Statistics Sweden, 2000) to the NSIs in the EU, it can be seen that very few NSIs collect process information on a regular basis, and most of them have not defined a standard set of quality indicators. A standard set of indicators can be used by the survey managers to monitor their production processes and to evaluate the quality over time, and the user of statistics will have adequate information about the information in order to correctly use the statistical data. One of a few systems that exist is the Information System for Survey Documentation (SIDI) developed by ISTAT (Bocci, L. et al., 1999) which is a generalised tool for the quality control of their surveys. The SIDI system manages both quality indicators and metadata in an integrated way. The standard quality indicators are grouped according to the main phases of the survey process. A set of standard quality indicators is available for each of

the groups in order to allow the user to investigate the underlying sources of errors.

Work on the development of quality index has quite recently started in some of the NSIs. An example is the work done by Statistics Netherlands (Booleman and Brakel, 1999) on how to achieve quantifiable output oriented quality characteristics, and how to link quality indicator information to the quality index. A general conclusion is that the calculation of a total quality index presupposes that all quality components can be measured in a quantitative way and that weights can be assigned to the resulting assessments. Therefore one should strive for the development of more quantitative measures for each component.

Furthermore, even if the user's interest is focused on the overall quality of the statistics produced it is seldom possible to quantify the total accuracy. However, it is often possible to give quantitative information for some of the errors and give verbal judgements of the effects of the other errors or at least to give a description of deviations from concepts/ norms or recommendations for measurement.

So called "quality information stairs" can be used for assessing the quality of a statistical product. The "steps" contain information that can be provided to the users depending on the "degree" of information available on the quality of the comparisons. An example of such quality stairs is given in Linden (1999). With the highest level of knowledge quantitative estimates can be provided for the remaining lack of quality. For the lower level of information a description can be given of the main sources and reasons for lack of quality due to for example the statistical *concepts* (statistical characteristics, statistical measure, statistical unit, population, reference times, study domains) and *measurement* (sampling design, sampling errors, data collection, data processing, estimation).

In order to be able to assess the quality, the users have to express their needs not only in terms of for example data content and timeliness, but also in terms of accuracy and comparability.

However, there is still a lot of work to do concerning development of measures, cost effective methods for assessing quality, and tools that support its measurement.

6.5. Quality Reports

The increased need for survey comparability, comparability between National Statistical Institutes, and for better descriptions of the European Statistical System, stresses the importance of standard sets of measures and indicators for reporting product quality. Work on such standardised quality reports is underway in several countries. Examples are the development of business survey reports for French official statistics, and Sweden has a rule stating that every survey should be accompanied by a quality declaration, and some

surveys or survey systems in the U.S. have produced so called quality profiles. Eurostat has developed a Standard Quality Report.

☒ Eurostat Proposal for a Standard Quality Report (Eurostat, 2000b)

Briefly, the ideal quality report should give a description and an assessment of lack of quality due to user satisfaction, sampling and non-sampling errors, measurement errors, data processing errors, key production dates, forms for dissemination, availability of documentation, changes over time, differences between national concepts and European concepts, and the coherence with other sources (for example, between preliminary and revised figures, annual and short term results, annual statistics with censuses).

Overall, the evaluation of the quality of statistics covers more than 60 different items (see Eurostat 2000a). Some of the required information is very specific for the actual survey and should therefore be gathered on a yearly basis. Other quality aspects that do not fluctuate so much over time or where the requested information demands extra resources should be evaluated on a multi-yearly basis.

☒ Proposal of a Standard Quality Report for French business surveys (Rivière P., INSEE, 2000)

The aim is to propose and submit a standard structure for a quality report that is sufficiently general to be applied substantially to any enterprise survey. Such a Quality Report would include three sections:

. A checklist or "quality sheet" containing all necessary quality indicators on different topics, with the aim to keep the sheet simple, concise, and readable.

. Comments as footnotes to the general terms used in the sheets. The comments are intended to explain the content of the checklist. The comments section must also provide an opportunity for self-assessment comments

. Description of methods. A short description of all the survey processes.

The proposed quality report is not intended to be exhaustive, and the time to fill in the report for a methodologist is estimated to be about two weeks.

☒ Quality Profiles

The purpose of a Quality Profile is to summarise what is known about the quality of data from the surveys and to provide information about the survey design and the survey procedures. The report should be of interest to users of data, and to persons responsible for various aspects of the design and operation of the surveys. An example is the US Quality Profile for the Schools and Staffing Surveys (National Center for Education Statistics, 2000) where information on errors associated with each phase of survey operations are presented: frame design and maintenance, sample selection, data collection, data processing, estimation, and evaluation of survey estimates.

It also attempts to identify key areas where efforts for methodological improvements might be most effectively directed and where further information is needed for the assessment of survey quality.

The problem with a quality profile is that it cannot be particularly timely since it compiles the results from studies of the quality and such ex-post activities take time.

Instead quality reports or quality declarations have been used where information on each dimension is provided. For instance, a quality report could give a description and an assessment of lack of quality due to user satisfaction, sampling and non-sampling errors, key production dates, forms of dissemination, availability and contents of documentation, changes in methodology or other circumstances, differences between preliminary results and final results, annual and short term results, and annual statistics and censuses. Such descriptions typically cover the various dimensions with a varying degree of success. It is very common that quality reports emphasise what is known rather than what is not.

6.6.   Implementation of quality reports

From the International Quality Questionnaire it can be seen that almost all NSIs are positive about the Eurostat request for quality reports. The reports are deemed as useful and necessary. The majority of the NSIs, however also express a concern regarding the level of ambition of the quality reports. The NSIs must be able to provide quality indicators easily within a reasonable cost. The indicators must include the same information for all Member States and should have a similar structure for business and household surveys.

The standard reports mentioned so far describe *what* to report. Experiences have shown that support is needed on *how* to compile a report. A very useful example on general guidelines on implementation of model quality reports is the reports from the project "Model Quality Report in Business Statistics", ONS et al. (1999).

The role of quality reports should be seen as a means to visualise quality components that an organisation view as the most important ones that need to be specified to the user of a product, depending on the different purposes that it should fulfil. From the International Questionnaire on Quality the Member States have given the following uses of the quality reports:

⊠   internally and externally as quality assessment tool;

⊠   to improve the quality of surveys;

⊠   to make comparisons between surveys;

⊠   to build quality indicators to be disseminated;

⊠   information to users;

⊠   a tool for improving production processes and data quality;

⊠   as part of a system for documentation of production processes.

In addition, Eurostat stressed the importance of having a standard structure (and indicators) for quality reporting which would ease comparisons between countries, surveys, and different thematic domains.

Thus, depending on the uses of the quality reports the "comprehensiveness" of a quality report will vary. However, as agreed in the Eurostat Working Group on the Assessment of Quality in Statistics, the structure of a quality report should as far as possible follow the Standard Quality Report as defined by this Working Group.

6.7.   Data quality and process quality

The users are normally interested in the quality of the final statistics (micro data or aggregated data), whilst the producer is *also* interested in the quality for different sub-processes of the statistical production (statistical processes such as observation, analysis of micro data (editing and imputation), aggregation and weighting, dissemination).

The collection of process data is often a precondition for the assessment of the product quality. It is also a precondition for measuring the efficiency of the production process of the product.

A lot of process information can quite easily be gathered and used for descriptions and indicators when evaluating the quality. For some of the information (quantitative estimates) special evaluation studies have to be carried through. These studies often need a lot of resources and are only motivated to conduct on a multi-yearly basis (section 4).

According to the International Quality Questionnaire the NSIs are collecting different types of process data for the following processes:

- ☒ interview process

- ☒ coding and editing

- ☒ budget

- ☒ timeliness of publication

- ☒ response rates

- ☒ data entry errors

- ☒ frame errors

The collection of process data is not always done systematically and the type of data that is collected varies within NSIs depending on the survey. The conclusion is that there is a lot of space for improvements in this area. First, for defining standard sets of process data that should be collected on a regular basis for measuring the efficiency of the production processes, and second, also for the development of methods and tools that support the calculation of process indicators. An example of such a tool is the Editing Standard Evaluation System (ESSE) developed by ISTAT (Rocca, G.D. et al., 2001). The performance of an editing process is determined by a number of factors

including the amount and kind of errors present in the data, the set of control rules (edits), and the characteristics of the error localisation algorithm.

6.8. Legal acts on quality

When dealing with quality issues with the Member States, the outcome can materialise in various shapes such as Regulations, or the setting up of appropriate working parties or simply holding more informal discussions, for instance in the sectorial Working Group meetings.

Quality is already included in several regulations and this is generally the result of pre-existing customs or previous working agreements with Member States

However, the existing regulations address the quality issues in very different ways. The most complete one is the regulation on the Labour Cost Statistics (Commission Regulation (EC) N° 452/2000 of 28 February 2000 (OJ L55, 29.2.2000, p53)). It reviews each of the seven ESS quality components and it recommends, sometimes as optional, the collection of the appropriate information or of the relevant indicators for each of these components.

Another example is the regulation on Structural Business Statistics (Commission Regulation N° 1618/1999 of 23 July 1999, (OJ L192, 24.7.1999, p11)) which has adopted a precise but very limited scope: in addition to the requirement of qualitative information on the survey strategy and the misclassification treatment, it concerns only the accuracy component, and only two aspects of it: sampling errors with the calculation of coefficients of variation (CV) and non-response with the calculation of non-response ratios.

Other Regulations remain vague and do not require any precise calculations: they foresees that quality should be covered, but leave much scope for Member States to decide how, only stressing the need that common criteria should be used.

There are needs to harmonise and standardise legislations on quality. This implies communication and co-ordination between the actors of the European Statistical System and harmonised solutions to the methodological problems encountered.

6.9. Conclusions

The increased need for survey comparability, comparability between National Statistical Institutes, and for better descriptions of the European Statistical System stress the importance of having and using a common definition of quality. The recommendation from the Leadership Group on Quality is that each NSI should report product quality according to the ESS quality dimensions and sub-dimensions. There are also needs for standard sets of indicators for this reporting. This implies that process data have to be collected for all the statistical production phases. Only a few NSIs are

currently collecting such process data in a systematic way, and there is space for a lot of improvement in this area, both for defining standard sets of process data that should be collected on a regular basis for measuring the efficiency of the production processes, and for the development of methods and tools that support the calculation of process indicators for the assessment of the data quality.

A formalised way of implementing quality issues is by the use of legal acts. Instruments such as Regulations concerning quality criteria for the evaluation of statistical products are already existing for some domains. However, there are needs to harmonise and standardise such acts.

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7. The Interrelationship of Different Quality Management Mainframes

7.1. Introduction

The objective of this paper is to give information about different basic Quality Management approaches used in (statistical and non-statistical) organisations, aiming at the improvement of their performance. Different frameworks will be presented, like Quality Control, Total Quality Management (TQM), the EFQM model, the ISO 9000 family, the Business Process Redesign (BPR) approach, the Balanced Scorecard and Six Sigma. The presentation will include a description of their strengths and weaknesses and shows to which extent the different concepts overlap.

7.2. Quality through inspection

The ultimate purpose of all quality models is to provide high quality products. The earlier view focused on the product rather than on the process that created the product. This naturally also lead to the belief that quality could be reached by inspecting the product and rejecting it or reworking it to meet the specified standards. A specific aspect of this approach is acceptance sampling, where not all products are tested, but instead a sample of a specific size. Depending on the number of defects the whole lot of products may be rejected or targeted for rework. This applies also to results from sub- processes. Various variants of this approach exist in statistical institutes today.

All products will receive the desired level of quality in case of a 100% inspection, and in the case of acceptance sampling a large (pre-specified) proportion of the products will. The 100% inspection is a relevant approach when no defect products can be allowed, i.e. when human life is at risk for instance. Acceptance sampling is usually much less expensive and time consuming, and therefore it is better suited for situations where some level of defects is acceptable. It might be the preferred approach if the production process is not in statistical control. The nature of acceptance sampling means that some lots that are acceptable will in fact be rejected and vice versa. However, in case of a production process under statistical control, the quality of the output is known in advance within certain limits. In this case acceptance sampling would only add cost and time to the production process.

The main benefits of such an approach are:

⊠ It is output driven: the characteristics or specifications of the products are clearly defined and could be presented to the users;

⊠ It is easy to apply and understand: once the characteristics are set, the producers are well aware of the requirements.

The main drawbacks are:

☒ No built-in mechanism of continuous improvement: the process will be improved only in case of problems;

☒ The focus is product-oriented: the quality of the organisation as a whole is not involved.

7.3. Total Quality Management

Total Quality Management, TQM, can be considered a management philosophy, aiming at conducting business with a focus on the overall quality of products and services. It is defined through a number of core values, which set up the framework. It is not defined in absolute terms, and forms the conceptual basis for a variety of derived models. Models like the European Foundation for Quality Management (EFQM) model and awards like the Malcolm Baldridge Award and the Japanese Quality Award are based on TQM. In order to give an idea of the core values of TQM, the following list comprises the basic features of TQM as interpreted by Statistics Sweden for the purpose of its own quality approach:

☒ Customer orientation:

In the daily work all staff see it as their task to fulfil the expressed and unexpressed needs of both external and internal customers. This is at the centre of TQM, since no organisation, part of organisation, or employee for that matter has a reason to exist only for itself. Its purpose is to add value to its customers. It is important to note that internal customers are included in this definition.

☒ Leadership and the participation of all:

A culture which places the customer at the centre requires that every leader shall have a sense of commitment and urge the quality work forward. The leader establishes clear objectives and makes it possible for the staff to feel that they are making particular contributions. This presupposes that all participate in the process of change. This approach encourages teamwork, develops the competence of all staff, and bases decisions on facts.

☒ Process orientation:

Operations are considered as being made up of a large number of processes. Adopting this point of view, one should delegate power and responsibility and foster improvement of workflow, final products and work organisation. Focusing on the processes creating the products is necessary to efficiently achieve constantly high quality in the output.

☒ Measurements and understanding of variation:

By continually measuring key process variables, as also the effects of different lines of approach, one obtains a basis for action and can determine whether there have been improvements in quality. The concepts of special and common cause variation are of central importance, since they have a direct bearing on the line of action.

☒ Continuous improvement:

In order to maintain and develop efficiency and competitive ability one must continuously improve processes and products. Change in the form of improvement is the normal state of affairs to be striven for. Reality and the currently available possibilities are constantly changing and must be taken into account in order to continue to provide good value to the customers.

The main strengths of TQM certainly lies in the overall contemplation of processes aiming at adding value to the customer through continuous improvement, in which all members of an organisation have to be involved. However, quite different ways are possible to apply this approach in practice. TQM offers no guidance on its practical implementation. It is this weakness that brings more concrete models on the screen, one of the most prominent being the EFQM excellence model.

7.3.1.   The EFQM Excellence model

The European Foundation for Quality Management (EFQM) is a private-non-profit organisation that developed a TQM-based applied quality model for use by its members throughout Europe, the EFQM Excellence model. Altogether 9 criteria with 32 sub-criteria have been identified to cover all aspects of TQM, 5 of the criteria refer to what an organisation does, and are therefore called the "enablers". They comprise the criteria on leadership, policy and strategy, people, partnerships and resources, and processes. The other 4 criteria cover what this organisation achieves, and are summarised under the term "results", including customer results, people results, society results, and key performance results of the organisation. Figure 1 gives an overview of the EFQM Excellence model in its latest version (1999).

Figure 1   The EFQM model
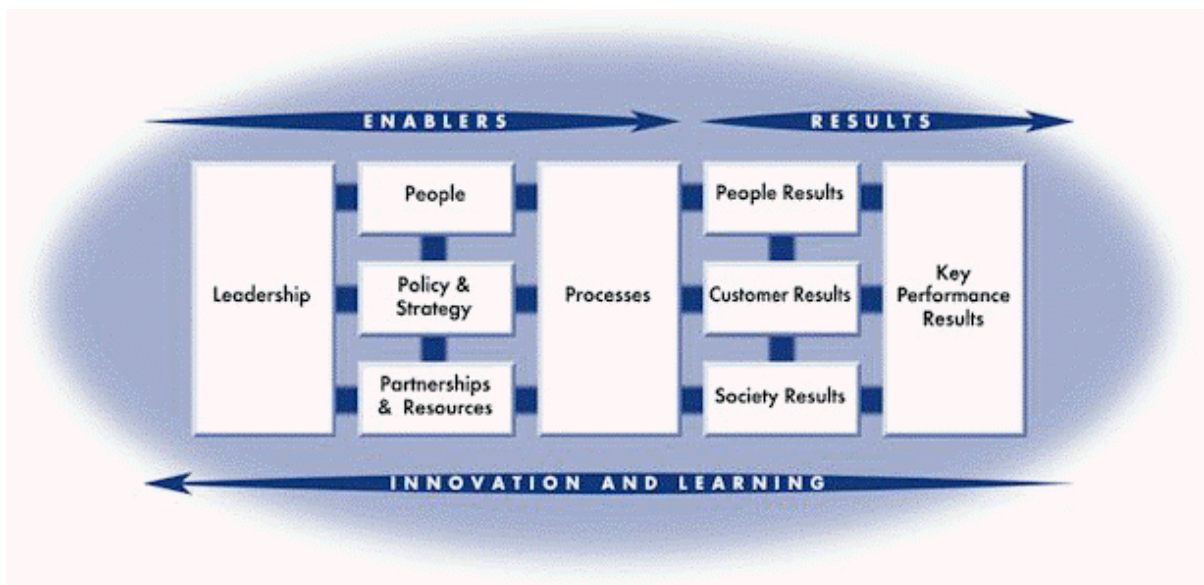
The EFQM excellence model is nothing but a tool enabling the user to get a fairly comprehensive overview of the different quality-related aspects of his organisation. The application of the model by itself does not improve the level of excellence of an organisation. It just delivers the basis for appropriate measures aiming at quality improvements. This flexibility is its strength and weakness at the same time. It is a strength as its application does, for example, not require an in-depth documentation as the ISO approach does. On the other hand, its use alone does not lead to any quality improvement. As mentioned, it forms the basis for concrete actions to be derived from the information gained through the model application. Another strength of the model is its flexibility as each user can start its improvement process in whatever area, depending on the specific weaknesses of the organisation under consideration.

There are further strengths of the model and its application. Developed from an internationally already successful approach, it takes European and national peculiarities into consideration. This fact might be one reason why the model is widely used all around Europe and even in countries outside. This wide use also makes it possible for users to benchmark their performance against many other organisations in the same branch or others. Although widely accepted this model also has some drawbacks. It takes a long time to implement the model in the organisation.

The Balanced Score Card (BSC, see below) is one tool to measure the overall level of quality of an organisation that might be based on the EFQM Excellence model.

7.3.2. Balanced Score Card (BSC)

The Balanced Score Card is a tool by which the performance of the organisation can be evaluated in a well-balanced way. Vision and strategy of an organisation are translated top-down into quantifiable initiatives at the operational level. Mission and strategy are transformed into a comprehensive collection of performance indicators. This collection forms a framework of a strategic measure-and–management system.

The following four perspectives are distinguished in the model.

- ☒ Customer perspective: On which critical aspects do our customers judge us?

- ☒ Learning ability: What makes us continually capable to go on improving?

- ☒ Financial perspective: What determines success to the shareholder?

- ☒ Business processes: What is essential in our business processes? Are we able to compete? Do we use modern tools and machinery?

Although BSC is a tool for the top, handling this tool has a strong influence on the behaviour of the staff. For each performance indicator the question is asked: who directs it, who is responsible and does the relevant staff members have the necessary power?

7.4. ISO

Although ISO (International Organisation for Standardisation) cannot be considered a quality system based on control, we discuss ISO in this section because it certifies and checks. The starting point of the ISO quality philosophy is that <u>you do what you put down in writing</u> and that <u>you put down in writing what you do</u>. The process in practice has to be transparent. Periodically it has to be checked (inspected) on that principle.

Thousands of organisations have or are preparing to get an ISO certificate. This model is based on the principle that people in an organisation have to reach agreements and keep to them. Agreements should be reached on:

☒ the course of the organisation in the field of quality, laid down in a specific and measurable quality policy;

☒ the construction of the organisation, laid down in an outline of the segmentation of authorities;

☒ the control over overlaps in the organisation, laid down in procedures;

☒ the control over the processes, laid down in instructions, specifications and testing plans.

The ISO model focuses on core values like customer orientation, leadership and participation of all, process orientation, and continuous improvement. In that sense there are no big differences between ISO and EFQM. The differences are in implementation. In the ISO model the organisation is obliged to put everything in official documents. The performance of this is checked periodically by means of the ISO standards. ISO 9000 sets the target of the relevant organisation, the product or service, and the specific procedures. It gives the definitions of the quality concepts and guidelines for the implementation.

The model distinguishes five ISO standards to guarantee quality, ISO 9000 through ISO 9004. The certification is done by acknowledged institutes. The titles of the three standards are as follows:

☒ ISO 9000:   Quality managing and norms for guaranteeing quality; guidelines for implementation.

☒ ISO 9001:   Quality systems: model for guaranteeing quality at designing, constructing, testing and delivering the product and the after sales service.

☒ ISO 9004:   Quality managing and the elements of a quality system. ISO 9004 pays attention to the efficiency by means of the quality costs of the organisation but can not be certified.

  The ISO 9000 standards are customer oriented in the sense that the customer stipulates the condition to the quality system of the producer. If the organisation wants to set up a quality system on its own initiative, ISO 9004 can be helpful. It is also useful for improving existing quality systems as it gives a lot of information and clarification of that system.

  ISO 9000:2000 is a revised version of the ISO 9000. The new version is closer to EFQM, paying more attention to development and improvement.

7.5. Business Process Redesign (BPR)

Like other Total Quality Management systems the aim of Business Process Redesign is improvement. BPR means 'starting over'. It does not mean tinkering with what already exists or making incremental changes that leave basic structures intact. It means asking the question: "If I were re-creating this company today, given what I know and given current technology, what would it look like?" Redesigning a company means tossing aside old systems and starting all over.

A good definition of BPR is 'the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed. This definition contains four key words.

☒ Fundamental: redesigning first determines *what* a company must do, then *how* to do it. It takes nothing for granted. It ignores what *is* and concentrates on what *should be*.

☒ Radical: radical redesign means getting to the roots of things: disregard all existing structures and procedures and invent completely new ways of accomplishing work.

☒ Dramatic: redesigning is not about making marginal or incremental improvements but about achieving quantum leaps in performance.

☒ Processes: a business process can be defined as a collection of activities that takes one or more kinds of input and creates an output that is of value to the customers. The individual tasks within the process are important, but none of them matters by itself if the overall process does not work – that is, if the process does not deliver the goods or services.

BPR is not the same as total quality management, or any other manifestation of the contemporary quality movement. Quality programs and redesign share a number of common themes. They both recognise the importance of processes, and they both start with the needs of the customer and work backwards from there. However, the two programs also differ fundamentally.

Quality programs work within the framework of a company's existing processes and seek to enhance them by means of continuous incremental improvement. The aim is to do what is already done, only to do it better. Quality improvement seeks steady incremental improvement to process performance.

Redesigning seeks break-through, not by enhancing existing processes, but by discarding them and replacing them with entirely new ones.

The strength of BPR is that it gives the opportunity to break free from convention and the existing way of performing a certain task. The focus on radical and dramatic changes makes it necessary to try and find solutions outside the existing framework of the current processes. On the other hand, processes may not always be in need of radical and dramatic changes, but rather minor adjustments and "fine-tuning". The approach also demands rather large resources that can only be allocated during a limited time and probably not very often. These are drawbacks that make BPR less useful as a stand-alone mainframe for quality improvement. In certain situations, when processes are in need of big improvements or when great new possibilities

have opened up, it can be a very useful approach though. A flexible combination between BPR and continuous improvements in smaller steps is the most rational way to improve quality if improvement of the current system is no longer possible.

7.6. Six Sigma

Is an approach that focuses heavily on continuous improvement to shorten cycle times and increase yields, but the most important goal is to reduce the variation in the output of the processes. The basis for the approach is to establish very formalised measurements of out put characteristics. These characteristics need to be critical to the customer, as the customer should define what the target value and defect determinant is. A lot of emphasis is put on the reliability of the measurements: they need to be subject to a minimum of measurement error. The single measurement that is followed is Defects Per Million Outputs (dpmo), which should be below 3,4. This level corresponds to six sigma performance.

Project teams, that are made up of all the staff of the organisation and that utilises basic quality management tools as well as more advanced methods of analysis, drive the improvement work. The teams work in a formalised way through the stages: Measure, Analyse, Improve, and Control. For the purpose of improvement not only output characteristics are measured, but also input characteristics. The Control phase aims at verifying the effects and institutionalise the results, that is make them visible in the organisation.

To strengthen this approach there is a formal structure with different levels of facilitators, based on the belts of martial arts; white belt, green belt, black belt, master black belt, champion.

The applications can so far mostly be found within the manufacturing industry in the US, but some examples from the service sector exist as well.

The positive side of the approach is that it focuses on concrete improvements, driven by measurements and supported by facilitators and quality tools. The approach does not provide a structure for the development of the organisation as a whole though, which might be one reason why many organisations use it as one tool, among others, for achieving concrete improvements and not as the single approach in the organisation.

8. Assessment Tools

8.1. Introduction

The purpose of quality management is continuous improvement of the organisation as a whole, formulated in clear objectives, to achieving sustainable excellence in all aspects of performance. For making improvement programs it is important to know the weak points within an organisation. Measurements are necessary to obtain this knowledge.

The EFQM model distinguishes nine criteria. Customer satisfaction, people (employee) satisfaction and impact on society *(results)* are achieved through leadership-driven policy and strategy, people management, resources and processes *(enablers)*, leading ultimately to excellence in business results.

Concerning the four 'result criteria' – people perception, user satisfaction, impact on society and business results – information about the effectiveness of the organisation can be got by measuring.

To get good results it is necessary to straighten out the whole internal organisation. Within this organisation five relevant criteria can be distinguished. For each criterion we can ask ourselves the following questions:

☒ are the **processes** running smoothly: what is the length of the production process, how is the tuning between the departments, are we doing it well, are the processes scrutinised critically with a view to increasing efficiency and effectiveness?

☒ does everyone know the **policy and strategy** to reach the objectives?

☒ has the policy on **people and information management** clearly been described: what do the employees perceive, are they closely involved in the objectives to improve the performance of the organisation?

☒ are the **resources** effectively used to realise the objectives? After all, without the right investments and tools it will be difficult to realise the objectives.

☒ in what way does the **leadership** interpret their task: do they have a clear vision and do they propagate this vision consequently, do they support the implementation actively to realise the agreed objectives, do they take the employees seriously when they suggest something for improvement?

Different assessment tools are known and applied in different organisations. Among others it is important to mention the following tools.

☒ Self-assessment according EFQM: within to so-called Plan-Do-Check-Act cycle measuring by yourself the present situation;

☒ Benchmarking: learning from the experience, knowledge and mistakes of others;

☒ Staff perception survey: measuring the motivation and professionalism of the employees;

☒ User satisfaction survey: measuring the fulfilment of the needs of the (main) users;

☒ Performance indicators: to compare the present performance with the targets, the past or others and to monitor the processes;

☒ Product quality indicators: quality reports present indications of the quality of a certain product, quality indicators can compare the targets with the realisation;

☒ Auditing: evaluation of the quality of the process and the results;

☒ Checklists: they can improve the quality and the stability of processes.

In general assessment tools give an answer on the question 'where are we now?'. The management should set targets like 'where do we want to be next year'. This chapter presents the different tools to assess the quality and the performance of an organisation. Not the absolute level of performance is important. The focus is on the relative improvement: the possibility of the organisation to learn and to improve itself. It is part of the Plan-Do-Check-Act cycle.

8.2. Tools for self-assessment: EFQM and other

As we have seen, the EFQM model is a comprehensive model for quality management: It has been designed for a number of different functions. One of these functions is to provide a general framework for strategic planning and the identification of necessary improvement measures. But, apart from this, the EFQM-model is also a diagnostic tool allowing an organisation to assess its current level of quality, to identify its strengths and weaknesses as a sound basis for improvement activities. This diagnostic function is usually referred to as "self assessment".

In an EFQM self-assessment, the organisation compiles a quality profile for the whole range of the criteria given by the model (see figure). For each of the criteria, there is a set of questions that have to be answered. E. g., for each enabler criterion, by answering these questions, the organisation identifies a list of its own strengths and weaknesses and has to indicate

☒ whether the approach of the organisation referring to the respective criterion is sufficient to answer the questions raised in the criterion,

☒ whether that approach is deployed, i. e. systematically implemented in all relevant areas and

☒ whether that approach is regularly assessed and reviewed.

Figure: Quality Profile (possible result of an EFQM self assessment)
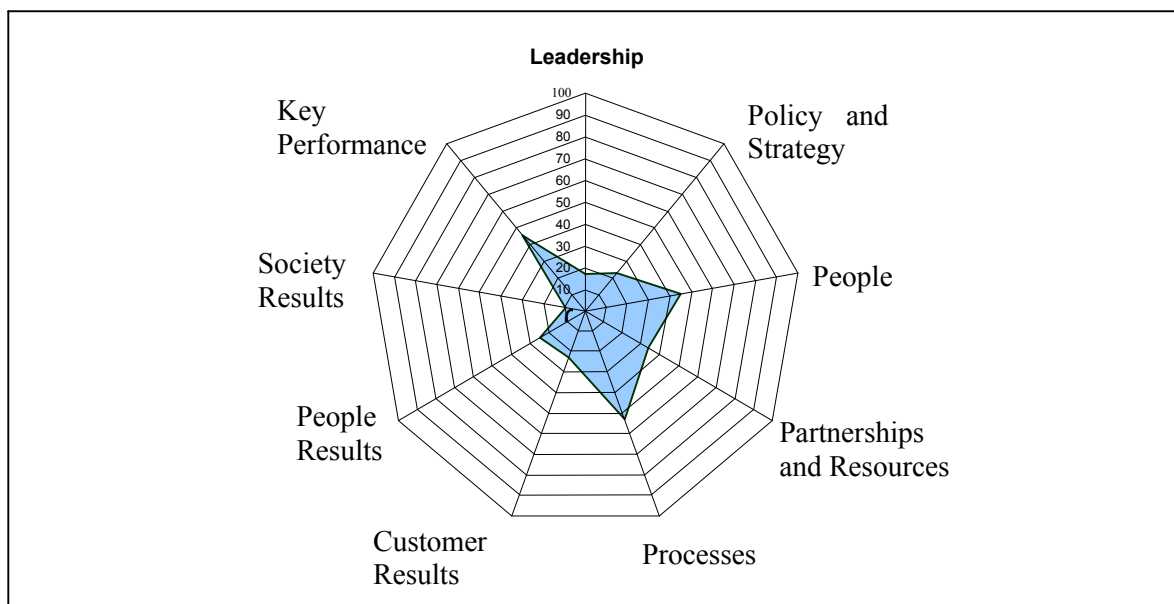
As a result, a percentage score is allocated to each (sub)criterion. Put together, these scores, in a rough overview, show the current "health" of the organisation and help to identify and prioritise a "therapy". Self-assessments can be undertaken at different levels of the organisation (e. g. at the organisation or department level).

In contrast to other assessment tools, we do not try to measure quality in a quantitatively "objective" way in a self-assessment. Strengths and weaknesses are evaluated subjectively to a certain degree. It is the method used during the self-assessment and its deployment that guarantees comparable and reliable results. There are different methods developed by the EFQM. E. G., a self-assessment can be undertaken as moderated assessment workshop during which a management team representing the organisation (or organisational unit) evaluates the organisation in consensus. Other methods include standardised questionnaires, assessment matrices, and the simulation of the application for the European Quality Award (EQA). Further information on self-assessment methods and tools is available at the EFQM (www.efqm.org).

Finally, it has to be noted that self-assessments cannot only be used at the level of the EFQM criteria but also at more specific levels, e.g. for statistical processes and products. Here again, a checklist prescribes a number of questions to be answered or simply ticked off. This approach has been used by, for instance, Statistics Netherlands, ONS, the Federal Statistical Office Germany and Statistics New Zealand. The process of ticking off the items on the checklist, which is done by people working with the actual process and product, increases the awareness of quality issues and reveals areas in need of improvement. Examples of items that can be part of such a checklist are (examples taken from Statistics New Zealand):

☒ The program has a good understanding of who the key users and emerging new stakeholders are.

☒ Questionnaires, definitions, and classifications reflect contemporary needs and situations.

☒ Documentation is complete and accessible.

☒ The program contributes to professional associations and international developments.

☒ Data definitions are consistent.

☒ The sample is regularly redesigned.

☒ Long-term time series are available.

☒ Seasonal adjustment analysis is performed.

☒ Sources and methods documentation is available.

☒ Release dates are advertised in advance.

☒ Information is available in formats and media as required by users.

☒ Standards for time taken to meet requests are met.

☒ All processes are automated.

☒ Information to respondents on purpose of collection is provided.

☒ Releases are checked for confidentiality.

☒ Indicators of quality are regularly measured and monitored.

☒ Requirements of the Statistics Act are met.

This kind of checklist can be developed by introducing follow-up questions containing key words like when, how, etc. Such follow-up questions make it almost impossible to provide too bright a picture of the current situation.

8.3. Staff perception survey

The business results and satisfied customers depend to a great extent on the motivation and the professionalism of the employees. That is the reason why it is important to measure the appreciation by the employees.

In the UK, for example, the ONS designed a annually 'staff questionnaire' to obtain information about staff perceptions and attitudes to issues concerning their jobs, their line managers, the organisation as a whole, internal communication, and to their training and development. The questionnaire is distributed to all ONS staff. It contains the next subjects:

☒ about you and your job;

☒ about your line manager;

☒ about your opportunities in ONS

☒ about your Division and ONS in general.

The questionnaire is distributed among all ONS staff. The final report 'Staff Perception Survey' attempts to summarise the large amount of data that were collected and to present a comprehensive picture of the attitudes and perceptions of ONS staff to the issues mentioned. The information is

published on Lotus Notes for each division in each Business Group and this has meant that Group Directors and Divisional Directors are using the results to identify issues requiring attention at various levels in the ONS. These issues are being addressed by a series of action plans to improve the staff perception in the next period.

8.4. Statistical Quality Checklist for internal use

Producers of statistics need information, which enables them to access the quality of process and the data. They need to understand:

☒ the context in which the data were assembled and analysed;

☒ the methods adopted and limitations these impose;

☒ the reliability of the figures;

☒ the way they relate to other available data on the same subject.

Statistics Netherlands, for example, has long recognised the need to provide producers with information about the quality and the process of statistics. To achieve this Statistics Netherlands works with a guideline. This guideline provides a checklist of matters that should be considered when developing the statistics. The advantage is that the checklist increases quality awareness in statistical departments.
The checklist contains questions about the following items:

☒ the objectives of the enquiry (including the contacts with the users);

☒ coverage (target, study population, sample frame);

☒ design (sample-based enquiries, data definitions, data collection methods and data processing);

☒ analysis (estimation and reliability).

8.5. Statistical audits

Several kinds of audits are known:

☒ EDP-audits: focus on information systems

☒ Financial audits: focus on financial systems

☒ Quality audits: check on the processes: within for example ISO these kinds of audits are checking 'are you processing according your process descriptions'?

☒ Statistical audits: evaluation of the quality of the statistical production process and the results.

Statistics Netherlands systematically uses a system of statistical audits for the evaluation of the different statistics. On the basis of these audits improvements of the process and the results can be proposed (again it is part of the Plan-Do-Check-Act cycle).

The basis for these audits is the *quality guideline* (statistical quality checklist) with regard to the entire statistical process from stating the purpose of the statistics up to and including the publication of the results and accounting for the quality of the results. Every (group of) statistics will be subjected to an audit once every five years.

Performing statistical audits should not be considered as equivalent to a financial audit or to an investigation by the Office of the Auditor-General. Auditing is mainly an instrument for assisting departments producing statistics in evaluating strong and weak points in the statistics they compile and an aid in formulating proposals for the improvement of the statistical process or the statistical results. The departments themselves should initiate the improvements.

The actual audits are carried out by so-called '*audit teams*'. The audit team is <u>not</u> directed or influenced by the client with regard to the subject matter during the execution of the audit. This is important in order to guarantee the independence and objectivity of the survey. For practical reasons and for reasons of continuity, a group of approximately 40 *internal* auditors is available. These auditors have been trained in carrying out audits by an external organisation. Periodically auditors exchange experiences, new auditors are trained and care is taken that auditors are involved in audits regularly in order to maintain the skill, continuity and professionalism within the audit teams. An advantage of using internal auditors is that they can take a look into the 'kitchen' of other parts of the Bureau. They are also learning from others.

The final audit report is offered to the division manager, the Director-General and the manager of the department. The latter is responsible for presenting the (draft) plan of action to his/her division manager. The division manager offers the approved *plan of improvements* to the Director-General. Content and execution of the plans of action are discussed between the Director-General and the division manager.

8.6. Performance indicators

Indicators should be developed for each of the 'result criteria' of the EFQM-model. Indicators are needed also within a process to monitor the process and the quality of the process and its products. Examples of performance indicators are:

- ☒ Process result: progress processes; quality products;

- ☒ User result: user satisfaction, number of press releases;

- ☒ People result: people's perception, mobility employees, illness percentage, education costs;

- ☒ Society result: percentage of press releases used by the press;

- ☒ Business results: all kinds of financial indicators

Every employee needs indicators but not all employees need the same set of indicators. The information needed depends on the task, responsibility and competence of the employee. The following questions should be answered:

☒ What determines the success of my job?

☒ How can I measure, observe, approach these success factors?

☒ What are standards or characteristics for such measurements?

☒ When should I interfere?

Each performance indicator should have the following properties:

☒ name of the indicator;

☒ identification of the process (where to measure)

☒ the success factor (what to measure or to approach)

☒ the definition of the indicator

☒ the way of measuring

☒ the frequency of measuring

☒ the owner of the indicator (the responsible employee)

☒ the users of the indicator (employees who's task or competence it is)

☒ the observer (who is performing the measurement)

☒ explanation of the indicator

☒ the way of dissemination

☒ the standard or norm value(s) of the indicator

☒ the interference value(s) of the indicator.

9. Tools for Standardising and Improving the Quality of Statistics Production Processes and other Operations

Summary

A number of different tools exist with the purpose to improve the quality of processes and operations, by identifying and promote proven good approaches. Some of these tools have been scrutinised and evaluated by the LEG and recommendations for further work has been given. This chapter contains descriptions of the tools, their individual characteristics and the result of the evaluation done by the LEG. The LEG concludes that on a European level the most benefit can be gained from the construction of Recommended Practices, while individual organisations can make good use of Current Best Methods.

9.1. Introduction

By standardisation we mean that a common approach is adopted for a specific process, either across an organisation or across several organisations – in other words, the elimination of variation. Standardisation has a number of effects, some that are positive and some that are negative. The overall effect of standardisation determines whether it is worth striving for or not. Some variation in approach is necessary and justified by the different circumstances that processes operate under, but some is not. It is important to reduce this unjustified variation, and to standardise the processes where appropriate. This is equally important for all processes that exist within an organisation, or system of organisations. However, we have chosen to focus mainly on the processes of statistics production, since that is the main activity of most organisations within the European Statistical System (ESS).

Standardisation in itself has several benefits for an organisation in that it facilitates:

☒ Documentation;

☒ Introduction of new employees;

☒ Internal rotation of staff;

☒ Introduction of changes to the process;

☒ Adoption of new solutions discovered by others who share the same approach.

☒ Efficient use of Information Technology solutions.

Apart from these benefits it is obvious that the identification of the best approach and the standardisation of that approach will be worth striving for.

Standardisation might also imply that not all aspects of the individual situation can be taken into account. This could in some cases offset the benefits of standardisation.

The proposal for the LEG on Quality outlined the following tasks for the LEG:

⊠ The LEG should recommend processes – the vital few – that are suitable for development of Current Best Methods (CBM), and how such development work should be organised.

⊠ The LEG should make recommendations regarding minimum standards that National Statistical Institutes (NSIs) should apply when conducting surveys. Obviously there is a difference between a minimum standard and a CBM. A minimum standard covers all survey steps. CBMs are developed for the most important survey steps and represent the methodology NSIs should strive for.

In the course of the work in the LEG we have found it useful to also include two other concepts, Quality Guidelines and Recommended Practices. We will describe these tools, evaluate them and make recommendations on how they can be used to improve quality within the European Statistical System, both at a common level and for individual organisations. The boundary between these tools may not always be absolutely clear-cut. Nevertheless, there are vital differences, and these will be highlighted and used as a basis for the conclusions drawn. We will also provide some examples of tools that fall into these categories that exist within statistical agencies (see Annex 3).

9.2. Definitions

In this chapter definitions of the different tools are provided, while some examples are presented in Annex 1.

9.2.1. Current Best Methods

A CBM is a description of the best-known method for a certain process, e.g. editing or the reduction of non-response rates. The method is described in a user-friendly way, with clarifying examples. When possible, the CBM also provides checklists for the user.

A distinction might be made between "repetitive" and "creative" processes. In a repetitive process the CBM can be made more distinct and it is easier to judge whether the CBM is being followed or not. In a creative process, like the development of new statistics, it is much more difficult to foresee all the different situations that may arise. In this case the CBM needs to support the decisions that need to be made and allow for more freedom. During the course of the work in the LEG we have not found the differences to be so large that we need to differentiate between the two alternatives in our analysis.

A CBM helps to ensure quality in a process and to reduce variation in the way it is carried out. All unjustified variation affects the cost and output quality of a statistical product and it is therefore desirable to reduce it. A CBM also serves as a type of documentation of the practices that are in use. Having a CBM in place makes the improvement of a process much easier, since there is documentation of the existing method. Another great advantage is the use of CBMs in training new staff. New employees will much more quickly be able to carry out their tasks in a way that ensures quality.

It is well worth noting that the construction and use of CBMs is by no means restricted to the process of statistical production; they can be just as relevant and effective in research and development and in administrative processes.

Some tentative guidelines for the construction of a CBM, based on experience at Statistics Sweden, can be found in Annex 2.

9.2.2. Minimum Standards

Standards, by themselves, imply something minimum that needs to be achieved to qualify, for instance for an award, a certificate or to belong to a group. Well known in this respect, and with a widespread use, is the ISO-family of standards. By using the word "minimum" we want to highlight the fact that the standard is aimed at being on a low level and should be relatively easy to fulfil. With regard to statistical production, Minimum standards specify absolutely necessary criteria to be met when performing a certain part of the statistical process. They cover all aspects of the statistical process and are defined in terms of requirements to be met by the design and the process, not by the final product. They are based on the fact that statistics production should build on scientific principles, where the choices made will influence the result. Some of these choices are so vital that standards for the selection of the approach are necessary.

A Minimum Standard would have the following benefits:

☒ To establish a scientific baseline for the production of statistics;

☒ To guarantee that all the statistical products at an NSI have the same common starting level of quality, defined by the fact that they all follow the minimum standards;

☒ To help producers in their current activity, by knowing the *least* they need to do to achieve respectable quality;

☒ To increase trust among users of statistics

9.2.3. Quality Guidelines

Quality Guidelines aim to present general good principles to adhere to when producing statistics. Quality Guidelines as such are more directed towards what to do than how to do it. They provide guidance on what is deemed important and what is not, and thus help the statistical practitioner in pointing out what areas need to be focused on and where more explicit information is needed on which approach to choose.

Quality Guidelines are not intended to be mandatory. Indeed, the product manager is free to make the choices that are judged to be most suitable for a particular process.

As an example, let us describe the structure of Statistics Canada Quality Guidelines. The handbook covers all the statistical steps and the management context:

⊠ Quality at Statistics Canada

⊠ Organisation and infrastructure for management of quality

⊠ The quality assurance framework

⊠ Conclusions.

It also has two appendices: the first is on the policy on the development, testing and evaluation of questionnaires; the second is on the policy regarding information for users on data quality and methodology.

For each statistical sub-process, the Quality Guidelines are organised as follows:

⊠ Scope and purpose (a definition and description of a particular statistical sub-process)

⊠ Principles (what should be done when performing that sub-process)

⊠ Guidelines (the main recommendations for a given sub-process)

⊠ References (subject area references).

9.2.4. Recommended Practices

Recommended Practices is a handbook that describes a collection of proven good methods for performing different statistical operations and their respective attributes. The purpose is to help the product manager choose among the Recommended Practices those that are most suitable for use in the process in order to ensure quality.

The reason for providing a set of good practices is that it is difficult to define best practices or standards for statistical methodology in a general context on a European level. Apart from this, many of the attributes of a CBM apply also to Recommended Practices.

9.3.   Pros and cons of the presented tools

The tools presented all have their own particular attributes and as such will work differently in different situations. We have identified some attributes that we consider important when trying to weigh the tools against each other. These are:

⊠ How the tool will inspire users to strive for excellence – we believe that a persistent ambition to achieve improvements and strive for the best approach is vital for long-term success.

- ☒ How it will reduce unjustified variation – variation is costly, and to reduce any variation that is not justified by other factors will make processes more efficient and lead to more stable outputs.

- ☒ How it will work at a European level – the ESS is a complex system, in which differences of culture and context (such as the availability of administrative sources) make special demands on the approach.

- ☒ How easy it will be to construct – preparing these tools requires resources, which are limited, both in terms of money and in the form of expertise.

- ☒ How easy it is to understand – accessibility is an important aspect if a tool is to gain widespread use and be used as intended.

- ☒ How communicable it is to customers – we believe that the users of statistics will feel greater trust if they have a good understanding of the methods utilised in production.

- ☒ How uncontroversial it is – there may be very different views on what is "best" or "good enough", which means that there will be considerable debate on what is proposed in some tools. This will hinder their use and limit their effectiveness.

The pros and cons of the various tools have been summarised in the table below. The LEG in formulating the recommendations has taken these characteristics into account.

Table 1. Pros and cons of the proposed tools

	CBM	RP	MS	QG
Will inspire excellence	++	+	--	-
Will reduce unjustified variation	++	+	+	-
Will work at a European level	--	+	+	+
Easy to construct	--	+	-	+
Easy to understand	+	+	++	+
Communicable to customers	--	+	++	+
Uncontroversial	--	+	--	++

++ Large positive aspects
+ Some positive aspects
– Some negative aspects
–– Large negative aspects

9.4.   Summary of the LEG's view

9.4.1.   Current Best Methods

The LEG agrees that the purpose served by CBMs is desirable in that they point out the best way to perform a certain operation/process and are useful as a tool for minimising unjustified variation. However, the problems involved in constructing and actually being able to define a CBM at the European level are not trivial. There are many differences between countries

that make variation in approach necessary. Among these are cultural differences, laws and regulations, availability of registers and auxiliary data, etc. This will undoubtedly lead to a number of variants of the CBM to take these differences into account. The standardisation purpose of CBMs across the ESS will then not be served so strongly and CBMs will be fairly country-specific. We believe that this will make the process of constructing them at a European level very demanding and there will probably be some controversy around whether a variation is justified or not. We therefore recommend that CBMs should be constructed and produced within the specific countries where their benefits will be strong and valid, while at the same time they are feasible to construct. It will be a great advantage if NSIs can also undertake to translate their CBMs into English so that NSIs in other countries can benefit from their work. We propose to give tentative guidelines on how the process of constructing CBMs at a national level can be performed later in Annex 2.

9.4.2. Minimum Standards

As the majority of the official statistics produced by the NSIs do follow basic scientific practices, and as Minimum Standards (MS) do not inspire excellence, we believe that it will be a better allocation of resources to develop Recommended Practices (RP) instead of MS. RP will be of great use to many NSIs and statistical products and will inspire excellence.

The construction of MS could be difficult, due to the fact that there may be controversy about what should be regarded as "minimum". At the moment no clear criteria apply and the discussions in the LEG have revealed considerable differences among its members. All these points in combination lead the LEG to recommend that no further work be done on defining general minimum standards for the statistical process. For specific statistical products, however, where the demands on comparability are high, such work might be worthwhile. This has been the case for the International Literacy Survey, where an international team of experts composed minimum standards. The regulations for statistics within the European Union could also be seen as a sort of minimum standard, where demands for comparability are high. In both of these cases the standards concern a specific statistic, and although they are judged to be successful, this fact supports the view of the LEG.

9.4.3. Quality Guidelines

Quality Guidelines are in place in organisations around the world. The best-known example, perhaps, is Statistics Canada. The LEG recognises the usefulness of Quality Guidelines as a symbol of a commitment to quality. In that they point out generally good principles for producing statistics, they help draw attention to quality issues and are as such a good foundation to build further on. Their general format, though, makes them less useful in specific situations, where they do not provide the explicit guidance that is sometimes needed. Since the existing Quality Guidelines of Statistics Canada are thorough and clear, we see no need for developing a separate set regarding the ESS.

9.4.4. Recommended Practices

Recommended Practices have much in common with CBMs in terms of construction and format. With regard to their particular attributes, though, there are significant differences. These differences make the idea of constructing Recommended Practices at a European level more appealing. Recommended Practices will be less controversial than CBMs since they will present a choice of different methods. At the same time they could induce improvements at NSIs that cannot be expected from Minimum Standards and Quality Guidelines for reasons explained above.

9.5. Conclusions

The discussion about CBMs, MS, QG and RP has shown the attributes of each tool. In particular, it will be almost impossible to construct a CBM that works at a European level, given the existing differences between NSIs. MS and QG would be easier to construct but they would not be so useful for improving quality in the ESS.

The LEG therefore concludes that it would be more fruitful to invest resources in developing Recommended Practices. In fact, most NSIs could benefit from RP, since they provide information on methods to be used to improve the quality of statistical products. To this end, RP should be developed following a general (not country-dependent) approach.

The CBM approach is more suited to individual organisations that want to reduce unjustified variation and improve their processes. Some tentative guidelines for their construction and implementation are given below. The LEG also encourages NSIs, and other organisations to make their CBMs available in English, even if that is not the language of the country, in order to facilitate the exchange of knowledge between Member States.

References

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Annex 1

An illustration of the differences between the concepts

To illustrate more clearly the differences and similarities between these concepts, we will provide simplified examples of how they could be expressed. All the examples are referred to the some operation – the editing activity – in order to better compare them.

Current Best Method for editing

Since a CBM for editing is a voluminous document we are not able to give a complete example. To give an idea of the format and contents of a CBM we provide an example from Statistics Sweden, describing the information that should be included in an error message:

☒ Which variable caused the error;

☒ Which editing criterion caused the error message;

☒ A verbal description of that editing criterion;

☒ Information about the object deemed necessary to verify the potential error.

Recommended Practices for editing

We assume a scenario where the statistical product in question is a monthly survey of the turnover of enterprises.
We define three different practices for the editing procedure:

☒ The turnover of an enterprise is compared to *the turnover last month*. If the change exceeds ± 20 % the variable is flagged for further control.

☒ The turnover of an enterprise is compared to *the turnover according to the VAT register*. If the difference exceeds ± 20 % the variable is flagged for further control.

☒ The turnover of an enterprise is compared to *the mean turnover for enterprises within the same industry and size-band*. If the difference exceeds ± 50 % the variable is flagged for further control.

This is a very simplistic example, but the intention is to show the difference between recommending one method over all other possible methods, and recommending several possible methods that will give good results.

Minimum Standards for editing

These are some criteria that might be considered "minimum" for the editing process, though it should be noted that they are only listed to reflect our interpretation of what constitutes a minimum standard. They have no official implications.

☒ The editing rules must be documented;

☒ Clerks in charge of manual editing should be provided with written, clear and detailed instructions;

☒ The editing should be internally consistent, that is their should be no internal contradictions.

Quality Guidelines for editing

We will use excerpts from Statistics Canada's Quality Guidelines and from a paper by Granquist and Kovar (1997) on editing to illustrate the format of a quality guideline.

"Data editing is the application of checks that identify missing, invalid or inconsistent entries or that point out data records that are potentially in error. Some of these checks involve logical relationships that follow directly from the concepts and definitions. Others are more empirical in nature or are obtained as a result of the application of statistical tests or procedures (e.g. outlier analysis techniques). Data from previous collections of the same statistics or from other sources may also be used.

Editing encompasses a wide variety of activities, ranging from interviewer field checks, computer generated warnings at the time of data collection or capture, through identification of units for follow-up, all the way to complex relationships verifications, error localisation for the purposes of imputation, and data validation".
(Excerpt from Statistics Canada's Quality Guidelines)

An example of Quality Guidelines

☒ Editing should address the following objectives (Granquist and Kovar, 1997):
  . "Gathering intelligence related to significant difference in the data for analytical purposes"
  . "Providing feedback that can lead to improvements in data collection and processing"
  . "Cleaning up the data"

☒ Attention must be paid to undesired effects of editing such as over-editing.

☒ Quality indicators for identified non-sampling errors can be calculated and analysed, such as: rates of missing data (also called item non-response), out-of-range data, and inconsistent data. Such indicators can be used for monitoring the editing activity and can provide rough information on the data collection process.

☒ Editing should be regarded as a part of the data collection process. Quality indicators from editing can provide useful information on error sources from previous phases, such as questionnaire design, definitions, interviewers' performances, and data entry errors. Such information can be used for improving the statistical process in future replications.

References

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Annex 2

Guidelines for CBMs at a national level – an illustration from Statistics Sweden

The process of constructing a CBM is not straightforward, but is nevertheless very important for how effective the recommendations proposed in the CBM will be. This will affect two important aspects of the CBM:

☒ The quality of the CBM itself and the procedure it proposes;

☒ How easily it will be accepted within the organisation.

Statistics Sweden has developed a number of CBMs during recent years and has found the following procedure to be effective.

The work should be done by a team consisting of both experts in the field and people actually working with the process in question. This will ensure first of all that the existing general knowledge of the subject influences the CBM (through the experts), but also that it is adapted to the specific conditions present within the organisation (through those working on the process). It will also pave the way for use of the CBM, since the risk of resistance to change is lower if staff members feel that they have been able to influence, and participate in, the change, and are not just being told how to change by others. The team should not be too large, since that will hinder its work; on the other hand, it is vital to ensure broad participation and to involve those affected by the work of the team. To help in this, a reference group can be assigned to give feedback on chapter drafts from the CBM. Another useful activity to involve staff, obtain input to the CBM and pave the way for its use is to provide regular information on the progress of the work through the channels in place within the organisation.

The team should start by identifying the different ways in which the process is performed within the organisation today, and ideally also why it is being performed in these ways. This will ensure that the existing experience within the organisation is taken into consideration and that the common knowledge of the organisation is utilised. The next step is to gather information elsewhere, through literature, study visits or benchmarking. The spirit of cooperation between National Statistical Institutes is high, and should be put to good use.

The format of the CBM may vary depending on what process it covers. What should always be present, though, is a concrete description of how the process should be carried out. If the "best process" varies according to the situation, the team should identify the vital few situations and be explicit in those cases. This is an important step in order to facilitate a reduction of unjustified variation, which is one of the main objectives of a CBM.

After a CBM is developed there should be a function in charge of the CBM that has overall responsibility for keeping up to date with differing needs and new developments in the area and forming a team when an update of the CBM is deemed necessary.

In cases where there are RPs available at the European level, these should be utilised in the development stage of a CBM.

Examples of tools that are in place at NSIs around the world

ISTAT

In 1987, ISTAT produced a series of methodological handbooks on the following aspects of survey techniques:

☒ Survey planning

☒ Questionnaire design

☒ Interviewing techniques

☒ Sampling design

☒ Variance estimation

☒ Data quality control system

☒ Graphical representations.

In 2000, ISTAT developed a checklist for documenting the statistical activity carried out by any statistical office belonging to the Italian National Statistical System. In addition, ISTAT has developed a handbook containing Quality Guidelines in order to support the statistical offices in planning and executing surveys, using administrative data for statistical purposes, and data validation. This handbook has a hypertext structure that helps the reader to detect the connections between different topics. A working group including different expertise has revised both the checklist and the handbook. The handbook and the checklist are now available on the ISTAT website.

ISTAT has also developed a CBM on telephone interviews for social surveys. (Muratore M. G., Quattrociocchi L., Sabbadini L. L. (2001) "Telephone Interviews for Social Surveys: Experiences and Methodology in Official Statistics", ISTAT, Collana Metodi e Norme, Roma).

Statistics Sweden

Statistics Sweden is working to improve its processes and eliminate unjustified variation by constructing Current Best Methods. At the moment four CBMs exist:

☒ Efficient editing (second version in preparation)

☒ Presentation of diagrams

☒ Reducing non-response

☒ Project work.

Three more are soon to be finalised:

☒ Disclosure control

☒ Non-response adjustment

☒ Processes for cognitive testing.

The documents are currently available on paper, but will soon be available on the Intranet, which will also make revisions and updates easier. Unfortunately they are all in Swedish.

Checklists and handbooks are available for a number of processes at different organisational levels. The handbook on quality reporting is especially worthy of note.

10. Documentation

Summary

This paper deals with various issues concerning documentation. In particular, the work of the Leadership Expert Group (LEG) on Quality and experiences from different National Statistical Institutes (NSIs) are reported.
Documentation activity is regarded as a tool for ensuring and improving quality, on one hand and for better using and understanding data, on the other hand.
In general, documentation concerns all the activities carried out by NSIs including the production of statistical information and other processes which support such an activity. Main topics discussed in the paper are: how different types of processes can be properly documented and how to provide the users with adequate documentation. In fact, different users (both producers and users of statistical information) have different requirements with regard to the content and to the degree of detail of documentation.
The paper also includes a review of the current approaches followed by the LEG countries with regard to documentation as well as the strategies, which have been defined for the near future.
Given that the documentation activity can be a demanding task for most NSIs, the importance of implementing tools such as information systems in order to support such an activity is stressed. Examples of information systems and other tools in place in some LEG countries are also provided.

10.1. Introduction[8]

This paper reports the work of the Leadership Expert Group (LEG) on Quality concerning documentation. The recommendations for the Member States for improving their documentation systems are provided in the LEG final report.

Documentation is an important aspect of quality. In fact, quality management inside a National Statistical Institute (NSI) as well as a user-oriented dissemination policy require the availability of proper, easily accessible and readable documentation concerning both processes and data.

NSIs have firstly recognised the importance of documenting statistical data and the underlying production processes. As a consequence, the awareness of the role of metadata in statistics together with the necessity of reporting on

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[8] In the paper, the following definitions have been adopted:
Documentation: a description concerning something
Metainformation: any classes of information related to data and in particular, for our purposes, to statistical data.
Metadata: are the "items" or "values" taken by a class of metainformation
The difference between metainformation and metadata is the same as the difference between information and data (in the sense that metainformation refers to a concept and the metadata are how the metainformation is documented or represented in database or in a document). For our purposes, we can consider metainformation and metadata as synonymous.

data quality has constantly increased. However the LEG has agreed upon the fact that adopting a Total Quality Management (TQM) approach requires, as a general principle, to extend the concept of documentation to all the activities carried out by a NSI such as administrative processes which support statistical processes.

It is worth nothing that most NSIs have to face the problem of lack of time for documenting as well as the costs associated with producing documentation. Therefore there is a need to find means, which facilitate the documentation activity such as information systems that make it possible to reuse information already produced, to support people in such an activity and also to help standardising the documentation activity. Such tools will also make the process of documenting cheaper in the long run.

Finally, we note that sometimes it could be worthwhile to keep memory also of failures so that the same mistakes will not be repeated even if there might be resistances in documenting negative experiences.

10.2. Importance of documentation

Two main purposes of documentation can be identified:

☒ To ensure and improve quality.

☒ To better understand and use data.

10.2.1. Documentation as a tool for ensuring and improving quality

Documentation is first of all a tool for **ensuring the quality** of the processes carried out by NSIs and in particular of the production of current statistics and of the planning of new surveys. In fact, a major internal purpose of documentation is that it makes it possible to take over other people's processes.

Documentation concerning the current statistical activities can be used as follows:

☒ Checklist for staff in every step of the process, allowing verifying that the operations have been correctly performed that is according to standards or specifications stated in documents such as Current Best Methods (CBMs) and handbooks.

☒ Base for training new staff. The availability of documentation will make it easier to integrate new staff and will prevent from introducing variations in the process due to differences in the training/ability of employees. Checklist for new surveys of the same kind. Documentation makes it possible to reproduce a process. Thus survey managers can benefit from other experiences when they are planning a new survey.

10.2.2. Documentation as a tool for improving the quality inside a NSI

To this purpose, it can be used as a:

☒ Base for improving current activities. In a first step documentation makes the producers conscious of strengths and weaknesses in the

process and in the product. Thus it constitutes a pre-requisite for the evaluation of both processes and data quality. In addition, documentation is a tool for follow-up. In fact, starting from the weaknesses that have been found, for example deviations in trend or changes in the level of quality, concrete actions for improvement can be undertaken

☒ Base for re-planning survey procedures in order to achieve higher quality. For improving quality it is important to share experiences and to have the opportunity to transfer experiences that have proved to be successful for one process to other situations. To this purpose, documentation should not be restricted to describing the way in which operations or processes are carried out but should also cover the criteria and the motivations that have led to a particular choice. We can refer to it as documentation on "solving problems".

☒ Base for improving completeness and avoiding redundancy in statistical information produced by a NSI. To this purpose documentation concerning the information content (e.g. statistical units, classifications and definitions) of the different surveys, statistical sources and analyses is required. In fact, it makes it possible to assess the statistical information issued by a NSI as a whole with regard to several criteria such as relevance, completeness, and non-redundancy.

10.2.3. Documentation as a tool for better understanding and using data

The other major purpose of documentation is to help the users making comparisons and statistical analyses. In fact, users need information about the data (metadata) as well as quality indicators in order to properly use them. With regard to this aspect, documentation can be used as a base for:

☒ Retrieving information (which sources of information are available for a given subject?).

☒ Comparisons (how are statistical units defined in different surveys?).

☒ Statistical analyses (how reliable are data for given research purposes?).

☒ Longitudinal studies (are there breaks in time-series?).

☒ Historical studies (in the future).

☒ Producing "new" statistics from micro data.

10.3. Dimensions of the problems

As stated in the introduction, the documentation activity can be very demanding for a NSI. Therefore it is important to adopt an overall strategy where the objectives to be pursued have been clearly defined and the priorities have been set. To this purpose it is helpful to analyse the different dimensions, which contribute to define the characteristics of the documentation itself. For example, questions such as "what should be documented, how and to which degree of detail?" should be answered by

taking into account the needs of the users to whom the documentation is addressed. In the next paragraphs, the following dimensions are discussed, namely: users' requirements; types of processes; different documentation contexts; ways of documentation and dissemination.

10.3.1. Types of users of documentation and their requirements

It is important to classify the different types of users in order to identify their specific needs. The main distinction is between producers and users of statistical information.

In this context producers can be classified as:

☒ People working inside NSIs: regular producers, producers who reuse statistics from other processes (e.g. National Accounts), management, those who follow-up quality.

☒ People working at Eurostat.

☒ People working at other international organisations interested in exchange of data.

☒ People working at other NSIs interested in making comparisons or for benchmarking.

With regard to the users of statistical information, it is useful to distinguish among the following categories since they have different requirements concerning documentation:

☒ General public.

☒ Experienced users, among which we can distinguish a separate typology people working for public administrations (including policy makers and their assistants) or for private companies (e.g. firms selling information).

☒ Expert users: such as researchers or analysers.

Each typology of producers and users has its specific needs with regard to documentation. The needs are different both with regard to the content of documentation (subject covered) and to the degree of detail to which a given subject is treated.

The producers, in particular people involved in the production of statistics, need the most detailed documentation since they are interested in the possibility of reproducing a given process. This is also true for producers of other NSIs whose purpose is benchmarking. A first identification of metainformation needed for this category is described under point 3.3 with regard to the production context.

Other types of producers, in particular those who reuse statistics already disseminated, might be less interested in some organisational aspects if compared to survey managers. Their needs will be more similar to those of the expert users. In particular, they need to know whether the data are sufficiently accurate for their purposes or research objectives. Thus they need information on the principal sources of error and when it is possible they need measures of both sampling and non-sampling errors (quality indicators).

The metainformation provided to them should report unusual circumstances, which might have influenced the data.

Experienced users are more interested in the information content of the survey (such as definitions and classifications). In general, they want to know what sources are available on a given subject and what are the main differences among them in order to find the data they need. They might be aware of the problem of data quality, but they might not have the expertise to understand quality indicators related to different sources of errors. In this case subjective assessment of data quality from the survey managers might be sufficient.

The general public do not use data for further analyses and do not need figures about quality. The information provided to them should be minimal and very clear since a major problem might be that the general public might be confused if too much information is provided to them.

Some examples of metainformation for the users (including producers who reuse the data) are provided in part 3.3 in the dissemination context.

Finally, the users and producers interested in exchanging data or making comparisons and people working in Eurostat can have similar needs with regard to documentation. Their needs are close to those of people directly involved in production with the exception that they will not be so interested in a detailed description of the organisational aspects.
A short description of the metainformation needed for these typologies of users is provided in section 3.3 under the heading "comparison context".

10.3.2. What should be documented: types of processes and products and related documentation

As already mentioned, the LEG has stressed the importance to take into account all NSIs activities and not only statistical processes (production and dissemination of data). Therefore some typologies of processes, which might be useful to document, have been identified. The classification is finalised to characterise the content of the related documentation. The following typologies have been considered: statistical production processes and data; administrative processes; NSIs strategies and policies; the evaluation of NSIs strategies and the relevance of statistical production.

☒ The first group, **statistical production processes and data**, includes:

. Direct surveys, use of administrative data for statistical purposes, mixed surveys.
. Statistical analyses or new data produced by using existing data (research studies, national accounts).

With reference to this group, three main typologies of information should be documented:

. Metadata concerning the information content of a survey, such as: assessments of needs, definitions, variables, reference units and classifications.

. Metadata concerning the production process (sometimes called paradata), namely: operations, control activity, staff, methodology, software used.

. Quality indicators: quantitative or qualitative information concerning the quality of statistical data.

Further information concerning the conceptual aspects of metadata and their use both for the development and use of statistics can be found in Dippo C. and Sundgren (2000).

It is worth mentioning that the use of administrative data for statistical purposes requires the availability of proper documentation concerning the administrative registers (for example how changes in the legislation might affect the register; and if the administrative data have been edited and how). For a detailed discussion see Eurostat, (1995).

There are other topics that should be documented with regard to the data produced by a given survey, concerning in particular data relevance (e.g. information needs covered by the data and the process of establishing such need) and data dissemination (e.g. where the data are available and which services are offered to the users).

With regard to data quality, users should be informed of any limitations in the use of data (e.g. breaks in time-series). It should be noted that documentation on data quality could also consist of qualitative information. In any case, when producing a written document it is recommended that a subjective assessment complement the quality indicators. The "Survey of Income and Program Participation (SIPP) Quality Profile" provide a good example of comprehensive documentation concerning the quality aspects of a survey (Jabine et al., 1990).

⊠ **Administrative processes** which support statistical production processes include many different processes, such as getting the funds and spending them for a given survey including the economic follow-up; printing the questionnaires; recruiting staff; contacting local authorities; contacting the media and so on.

We note that some administrative processes can be directly related to the correspondent statistical process (for instance printing of the questionnaire for a given survey or the process of getting the funds and spending them for one survey), while other ones are horizontal (e.g. recruiting the interviewers, or contacts with local authorities or with the media) since they may be common to all surveys. There might be some differences among the NSIs due to the choice of different organisational models.

The documentation concerning administrative processes mainly consists of documents explaining the procedures that should be followed. In some cases checklists explaining what to do might be useful. For example for recruiting staff, the checklist can cover topics such as

advertisement, references, how to interview the applicants, how to estimate competence, which qualities are most important, how to introduce a newly employed person and so on.

☒ The third group comprises **NSIs strategies and policies**, for instance:

. Corporate plan and mission statement.
. Dissemination policy.
. Quality policy.
. Policy on human development.

Obviously in certain circumstances the NSIs strategies and policies are automatically documented, for example when a corporate plan or a mission statement exists. Otherwise, it is required to prepare documents explaining the strategy that the NSI wants to pursue (e.g. quality policy or policy on human development). For example documentation concerning policy on human development might concern items such as: the need for further education of the staff in relation to the demand of certain competencies within the organisation; the process of promoting the staff; the setting of wages; the definition of responsibilities for the staff.

☒ In the fourth group, **the evaluation of NSIs strategies and the relevance of statistical production,** two main processes have been considered. They are:

. Staff satisfaction surveys.
. Users' satisfaction surveys.

In fact, the LEG has recommended having in place tools for evaluating the perceptions and the degree of satisfaction of both the internal staff and the external users of statistical information. To this purpose the Staff satisfaction survey and the Users' satisfaction survey should be properly documented. This implies documenting not only the survey characteristics (e.g. the content and the periodicity) and the results obtained but also the follow-up actions that have been undertaken.

As a concluding remark, we can state that producers are interested in the documentation concerning all the above-mentioned types of processes, even if different types of producers will have different priorities. For example, documentation concerning administrative processes will probably be more relevant for people working inside a given NSI. On the contrary, the circulation among NSIs of documents stating their quality policy or their dissemination policy might help a harmonisation process at a European level and might promote improvements inside NSIs.

10.3.3. Different documentation contexts

It can be useful to distinguish between three documentation contexts (or environments), namely a "production" context, a "dissemination" context and a "comparison" context. Each one will be defined by specifying what could be its (standard) content.

♦ *Production context*

The main objective of this environment is to describe precisely the whole production process, so that it becomes possible to repeat it in the same way. Thus, the content of the documentation belonging to the production context could be defined as follows:

General information on the survey[9]

Such information includes, among others, a description of the survey objectives, historical background, information on regulations or legislation if necessary, and information concerning the design and the test of questionnaire.

Questionnaire

A copy of the questionnaire should be available.

Variables[10]

The documentation concerning variables should include:

☒ The name of the variable.

☒ The origin of the variable. This means to specify:

☒ If the variable is obtained by coding an answer to a question in a statistical questionnaire or in an administrative document.

☒ If the variable is obtained from a calculation based on other variables (derived variable).

☒ If the variable comes from an external source.

☒ Its statistical nature (i.e. whether it is qualitative or quantitative).

☒ The length of the corresponding record.

☒ The level of detail of the observed variable.

☒ The unit of measure (when it has a meaning).

☒ The list of values taken (codes and headings) when a not standard classification is used.

☒ The description of the external source (when a variable comes from it).

☒ The description of the calculations made in the case of a derived variable.

Classifications

All the classifications used should be documented by describing:

☒ The references to the classifications, when standard or general classifications are used.

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[9] Direct surveys as well as surveys based on administrative data are considered.
[10] Not only statistical variables should be documented but also management, monitoring and quality indicators

☒ The texts of the classifications when a specific classification has been adopted.

☒ Information explaining particular points in the processing of some items of the referenced classifications.

Definitions

Every survey should provide proper definitions of the concepts (e.g. unemployment) which are used and of the statistical units (e.g. enterprise or local unit) which are observed and/or analysed. If standard definitions are adopted and if a dictionary exists, then it is sufficient to refer to the general definitions.

In general, the documentation of the survey definitions concerns:

☒ The title of the defined concepts.

☒ The text of the definition.

☒ The links between these definitions and the variables to measure the concepts.

Methods

Statistical methodologies and techniques used during the survey production process should be documented.

Results

It is recommended to keep memory of all the files produced during the data processing, starting from the files of raw data up to the files for data dissemination.

The required documentation is:

☒ The name of the file.

☒ The storage format.

☒ The dissemination status.

☒ A description of the file (design, number of records).

Documentation concerning other outputs of the survey is also included.

Quality indicators

All the available information concerning quality should be documented. Such information includes quality indicators used for monitoring the production process as well as the quality assessment of the final data (e.g. accuracy).

It is worth mentioning that Eurostat has defined the standard content for reporting on quality (Eurostat, 2000).

♦ *Dissemination context*

The main purpose of the dissemination context is to provide users with all the documentation, which enables them to understand the statistical data. Therefore, in this environment more information concerning the products

(statistical data) is needed with respect to what has been defined in the production context. At the same time, some elements defined in the production context are no longer required. For instance:

Questionnaire

A copy of the paper questionnaire is not necessary.

Variables

Only the variables related to statistical data should be documented.

Classifications

Only the classifications related to the disseminated data and at the aggregation level of the publication should be documented.

Definitions

Also in this case only the definitions strictly related to the disseminated data are needed. The texts can be adapted in order to meet the users' needs.

Methods

Detailed description of the applied statistical methodologies is not required. General information (e.g. concerning the sampling) might be sufficient. Also in this case, experienced users have more demanding requirements.

Results

All necessary metadata together with indicators of precision and other quality indicators should be provided to the users in order to allow them to correctly use the data for their knowledge needs.

♦ *Comparison context*

This context differs from the two previous ones because the objective is to allow comparisons, and particularly at an international level. Thus, the documentation for this purpose is somehow intermediate between what producers need and what users need. The most important issues in this environment are the documentation concerning the products and the data processing. Consequently the documentation in the comparison context is close to that of the production context without the preliminary stages (for instance certain administrative processes, and some stages before data processing) and with detailed metainformation on the results.

10.4. Ways of documentation and dissemination

Different media can be used for documenting processes (not only statistical ones) and products. They range from printed or electronic documents to information systems. Documentation embedded into software for producing and disseminating data should also be considered.

When documentation is stored in an information system then it can also be a source for retrieving new documentation. In particular information systems where it is possible to reuse documentation can be built. We can consider:

- ☒ Automatic transfer of parts of the documentation to a metadata database. For example to extract some modules from the process documentation in order to provide the end user with metadata describing the process and information on quality.

- ☒ Automatic transfer of parts of the documentation to another documentation system. For example, parts of a process documentation are transferred to a product documentation.

With regard to the dissemination of documentation, we distinguish between internal documentation which is accessible only to producers (in some cases it might be restricted to producers inside a NSI) or also to other producers (as classified before) and external documentation which is addressed to the users of data (in this case producers who reuse statistics from other sources are also included).

♦ *Pros and cons of different ways of documentation and dissemination*

The different media should be assessed with regard to their respective advantages and disadvantages. The main factors to be taken into account are:

- ☒ The costs, in particular the amount of work and the time, required for implementation and for collecting and updating information.

- ☒ The degree of standardisation and comparability.

- ☒ Accessibility to users.

Many processes can be properly documented by producing printed or electronic papers. These media are less demanding with regard to the associated costs. Information systems will be much more costly to implement since they require a design and a test phase and proper expertise. On the other hand, by using information systems a higher degree of standardisation and comparability can be achieved if compared with paper documentation.

The time required to the survey managers to document in detail the production processes (refer also to the production environment) can be high especially when they document the process for the first time. In some cases it might be necessary to collect information from different people (some parts of the survey cannot be directly managed by the person responsible for the survey). In addition the survey managers might consider the task a burden if they cannot see a comeback.

It is also important to note that it is a good initial result to have documentation on many processes, but then the way in which such information is organised assumes a great importance in order to make documentation really useful and used. In this sense, it might be worthwhile to invest resources in defining a structured and standardised approach for documentation inside a NSI.

10.5. Documentation activity in some NSIs

To the purpose of getting information on how the documentation activity is planned and carried out in different NSIs and at Eurostat, a short questionnaire was distributed among the LEG members. In this paragraph, the principal findings of this internal survey are summarised. The detailed results from the questionnaire are presented in Annex A2.

The main purposes of the survey were to achieve information concerning the current strategies inside the surveyed organisations with particular regard to whether the documentation activity was mandatory or not and whether minimum standards for documentation had been defined or not. Another purpose was to identify if the documentation strategy inside a given NSI was differentiated in relation to the type of activity. In particular, we focused on the following three areas: statistical production processes; dissemination of statistical data; strategies and policies.

A major survey result is that the importance of documentation is recognised in all the organisations even if the strategies and the tools in place greatly differ from one organisation to another. In particular there is a tendency in all the organisations to increase the domains for which documentation is required. Five of the six organisations that answered the questionnaire stated that they would have all statistical processes documented within few years.

It is interesting to note that our results show a strict link between mandatory documentation and minimum standards for documentation. In fact, documentation is mandatory for all statistical processes only for two organisations, namely INE-P (Portugal) and Statistics Sweden and these NSIs are also the only ones, which have defined the content of minimum documentation. At INSEE (France) documentation is mandatory for every new survey, which has to get a visa from the Quality Label Committee of the National Council of Statistical Information. In France an attempt at defining minimum documentation has been made but a consensus has not yet been reached inside the NSI.

The issue of minimum documentation has been discussed also inside the LEG. The definition of minimum documentation has been considered as a first step given that the LEG recognised the difficulty of achieving a comprehensive and detailed documentation within the European Statistical System (ESS) in the short run. However, even if it is easy to agree on the usefulness of defining minimum documentation, the task becomes much more difficult when it is required to agree on the content and the format of minimum documentation. Experiences have shown that it might be difficult to reach a consensus even inside a given NSI. For these reasons the LEG has decided not to provide recommendations on this issue.

Documentation concerning information for better using and understanding data is mandatory for all disseminated data for 3/6 organisations, namely INE-P, INSEE and Statistics Sweden. At Eurostat documentation is mandatory only for some data. All the organisations provide metadata to the users. Quality indicators are regularly provided only by Portugal and Sweden.

Statistics Netherlands is going to provide quality indicators in the near future. Istat (Italy) has no general rules at the moment; thus the responsibility for providing both metadata and information on quality is up to the survey managers. The content of minimum documentation that should be provided to users has been defined by 3/6 organisations, namely Portugal, Sweden and Eurostat, whilst Statistics Netherlands plans to do in 2001.

With regard to the strategies and policies, almost all (5/6) the organisations have a mission statement and a document describing their dissemination policy, while only two organisations have documents concerning the quality policy and the policy on human development. When such documents exist they are also available to the public.

In order to support people in documenting both processes and data INSEE, Istat and Statistics Sweden have documentation systems in place. A description of these systems is presented in the next chapter.

10.6.   Means to facilitate documentation

As stressed in chapter 2, the documentation of statistical activities is a tool for improving the quality of the produced data. In addition, the users require metadata and information on data quality in order to properly use the data. Therefore, the need and the demand for documentation will probably increase in the near future.

Nevertheless, the documentation activity might be perceived by some survey managers mainly as a time consuming activity. In fact, the survey managers are primarily concerned with activities related to data production and dissemination. Usually, they have to cope with the limited resources available, on one hand and the increased demand for more and more timely data, on the other hand. Moreover, it should be noted that often the disadvantages (such as the additional workload implied by the documentation activity) might predominate over the benefits, which can be better appreciated in the medium-long term.

Thus there is a need to develop tools which facilitate the documentation activity and which help the survey managers to take advantage of it.

In this respect the development of information systems for documenting both metadata and quality measures will reduce the amount of time that the survey managers spend in documenting their processes and products. In fact, information systems allow the survey managers to reuse information already produced and facilitate the updating of the documentation. For example, information systems may be designed in such a way that the process documentation needs to be updated only when changes in process occur. The other great advantage is the availability of standardised, comparable and easy accessible information, which encourages the exchange of experiences through the possibility of comparing different surveys.

Another important issue is that information systems help the users in using the data correctly and increase the possibility of integrating different sources.

In fact, they help the users in retrieving the information on the available sources. At the same time, the users may know whether and how information sources differ from one another and may select the most adequate ones. Therefore, they are tools for increasing the relevance of statistical information produced by a NSI.

Obviously, resources are required to develop and maintain information systems updated. Thus, they should be considered as an investment by the NSIs. The discussion inside the LEG showed that the NSIs has chosen different approaches and different tools in order to support the documentation activity. In particular, some NSIs has developed information systems, while other NSIs has chosen different approaches, which are worth mentioning.

In this chapter, a summary presentation of three information systems in place in different NSIs, namely at Statistics Sweden, INSEE and Stat is reported. In addition, the less structured approaches followed by the Office for National Statistics (ONS) in the U.K. and INE-P is briefly described.

10.7. Statistics Sweden's Documentation System[11]

At the beginning of the 1990s Statistics Sweden introduced a standardised description model for statistical surveys, known as SCBDOK (Rosén & Sundgren, 1991). The SCBDOK description model is the basis for two other durable achievements during the early 1990s:

- ☒ A template (including instructions) for the documentation of final observations registers (archived microdata from statistical surveys), the so-called SCBDOK template;

- ☒ A standardised quality concept and a template (including instructions) for quality declaration of official statistics.

     During the latter part of the 1990s these initial developments provided an essential foundation for a number of further developments in the area of documentation, metadata, databases, publishing, and archiving:

- ☒ The Classification Database (KDB) for national and international standard classifications;

- ☒ The METADOK template, a computer- and software-oriented subset of SCBDOK;

- ☒ The metadata part of Sweden's Statistical Databases, called MacroMeta;

- ☒ A documentation template (including instructions) for annually updated descriptions ("product –descriptions") of each of the approximately 200 statistical products/surveys that make up the Swedish system of official statistics;

- ☒ A documentation template (including instructions), called "Facts about the statistics", giving a "popular" description of the official statistics

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published on the Internet in the form of standardised, database-based, electronic Statistical Reports.

Other related developments have occurred in the areas of:

☒ Archiving;

☒ Information for citizens about the contents of personal registers, as required by the Personal Data Act;

☒ The yearly quality survey for self-assessment of quality changes in official statistics.

All these systems are based either directly or indirectly on the statistical theory, survey methodology, and info logical theory behind the SCBDOK model, which ensures a certain conceptual and terminological consistency.

The main difference in purpose between the SCBDOK template (1) and the quality declaration template (2) is that the SCBDOK template aims to describe final observation registers, micro data, and the survey process behind these registers in a way that enables a future (re) user to use and analyse the data in a responsible manner; whereas the quality declaration template aims to describe aggregated statistical end-products, macro data or "statistics", so as to enable users to interpret and analyse the statistics in a responsible way.

The administrative information contained in the product description (6) can be obtained from SCBDOK. The rest of the product description template is identical with the quality declaration template. The contents of the "Facts about the statistics" (7) can be derived from the product descriptions.

The metadata part of Sweden's Statistical Databases (5) includes: product descriptions (6) of all statistical products/surveys, register documentation (SCBDOK (1) and METADOK (4)), descriptions of archived data sets (8) and the Classification Database (3). In addition, there is a large amount of structured metadata describing various aspects of the statistical data stored in a relational database. Among other things, this metadata provides descriptive texts, explanations and footnotes for variables and multi-dimensional data.

The only documentation that has so far been produced for all products is product descriptions. The regulations governing the system of official statistics in Sweden require all agencies responsible for official statistics to provide an updated product description each year for every statistical product.

A review of the product descriptions a few years ago and other signals have revealed a rather negative attitude to documentation; the survey managers felt that it was time-consuming and complicated and failed to see any reason for it. They regarded all these demands as "administrative pollution".

Some measures have been taken towards a technically integrated system, where all transformations between application systems, between databases and between software tools should be as automatic as possible, and towards improved availability of the documentation:

☒ The metadata base in Sweden's Statistical Databases, called MacroMeta, is the source of metadata for all software products that interface Sweden's Statistical Databases, e.g. PC-AXIS and a wide range of commercial software products. Over the last few years production systems have been equipped with an automatic link to Sweden's Statistical Databases and to the new standardised system for electronic publishing via the Internet. Thus both data and metadata are transferred, as automatically as possible, from the production systems to the output databases and the electronic statistical reports.

☒ The METADOK development started as a micro data equivalent to MacroMeta, called MicroMeta. Obviously, MicroMeta has much in common with MacroMeta, but MicroMeta (in its METADOK shape) also has a life outside Sweden's Statistical Databases. It will be used as a cornerstone in the new Register System that is now being developed at Statistics Sweden, and it can also simplify the transfer of metadata between the different software packages and documentation systems that are used at Statistics Sweden. For example, the METADOK system can be used for inputting formalised metadata into the SCBDOK system, and at the same time different software tools such as SAS, PC-AXIS, and Power Designer can use these metadata.

☒ As a result of the EU-supported IMIM project (IMIM = Integrated MetaInformation Management) some new ideas and tools have emerged and matured. The IMIM project elaborated some important ideas concerning integrated metadata management at statistical offices, and on a more practical level a prototype version of a software tool supporting integrated statistical metadata management was developed and tested. The name of this tool is BRIDGE, and it has an interface, called ComeIn, which enables and facilitates flexible exchange of metadata between all the different kinds of metadata holdings and metadata management systems that typically occur at a statistical office. BRIDGE with ComeIn is now being used for a standardised development of classification databases in a number of countries. It is also planned to develop interfaces between BRIDGE and a number of software products that are frequently used in statistical offices. More information about BRIDGE and ComeIn can be found in Rauch & Karge (1999) and in Rauch (2000).

☒ The documentation system has been reviewed in order to strictly define the statistical product, which from the point of view of documentation is not always the same thing as a survey.

☒ Today all documentation, as far as produced, is made available to users on Statistics Sweden's website.

All the measures mentioned above are steps towards a more user- and producer-friendly system. Though many steps still remain to be taken, survey managers can already see something positive in these developments and many users appreciate the easily available information about Swedish official statistics on the Internet.

10.8.   INSEE's Documentation System

In the middle of the eighties, INSEE, the French National Statistical Institute, launched a research program aiming at rationalising the know-how transfer, particularly by documenting the production processes. A method was designed and specific software was developed.

The method was inspired from what existed in industry enterprises. Thus a statistical survey, which was the main process considered at the beginning, could be described by a number of elements or components such as: data collection system (questions, organised in a questionnaire,), concepts (with their operative definitions), statistical variables, classifications, statistical processing (with specific methodologies), data processing, etc., and by the links existing between these elements.

A conceptual model was designed, and a computing tool was worked out, using the relational model of databases. The basic object of this architecture is called a "form", or a type of form, because different types had been identified: a type of form is defined to store documentation on the questions of a survey, another is devoted to the variables, yet another to the computer programs, etc. The information is stored in the system in different relational tables containing respectively the characteristics of the forms, the links between them and the texts related to the forms.

As there was no obligation to use this system in the Institute, the result is that there were only a few statistical activities, mainly household surveys, which chose to adopt it. As a matter of fact it appeared that the producers of statistics found this system could be a real support in their job, particularly when they had to prepare a new version of the survey, or when a new survey manager was appointed, but it was really too time consuming and the direct results were too slim. It could be said that at that time the available software only had limited possibilities.

An internal audit was carried out in 1995, which proved that the method was not questioned, but the software had to be changed. The tool is now integrated to the workstation in a microcomputer environment, and much new functionality is available in a user-friendly way. This is true for information management and retrieval, with facilities for printing, exporting and creating HTML pages.

Today, and although it is not strictly mandatory to document statistical production processes or other processes (however it is quite recommended), about twenty-five statistical activities are documented with this system inside INSEE, and several statistical services in other Ministries are willing to use it. These operations cover household surveys and business surveys, but also registers, processing of administrative data, production of indexes, etc., and coordination activities.

A last point, which is worth noting is that the information stored in the system is more and more directly used for dissemination, that is it can be easily introduced either in publications or in CD-ROM or in web sites.

More detailed information can be found in Crosnier D. (1999) and in Crosnier D., Marina L. (1996).

10.9. Istat's Documentation System

Istat has developed an Information System for Survey Documentation, named SIDI, in order to support the survey managers in the quality control activity. More precisely, SIDI is a generalised tool for monitoring the survey production processes; for documenting the activity of data production and quality control; and for disseminating suitable information on data quality to the users.

To this purpose SIDI manages both qualitative and quantitative information (i.e. metadata and quality indicators) in an integrated way. In our approach, we have focused on the production process since it is widely recognised that data quality can benefit from improvements in the process.

The classes of metadata managed into the system concern the following aspects:

☒ The survey information content such as statistical units and observed phenomena.

☒ The planning of the survey.

☒ The survey operations.

☒ The quality control actions related to each operation.

☒ The data repositories such as the questionnaire, the intermediate files, the files of final data.

☒ The replanning of the survey.

The system also manages time series of quality indicators. Such indicators allow the survey managers to monitor their production processes and to evaluate the quality over time. To this purpose standard quality indicators have been defined for the relevant phases of the survey production process, namely:

☒ Frame.

☒ Data collection.

☒ Data entry.

☒ Editing and imputation.

☒ Timeliness and punctuality.

☒ Costs.

The integrated management of both qualitative and quantitative information has many advantages. First of all it is possible to analyse the quality indicators taking into account the survey context for example which phenomena have been observed, which operations have been performed and how they have been controlled. Moreover, it is possible to compare the quality indicators of different surveys taking into account the main error sources, which affect them. For example it is possible to compare the nonresponse rates for all the surveys, which adopt the same data collection procedure (Brancato et al., 1998).

In order to allow comparisons among different surveys, both the qualitative and the quantitative information have been highly standardised.

The standardisation of the metadata has been achieved by defining a system of thesauri. In particular a thesaurus has been implemented for each concept documented into the system (e.g. phenomena, statistical units, survey operations and quality control actions). A thesaurus is a list of items, which provides standard descriptions concerning the concept of interest. When documenting a process, the survey manager chooses the proper items among the ones listed in each thesaurus. In order to ensure flexibility to the system, the survey managers are allowed to insert new items in the thesauri whenever it is necessary. The quality managers of the system are in charge of validating the new items added by the survey managers. In this way, it is ensured that each thesaurus remains coherent and non-redundant and that the new items are pertinent and correct. Furthermore, the survey manager can specify the period of validity for each chosen description (e.g. when a given operation has been introduced in the production process and whether it is still in use or not). In this way the survey managers are required to update the metadata only when a change in the process occurs. For a more detailed description see D'Angiolini et al., (1998).

With regard to quality indicators, it is worth noting that a set of standard quality indicators has been defined for each of the above-mentioned groups. By analysing the set of indicators belonging to a specific group, the user can investigate the sources of errors affecting a given phase. In this way both in-depth analyses of a specific phase and joint analyses of the indicators coming from different phases can be performed. The system also manages quality indicators, which result from ad hoc analyses performed by survey managers.

The architecture of SIDI consists of two integrated systems: SIDI1, which is the system for metadata management and SIDI2, which is dedicated to the management of quality indicators and to the dissemination of both qualitative and quantitative information. In particular, SIDI2 has a subsystem named SID-TOP, which has been especially designed for enquiring metadata and quality indicators. SIDI-TOP has been implemented as a web-based application, which accesses a relational database, namely the SIDI1 database, in order to provide the users with an easy access to the system.

More in detail, the SIDI2 system is composed of three different sub-systems:

☒ SIDI-TOP: the subsystem for enquiring and analysing metadata and quality indicators for ISTAT surveys.

☒ SIDI-Survey: the subsystem for producing and analysing quality indicators, which are specific for a given survey.

☒ SIDI-Comparisons: the subsystem for managing and disseminating information obtained by comparing different surveys.

At the moment, SIDI-TOP has been already developed while the other two subsystems have only been designed. When the system will be fully developed, the quality indicators shown by SIDI-TOP will be automatically provided by the two subsystems SIDI-Survey and SIDI-Comparisons.

In particular SIDI-Survey will manage all the quality indicators, which are required for calculating the standard quality indicators, managed into SIDI-TOP. However, SIDI-Survey has been designed as a much more flexible system in order to satisfy the specific needs of the survey managers. To this purpose it will manage ad hoc quality indicators defined by the survey manager as well as standard quality indicators with more detailed classifications (e.g. by economical activity or by enumerator).

SIDI-Comparisons is a subsystem which will be equipped with data warehouse functionalities so that the users will be enabled to make quality analyses starting from the detailed quality indicators related to different surveys and stored in the respective subsystems SIDI-Survey.

SIDI-TOP provides the users with a great variety of functionalities for analysing either a single survey or for comparing different surveys. In general, graphical and tabular representations are available for investigating a specific indicator or a group of them. A specific indicator can be analysed over time and/or with regard to geographical detail (when appropriate). It is also possible to compare the values taken by a specific indicator for a given survey with average values of the same indicator. A general mean, calculated by averaging the values for all Istat surveys, is available for all the groups. In addition, for each group of indicators, different relevant criteria for evaluating the mean values have been defined. For example, with reference to the data collection group, specific mean values are obtained by considering the data collection modes such as the average values for mail surveys. For each group of indicators, a methodological report containing definitions and evaluation functions is also available. Finally, SIDI-TOP has a special environment where all the documents and the results of specific analyses performed by the survey managers are stored and made accessible to all users in a HTML format.

Given that the SIDI system has not been completely developed, its use is limited to internal users. However, about forty surveys (both social and economical ones) have documented their processes while a project for collecting standard quality indicators has been recently launched.

With regard to further developments, two main projects are going to be launched in 2001. The first one is a study for extending the SIDI system to all the statistical offices inside the Ministries and other public organisations, which compose the Italian Statistical System. The second one is a project for designing and developing an information system, which will manage in a

more detailed way the metadata concerning the survey information content. This system will be integrated with SIDI and will extend its functionalities with particular regard to the management of metadata concerning variables, classifications and definitions.

10.10. ONS's Standards and Guidance (STaG) database

The Office for National Statistics is undertaking a project to develop an electronic statistical standards and guidance framework. When fully populated, the framework will provide a large Lotus Notes reference database which will facilitate the bringing together of all existing statistical methodologies and processes from across all the ONS. This will not only ensure greater transparency and accountability, but will facilitate the strengthening of existing arrangements by:

☒ Giving all staff access to a wealth of information.

☒ Spreading best practice.

☒ Ensuring consistent standards.

☒ Enabling easier comparisons of methodologies.

The project was launched in the ONS electronic newspaper (the Daily) in September 2000 and has been personally endorsed by the National Statistician, Len Cook. To raise awareness of the project, the project team held seminars at all ONS sites and invited colleagues from other National Statistics offices.

In November 2000, an inventory database was distributed to senior staff, requesting information on the format of existing guidance for each statistical work area. The information collected on this database will assist in the staging of the population of the database and will identify areas where further work is needed. The staging will be managed using formal project management techniques to ensure the framework is delivered in a controlled environment and that it met the needs of ONS staff.

The Lotus Notes database, which will store the framework, was developed in consultation with ONS Information Systems staff to ensure it met the office standard and fully exploited the flexibility of Lotus Notes, ensuring it was as automated as much as possible for ease of use. It was launched to all ONS staff on 30 March 2001. At the moment it is partly populated with a selection of ONS information, Government Statistical Service (to be replaced in time by National Statistics protocols) and guidance for the work area that produces the Retail Price Index. It is planned to incorporate guidance from several other work areas over the coming months.

10.11. Proposal for the Development of INE Documentation System

The organisation of a documentation system for INE has been one of the tasks previewed in this year's (2001) annual program for the Quality Management System.

A study of the present situation has been made and it has been followed by a draft document to outline a possible platform for the system (INE, 2001). On this basis a proposal was submitted to INE Quality Commission, which received a positive response. At the moment, an action plan is being developed to present in detail the phases in which the system will progress.

The proposal is an attempt at defining a unique structure to integrate the documents that INE (through its different functional units) produces internally that are in use to support its current activities.

The set of the documents gathered observe the following criteria:

☒ They are of a wide use in INE (such as administrative forms);

☒ They are recognised as important support for the performance of current tasks (both statistical and non-statistical ones) and there was a particular concern to group the documents that are seen as important to all categories of technicians.

Such documents are:

☒ The models used to establish formal contacts in and out of INE (regulatory/statutory notes, letters, fax);

☒ The forms in use for all INE units related to the management of human and financial resources, and also to the performance of administrative tasks;

☒ The documents produced internally and that should be of broad knowledge and available to all collaborators, issued from different areas of responsibility: including non-statistical areas – Planning, Financial, Administrative and Human Resources, Computer systems/Information technology, Quality Management – and statistical areas, such as Statistical Coordination (metainformation/metadata).

The sort of documents produced range from annual reports, periodical performance indicators, case studies, and handbooks.

The scheme of the system is developed considering the utility and advantages from the internal user point of view. The system was drafted taking into account the adjustments necessary to upgrade the organisation's knowledge level and an easy access to the documentation. It also required the definition of information/documentation flows and common classification codes, and the creation of links between the different levels of documents.

The implementation of a Quality Management System in INE contributed to view the documentation function as an integrated part in the management of

all other processes/functions. This perspective is in accordance with the ISO 2000 standards and tries to establish a difference between managing a system and documenting it. The documentation is regarded as the formal support in the chain of processes (inputs/outputs) and its own system should be as flexible and adjustable as possible for each particular organisation.

10.12. Conclusions

In order to enhance the documentation activity, each NSI should define an overall strategy for the whole organisation. To this purpose the following steps have been identified:

⊠ To analyse the documentation status inside the organisation (i.e. to verify the existence of a policy for documentation and at the same time, to identify the strengths and weaknesses in this field).

⊠ To take into account the organisational aspects (e.g. to decide the most suitable media and the best way to obtain information from survey managers; to assess the costs associated with the implementation and the updating of information systems).

⊠ To refer to best practices or to the experiences made by other NSIs.

⊠ To establish a plan of improvement by setting the priorities (which processes should be documented first, in which way and to what extent) and by scheduling the activities.

The LEG has recognised the importance of documenting the NSIs policies and strategies (e.g. mission statement, quality policy, dissemination policy and policy on human development) and having these documents publicly available to the purpose of promoting improvements inside NSIs and as a first step towards a harmonisation process within the ESS.

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Annex 1

A. 1 Examples of how to "reuse" documentation for different users of documentation

Some different documentation-users are listed in the left column of the matrix below (see also paragraph 3.1 in this chapter). The table-headings provide some examples of different types of documentation. The level of detail needed is marked for each piece of documentation and for each type of user. The aim of this matrix is to show that the same piece of documentation can be used for more than one user group using different levels of detail. This type of matrix could be used when discussing the content of a documentation system.

Documentation-users	Documentation on the process of deciding which information to collect	Documentation on the economic follow-up	Documentation on the editing process	Documentation on accuracy	Documentation on quality policy	Documentation on staff satisfaction surveys
Producers (at NSIs and at Eurostat)[12]						
Survey managers	HIGH	MEDIUM	HIGH	HIGH	HIGH	LOW
Management	HIGH	HIGH	MEDIUM	HIGH	HIGH	HIGH
Those who follow up quality	HIGH	LOW	HIGH	HIGH	HIGH	HIGH
Survey managers who reuse statistics from other processes	LOW	LOW	HIGH	HIGH	HIGH	LOW
Survey managers who are interested in making comparisons and benchmarking	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH

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[12] The aim is to understand the processes, the policies and the data
   -For ensuring and improving quality
   -For the correct reuse of data
   -For the correct comparisons of processes

Documentation-users	Documentation on the process of deciding which information to collect	Documentation on the economic follow-up	Documentation on the editing process	Documentation on accuracy	Documentation on quality policy	Documentation on staff satisfaction surveys
Producers who compile and harmonise data at Eurostat and at other international organisations[13]						
Survey managers of compiled and harmonised statistics	LOW	LOW	HIGH	HIGH	LOW	LOW
Management	LOW	LOW	MEDIUM	HIGH	LOW	LOW
Those who follow up quality	HIGH	LOW	HIGH	HIGH	HIGH	MEDIUM
Survey managers who reuse statistics from other compiling and harmonisation processes	LOW	LOW	MEDIUM	HIGH	HIGH	LOW

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[13]The aim is to understand the processes and the data
-For the correct use of data
-For the correct comparisons of processes

Documentation-users	Documentation on the process of deciding which information to collect	Documentation on the economic follow-up	Documentation on the editing process	Documentation on accuracy	Documentation on quality policy	Documentation on staff satisfaction surveys
Users[14]						
The general public	LOW	LOW	LOW	HIGH	MEDIUM	LOW
Experienced users; students and journalists	LOW	LOW	MEDIUM	HIGH	MEDIUM	LOW
Experienced users; working for public administrations including policy makers for private companies	HIGH	LOW	MEDIUM	HIGH	MEDIUM	LOW
Experts; researchers, analysers	HIGH	LOW	HIGH	HIGH	MEDIUM	MEDIUM

Conclusions concerning the importance of documentation for different types of documentation-users	**Important in all dimensions**	**Important for management and bench-marking (the producer dimension)**	**Important in all dimensions**	**Very important in all dimensions**	**Most important in the producer dimension**	**Most important in the producer dimension**

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[14] For better understanding and use of data

A2. Results from the questionnaire on Documentation

Results from France, Germany, Italy, the Netherlands, Portugal, Sweden and Eurostat.

Documentation for ensuring and improving the quality of statistical processes – internal users

1. Is documentation concerning statistical processes mandatory in your agency?

Documentation concerning statistical processes is mandatory for Portugal and Sweden. At INSEE it is mandatory for every new survey, which has to get a visa from the Quality Label Committee of the National Council of Statistical Information.

In most organisations documentation is strongly recommended for statistical products and some survey managers insist on it within their domains. The tendency is towards increasing the number of statistical processes, which are documented.

Within some years, 5/6 organisations in the survey intend to document all statistical processes.

2. If statistical processes are documented in your agency, how is documentation published?

All organisations use both printed and electronic documents in order to publish information concerning statistical processes except for Sweden where documentation is only published on the SCB Intranet.

Information systems are in place in 4/6 organisations, namely France, Italy, the Netherlands and Sweden.

At Eurostat the documentation concerning improvements projects for processes is not published widely.

3. If statistical processes are documented, has a "minimum documentation" been defined in your agency?

Two organisations have defined a minimum documentation, namely INE-P and Statistics Sweden.

In Portugal the minimum documentation required for statistical processes is specified by the Statistical Production Procedures Handbook (INE, 1997). The required documents concern the following primary statistics production phases: I - Project Purposes; II – Project Conception; III – Project Methodology and Viability; IV – Approval; V and VI – Planning and development; VII – Collection; VIII – Data processing; XII – Data dissemination.

In Sweden the minimum documentation should contain (I) everything that is necessary for reuse of archived micro data; (ii) a quality declaration facilitating correct interpretation of published statistics (macro data).

In France an attempt at defining minimum documentation has been made but a consensus has not yet been reached. Thus the process of adopting a minimum documentation is still in progress. The aim of the proposal of minimum documentation was: (I) to provide the producers with the references acknowledged by everyone, allowing the know-how transfer; (ii) to provide the "disseminators" and the

Persons in charge of archives with the minimum information allowing a sufficient understanding of the data by end-users as well as their future use. The INSEE proposal for minimum documentation has a content quite similar to that listed in paragraph 3.3 under the heading "production context" except for the quality indicators, which were not included. Eurostat is developing a "preferred approach" to process documentation.

4. Can you specify the content of documentation concerning statistical processes (e.g. description and methodology of the different phases: planning, questionnaire design, sample design, data collection, data processing, validation, data dissemination, etc. and also definition of variables, classifications, copy of the questionnaire, quality measures, process indicators, quality reports,)?

In France, Italy, Portugal and Sweden almost all the above-mentioned topics are documented. In France, Italy and Portugal there are differences with regard to the type of surveys (i.e. direct surveys are documented better than surveys using administrative data). Documentation concerning quality measures is also less developed than the process documentation. In Sweden the approach followed is a statistical process model and lacks information on the project. The aim is primarily to use and understand the data. Statistics Netherlands is now preparing a general framework for documentation, which should be ready in 2001. At Eurostat process documentation is a project development model aimed at identifying scope for improvement and management tools.

5. Which tools do you have in place to help people documenting statistical processes?
Documentation systems are in place at INSEE, Istat and Statistics Sweden. Other tools used in some organisations are checklists (Italy and Statistics Sweden) and guidelines (Portugal and Statistics Sweden). Two organisations have no specific tools.

6. Which unit of the agency is responsible for collecting and organising these elements of documentation for internal use?

Is there a specialised unit?

5/6 organisations have a central unit responsible for quality issues and for organising the documentation. In Portugal the central unit is also responsible for collecting the data and publishing them on the Intranet. In Sweden the organising, the Information and Publishing Unit make collecting and publishing. At Eurostat, the methodology for documentation has been developed by external consultants.

Documentation for better using and understanding data – external users (also internal users who reuse data)

7. Is documentation concerning information for better using and understanding data mandatory?

Documentation is mandatory for all disseminated data for 3/6 organisations, namely INE-P, INSEE and Statistics Sweden. At Eurostat documentation is mandatory for some of the data.

8. What sort of information for better using and understanding data is provided to external users together with data?

All organisations provide metadata. Two countries (Portugal and Sweden) also provide quality indicators. In Sweden there is also a popularised version of metadata and quality declarations for specific user groups (e.g. readers of press-releases and monthly statistical reports). In Italy some metadata and information on quality are provided but there are no general rules; thus the responsibility is up to the survey managers. Eurostat provides metadata in NewCronos. Statistics Netherlands is going to provide quality indicators in the near future.

9. How is the information provided to external users?

All the organisations provide information to the users by means of publications and special documents. Four organisations also publish such information on the web (INSEE, Istat, Statistics Sweden and Eurostat). INSEE, Statistics Sweden and Eurostat also have an information system.

10. Has a «minimum documentation» for external users been defined?

3/6 organisations have defined a minimum documentation (Portugal, Sweden and Eurostat). The Netherlands plan to do it in 2001.

11. Which tools are in place to help people in documenting the data?

Germany and the Netherlands have no tools. Italy, Portugal and Sweden have checklists and/or guidelines. France has a documentation system. Eurostat has the Special Data Dissemination Standards (SSDS) guidelines and checklists by domain for Euro-SICS (business cycle indicators of the Euro-zone) only. It also has internal guidelines for domain managers

12. Is there a unit of the agency responsible for defining and organising this documentation for external use?

5/6 organisations have a unit responsible for this task. It is the central unit for quality issues and for organising the documentation, which in this case co-operates with the Dissemination unit. At Eurostat Unit A3 co-ordinates meta-data within Eurostat; Unit C1 is responsible for information and dissemination; and Unit D1is responsible for classifications and methodological co-ordination.

Documentation for ensuring and improving the quality of other processes (not statistical ones)

13. For which of the following issues, has your agency published a document?

5/6 organisations have a mission statement
2/6 organisations have a quality policy
5/6 organisations have a dissemination policy
2/6 organisations have a policy on human development
Sweden also has an IT-strategy

14. Which of the following documents are available also to people external to the agency?

5/6 organisations the mission statements are available to the public
In 2/6 organisations the quality policies are available to the public
In 5/6 organisations the dissemination policies are available to the public
In 2/6 organisations the policy on human development is available to the public
In Sweden all final documents produced by a governmental agency are available to everyone under Swedish law. In Italy and in Portugal there is also a Quality Charter available to the public.

NSIs also have specific tools for disseminating methodological issues such as specialised reviews. As an example, we mention the Journal of Official Statistics (JOS) issued in English by Statistics Sweden since 1985, which publishes recent advances and research activities concerning statistical methodologies. In 1997, Istat established an English-language series, Essays, which focus on research studies. Essays also publishes the proceedings of seminars and scientific conferences promoted by Istat with particular emphasis on quality related issues (see for example, Quintano C. and Castellano R. (edts.) "Strategies for dealing with nonresponses for quality in some Istat surveys", 2001).

11. Dissemination of information

Summary

The dissemination of information mainly inside the European Statistical System (ESS) is discussed with respect to the level of information flows, the type of information and the organisation of information flows. Current good examples are given for potential use in the ESS.

11.1. Introduction

Though not explicitly mentioned in the terms of references of the Leadership Expert Group (LEG) on quality, a crucial element of any kind of quality improvement in the European Statistical System (ESS) is effective management[15] and dissemination of information, finally aiming at an increase of knowledge in the ESS. (Dissemination of) Information as such is not part of the definition of quality. There are nevertheless close links with quite a number of aspects of quality. Examples are information about the users and their needs, information about methodology and software for the production of statistics (e.g. calculation and estimation procedures) or information about modifications of concepts and classifications.

Dissemination of information has a variety of dimensions with different importance for the ESS. Due to the limited time and resources available, the LEG decided to restrict its activities to core dimensions for the ESS, i.e.

☒ level of information flows,

☒ type of information,

☒ organisation of information flows.

The results are presented in the following chapters. They include an overview of the different dimensions and present partly new ideas on information as well as on their organisation. A first list of current good practices is included and recommended for further discussion and potential use in the Member States.

11.2. Level of information flows

Altogether 6 levels of information flows with statistical agencies involved can be identified:

☒ information flows within (national) statistical agencies[16],

☒ information flows between (national) statistical agencies,

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[15] Management of information can be defined as the manner in which an organisation captures, records, stores and retrieves all kinds of information be they written or electronic or any other means.

[16] Statistical agencies include mainly statistical offices but also other institutions involved in official statistics such as ministries collecting selected data for example in the field of agriculture or unemployment.

- information flows between national statistical agencies and Eurostat,

- information flows between national statistical agencies and (other) supra- and international organisations such as organisations of the United Nations, and also the Organisation for Economic Co-operation and Development (OECD) or the International Monetary Fund (IMF),

- information flows between Eurostat and these supra- and international organisations[17], and

- information flows between statistical agencies and the "rest of the world", including the (main) information providers, users and the academics.

None of these levels of flows should be excluded, but the flows vary in importance. The following considerations will be concentrated on the information flows within and between national statistical offices, between these offices and Eurostat (and therefore indirectly also with other international bodies) and between national statistical offices and the academics and research institutes as important users and suppliers of data and methodology.[18]

11.3. Type of information

Despite the above fixed priorities, the selected information flows still contain quite different types of information. They cover regular information flows of for example data and metadata between statistical agencies, latest developments or staff information such as newsletters inside statistical agencies, but also quite diverse ad hoc information flows. Examples are the exchange of methodological papers, research agendas, general or new (methodological) developments, organisation of surveys or information on the development of the agencies such as the results of staff surveys. If such ad hoc information is considered to be of general interest, the creation of new information tools like databases might follow leading to additional information flows to keep the newly created tool up-to-date.

A summary of the different types of information with a particular view to the needs of the ESS is given in the annex.

11.4. Organisation of information flows

Information flows can be organised in quite different ways. More traditional ways include formal and informal discussions during or linked to meetings, e.g. at Eurostat, the exchange of documents via traditional or electronic mail, organisation of workshops and conferences, and through joint projects or bilateral and multilateral co-operation respectively. Latest technological

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[17] These flows gain more and more importance with respect to avoiding double work of data transmissions by national statistical agencies.

[18] An important information flow concerns the flow between statistical agencies and their clients and customers. This flow is not considered here in more detail as another chapter of the LEG report is devoted to users and clients encompassing this information flow.

developments offer interesting new possibilities such as electronic discussion groups on the basis of products like CIRCA, generally accessible web pages (including appropriate functions like the search function), databases on current work in progress or internal networks (INTRANET).

Future work should to some extent concentrate on the possibilities of the new technologies. However, there are fairly traditional tools that should be used more intensively. One possibility might be a system of methodological conferences at European level that could be organised on a regular basis as it is done in the United States.

Two aspects of the organisation of information flows need special attention: the selection of relevant information and the continuous up-date of the information. The amount of information increases in a way that a systematic follow-up of all incoming - and particularly new - information flows is almost impossible. An intelligent system of information management has therefore to be established at ESS level to get the most out of all information available ("knowledge management"). One solution might be the creation of a system of "information managers" all around the ESS responsible for different aspects of these information flows. In particular, each NSI should have someone in charge of the up-dating process. These managers should co-ordinate and update information so that the core knowledge is made available to all ESS members.

A summary of appropriate ways to disseminate information as well as possibly linked problems is included in the annex.

11.5. Conclusions

The work of the LEG has shown a wide range of information at different levels and of different types in the ESS, the dissemination of which is organised in different ways. Current good examples, based on the limited knowledge of some LEG countries, are summarised in the following table. The examples could be of interest to other ESS members.

A summary of the findings on the dissemination of information can be found in the final report of the LEG, including recommendations. Nevertheless, two aspects deserve special attention. Firstly, the overwhelmingly rapid increase of information in the ESS requires serious consideration on how to manage it. Secondly, the methodological knowledge in the ESS is such that one could consider establishing biennial statistical conferences at European level on all topics of relevance to the ESS, similar to meetings organised in the United States and other countries. Such events might replace some of the ad-hoc conferences that are until now organised by Eurostat and its contractors.

Examples of current good practices on the dissemination of information in the ESS[19]

Current good practice	Information flow	Type of information	Organisation of the information flow	Description	Process manager
CYBERNEWS, SCB'S NEW INTRANET	Inside a statistical agency (Eurostat, Sweden, ISTAT, INE-P)	General staff information and administrative routines	Intranet/Extranet	Information on everyday (working) life in the statistical agency, including latest news, products and services, publications, databases, documents, working tools, administrative resources/information or links to external sources	Statistical agency
CIRCA groups	Between statistical agencies (including Eurostat)	Discussions and access to documents	CIRCA	Discussion forums with restricted access, including access to relevant documents	Eurostat
SAM-Forum	Between (national) statistical agencies	Information on the statistical system, the legal basis, the tools and international co-operation	Internet	News, Bulletin Board, legal basis, information on the system of official statistics, tools, nomenclatures, standards, methods, international co-operation, documents and reports from meetings, participants in working parties, information on organisations connected to the production of statistics, e.g. the Data Inspection Board	Statistical Agency
Swestatnet	Between (national) statistical agencies and the general public	Gateway for statistics from all 25 agencies responsible for	Internet	Links to the website of Statistics Sweden and to the statistical part of websites for the other 24 agencies	Statistical Agency

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[19] The following table does not include some more traditional examples on the dissemination of information, like seminars, roadshows, workshops inside statistical agencies, press notices, pamphlets and booklets or a policy of regular team meetings. Such tools can be very successful from the point of view of the exchange of information, depending on the individual features. It is assumed that they are widely used in the ESS in one way or another.

		official statistics			
Websites	From a statistical agency to the public (Sweden, ISTAT, Eurostat, INE-P)	Data, metadata, information on services offered	Internet	(Access to) all official statistics available in a statistical agency, documentation on quality, information on registers and series in the archives	Statistical agency
Newserver	Inside a statistical agency (ISTAT)	Information on specific topics	**Intranet**	Discussion forum on selected topics such as statistics, software, e-mail, including access to relevant documents	Statistical agency
DSN (Data Shop Network)	Between Eurostat and the NSIs of the EU and some private agencies	Data, statistical products and marketing information	Internet CIRCA Electronic mail TESTA[20]	Weekly Bulletin, electronic publications, working papers, material for training	Eurostat
Midi d'info	Inside a statistical agency (Eurostat)	General	Meeting	Interested staff members of all grades participate in an information session on quite diverse topics e.g. new legal procedures, the change of the statute or the first results of a staff survey, followed by a general discussion	Eurostat
Meeting of the Middle Management Committee	Inside a statistical agency (Eurostat)	Management	Meeting	All middle and top managers meet once a month to discuss management related topics	Eurostat
Electronic exchange of documents	Between Eurostat and the NSIs and other participants in Eurostat meetings	Agendas/minutes/ documents/conclu sions from meetings	Electronic mail	All documents for meetings are sent via e-mail	Eurostat
Project seminar	Inside a statistical agency (INSEE)	Methodology	Work shop	Seminar to discuss different issues of new projects with staff from different areas e.g. on designing new surveys	Statistical agency

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[20]   Trans European System Telecommunication Administration

Type of information and ways of dissemination

♦ *Type of information*

☒ data

☒ metadata

☒ analyses

☒ administrative information on staff, meetings, conferences, web pages, addresses, vacancies, agendas/documents/minutes of meetings, business plans etc.

☒ methodology

☒ information on research

☒ legislation

☒ standards

♦ *Ways of Dissemination*

☒ paper

☒ diskette and comparable tools

☒ data bases

☒ CIRCA

☒ web pages

☒ INTRANET

☒ GESMES

☒ traditional mail

☒ electronic mail/SMS

☒ formal discussions

☒ informal discussions

☒ work shops, task forces, etc.

☒ conferences

☒ bilateral and multilateral projects

☒ networks

☒ technology transfer

☒ exchange of staff between organisations

♦ *Identified problems*

⊠ costs for regular up-dating

⊠ selection of relevant information

⊠ creation of web pages

⊠ measurement of level of penetration of disseminated information

⊠ development of a systematic approach at national and European level

⊠ co-ordination of main activities at European level

⊠ rapid increase of information and risk of information overload

12. Implementation of Quality Management in National Statistical Institutes

Summary

Quality Management is implemented in National Statistical Institutes (NSIs) following decisions made by top management, as part of the organisation's overall strategy. It is clearly a top-down process, but the involvement of the whole organisation is also a necessary condition for success.

It is a long-term commitment and implies a change in NSIs from product to customer orientation based on a new organisational culture and working on a set of core values such as continuous improvement, benchmarking, teamwork, innovation, and others.

General guidelines for practical implementation of quality management can be outlined. Some resistance and other obstacles might emerge.

All NSIs in the European Statistical System (ESS) should consider the adoption of a systematic approach to quality.

12.1. Introduction

NSIs are nowadays confronted with a rapidly changing environment and facing major challenges such as new statistical requirements, new information systems, competition in the market, increase in and diversification of users, combined with stable or lower budgets. So it is essential to define their mission and vision, to outline strategies and policies in order to achieve good quality of their products and services.

The aim of quality management is the continuous improvement of quality and performance of the organisations. Most NSIs have ongoing quality improvement projects, but work is not always systematic. However, many NSIs have already opted for business excellence models and self-assessment tools to find strong and weak points, as a basis for improvement work. Yet the decision for a management model is just a first step towards systematic quality management. In order to achieve effective and suitable quality management, actions taken for its implementation are crucial. Top management commitment, staff involvement, a clear quality organisation as well as review and documentation have to go hand in hand.

12.2. Starting and managing a process for change

The concern about quality is not a recent development in NSIs, what is recent is the systematic, integrated and organised way of working with quality issues. NSIs manage and improve a large number of processes involving products, services and user relationship. To develop quality management, NSIs must identify and design the key processes needed to be worked, define sequences and take and measure actions, in order to enhance the satisfaction levels of users, both internal and external. It is important to focus on the processes, as product quality is achieved by means of process quality. But other aspects should be taken into account, such as planning (goals, timings and responsibilities) and the identification of all interested partners and their respective roles in this process.

In NSIs the main purpose is continuous improvement of the quality of the products and services, and there are different ways to put this approach into practice, using various quality management frameworks. Empirical studies have shown that the implementation of quality management is a long-term commitment. It requires a change in the organisation's culture, supported by a new vision, based on a set of core values shared by all staff, such as:

☒ Leadership (defining a clear vision and mission, getting personally involved in quality work, investing in skills, innovation and creativity)

☒ User orientation (focusing on the needs of internal or external users, strengthening their relationship, improving accessibility of products and services)

☒ Process-orientation (focusing on the processes that create products, analysing and continuously improving the key-processes of the organisation)

☒ Teamwork (teambuilding, improving communication, stimulating teamwork as a motivating force)

Benchmarking, continuous improvement and review, (sharing good practices, learning from others' experiences and measuring results).

Each NSI can emphasise and concentrate work on different values in its own quality approach. However, all NSIs must have a clear perception and sense of their mission and goals, give priority to concrete results, and assess their results taking into account user satisfaction, aiming at efficiency and quality.

The commitment that has to be assumed is a long-term investment on change. Organisation and structural changes must be introduced and sustained over the short and long term. It is not an easy and fast way, some changes can be put into practice immediately, but others face resistance and problems, namely the existent organisation's culture. Big and small changes have their own timing and need to be managed. Organisations normally take 5 to 10 years to progress and reach a higher level of quality. It demands continuous, patient and persistent work. But even then there are always new opportunities for improvement.

Introducing quality management and making it work means implementing change in NSIs, and, as any process of change, is expected to face some constraints and resistance. Some examples are:

- ☒ Internal problems of motivation (goals of the organisation are not clear enough; the need for change is not well explained; fear of different working conditions or need of new skills, etc.)

- ☒ Low willingness to take risks on the part of management (commitment is missing, resources for assessment or benchmarking are lacking)

- ☒ Insufficient change management (the language of quality management is too formalised and abstract, it does not take the specific situation of the organisation into account)

- ☒ Lack of communication and co-operation (lack of external support, inefficient teamwork etc.).

12.3. Guidelines for implementation of quality management in the ESS

There are many ways to implement systematic approaches of quality work. NSIs are unique, with very distinctive strengths and opportunities, frameworks and resources. However, some collected experiences show that there are common important phases that may be followed:

12.3.1. Leadership

♦ *Top management commitment*

As mentioned above, the implementation of quality management is, at the beginning, a top-down process. Top management decides univocally to start the implementation and to support it personally, through actions rather than statements. Top management has to set clear goals and priorities, break barriers and obstacles and stimulate continuous improvement. This commitment includes the willingness to provide the adequate human and financial resources for the implementation of the strategy and the system. The quality culture of the organisation should not be affected by a change in leadership.

♦ *Strategic Orientation*

Top management has to make sure that implementation of quality management should be supported by the vision, mission and values of the NSI. Strategy formulation and policy making are clearly top management assignments that can hardly be delegated to other people in the organisation. Examples can be found in mission statements and quality declarations, such as Eurostat's corporate plan, TQM at Statistics Sweden, ONS 2000 change program in UK, NSI Portugal's Quality Charter.

♦ *User Orientation*

Top management should communicate to all staff that the focal point of the activities of NSIs is the user of official statistics. The importance of involving users in the production and dissemination of statistics and improving their perceptions by creating added value has to be stressed during the implementation of quality management. Some NSIs assess and improve the levels of user satisfaction through regular customer satisfaction surveys.

The user-producer dialogue should be strengthened. In most countries in Europe, the links between users and producers are established by Statistical Councils, whose main task is to review the statistical programs and set priorities.

12.3.2. Involvement of the staff

The next step is the involvement and participation of all staff. Once initialised by top management, activities should be carried out as bottom-up processes (as far as possible). Important elements are information, participation and quality training.

♦ *Communication and Information*

Good communication is essential for successful implementation of quality management. Effective two- way communications should be achieved with the staff. People should be informed of what is planned to make participation easier. Fears about the outcome of changes can be (partly) avoided only by open information.
Communication between different levels and functions has to be assured. Benchmarking sessions can be convened within the organisation or with similar organisations. Recognition systems are adjusted to honour employee contributions to quality improvement through suggestion boxes, team participation, innovation and initiative.

♦ *Participation of all*

Contribution to improving performance can come from every employee, regardless the respective position in the hierarchy, generating benefits for the NSIs. Change can come from individuals or small teams acting as the driving force for the change process. Examples are TQM pilots at Statistics Sweden or Quality poles in NSI Portugal, specially trained quality facilitators who assist participants in quality work and the use of quality tools. Mobilisation of

employees for quality programs is a condition for the success of quality management. NSI Portugal and the Federal Statistical Office of Germany have recently undertaken so called Quality Meetings, aiming at involving all staff and giving information regarding its implementation.

♦ *Quality Training*

Persons who are assigned for specific tasks within quality management should be competent and have a good mix of skills and knowledge on the basis of education, training and experience. Staff at all levels has to be trained in quality related tools, beginning with the top and working down. It is important that everyone, at all levels of the NSI, is actively involved in the implementation of quality management. Responsibility and accountability are assigned at the lowest level.

12.3.3. Quality organisation

For the implementation of quality management some basic organisational requirements have to be fulfilled.

♦ *Quality Management Organisation*

Management decides how the quality work has to be organised and makes sure that the necessary responsibilities and authorities are defined e.g., it decides whether or not a quality committee is to be created and what its mandate is to be, appoints the team responsible for promoting quality, as well as the quality facilitators to work on continuous quality improvement.

♦ *Resources for Quality Management*

The implementation process of quality management is an investment, which needs human and financial resources. The commitment of the management has to include the willingness to pay for this task. Returns on investment have to be regularly evaluated and measured by quality and performance indicators.

♦ *Project Management*

In the beginning of the implementation, quality work will usually be organised as improvement projects and have to be carried out in accordance with the general rules of project management. Such projects can fall into different categories, some can be designed to bring improvements in timeliness, others to standardise methods and procedures or reduce production costs in survey processes, thus increasing efficiency.

♦ *Quality Documentation*

Documentation is vital to ensure and improve quality, and also to better understand and use statistical data. However, it should never be considered as an aim in itself, but as an activity to support the implementation of quality management. Some documents describing NSIs strategies and policies, statistical production processes and data, and assessment tools are required for a systematic approach to quality. These documents should be controlled, reviewed and regularly updated.

12.3.4. Review and Continuous Improvement

In order to ensure that quality management is effective, results should be monitored, measured assessed and analysed so that a process of continuous improvement is assured.

♦ *Evaluation of Quality*

The process of identifying strengths and weaknesses and setting priorities is very important for many phases of the quality management implementation. One possible way is through self-assessment, an inventory to be carried out by the organisation. Within such an assessment a team is pressed to elaborate a common judgement of the "status quo" of the NSI. This assessment should be carried out in accordance with a framework, which helps organisations in this exercise. Different management models can be used as frameworks for self-assessment and quality improvement. The most commonly used are business excellence models, inspired by TQM principles, with similar components such as leadership, people, partnerships and processes, amongst others. The EFQM model is a well-known framework, which is used by some NSIs. This evaluation of quality should be repeated regularly in order to measure the progress (return on the investment), and allow benchmarking with similar organisations.

♦ *Quality of Processes*

In NSIs a better control of processes will improve the final products - the statistics. Hence, the core of quality management is an optimisation of processes predominantly in production, but also in internal support and management processes. An evaluation of the most important processes should be a module of quality management.

As product quality is achieved by means of process quality, NSIs must identify and manage a large number of processes. The key processes and their variables should be selected and controlled in order to introduce improvements and increase their efficiency. Process orientation is one of the basic elements of TQM.

Quality management will work better if built on sound statistical and scientific principles. For each statistical product it is possible to define and understand the production process and a measure of quality, and then improve the product through process improvement.

♦ *Quality of Products*

A good process is a necessary but not sufficient condition for having good products. To be an effective organisation, the mix of products should be continuously optimised. The optimal mix is depending on user needs, costs, the available budget, the response burden and technical possibilities. The characteristics of the products should be described with the help of the underlying quality dimensions, such as accuracy, timeliness, comparability, accessibility and coherence. And during the production process all phases

should be monitored to obtain, in advance, the specified characteristics of the process and its products.

♦ *Improvement Projects*

Some NSIs undertake quality work in the form of improvement projects. Improvement is of course imperative not only in the statistics production, but for other processes and activities as well. Improvement projects should be initiated within all areas of NSIs. To support the work in these projects there are a number of proven quality tools that can be used. These include Flow-charts, Pareto Diagrams, Cause-Effect Diagrams, Control Charts, Brainstorming and more. Another powerful way to support the improvement activities within projects is to select and train "Quality Facilitators", with knowledge of effective teamwork and the application of the mentioned tools. This approach has been taken in Finland, Norway, Portugal and Sweden with good results.

12.4. Conclusion

NSIs face new challenges and operate in a fast-moving environment, so they need to adopt a systematic approach to quality work if they want to reach higher levels of quality of their products and services. This work must clearly be carried out as both top-down and bottom-up approaches. Frameworks such as business excellence models inspired by TQM principles (EFQM or others) can be used by NSIs to provide statistical data and services with high quality and enable continuous quality improvements. This systematic quality approach is difficult to implement and demands a lot of effort and this is the reason why so much emphasis should be put on the procedures.

EUROSTAT and many NSIs within the ESS have already started quality work on a systematic basis. Benchmarking and learning from each other's experiences should be stimulated through increased co-operation in quality issues at the European level. The search for Quality has to be permanent and pursued all the time by all NSIs.

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