

The ten commandments of proces and product quality in official statistics

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Abstract

More and more statistics are produced in a standardised way. We talk not only about re-use of data, metadata and tools but also about every production cycle being done the same way. In this paper we elaborate on what we mean by 'the same way'; what are the requirements in terms of process and product quality? When are we allowed - or even forced - to change our processes? What are the differences between product specifications and product quality reports? What is the relation between process and product quality? And is preferable to maximise product quality again every production cycle? Lastly examples of what could we learn from practices in the world outside statistics are given. In terms of commandments, the paper formulates a way to produce our statistical information recurrently, according to a set of pre-defined and pre-set quality specifications such as accuracy, punctuality and timeliness, and their tolerances.

Key words: Standardisation, process quality, quality reporting, quality specifications

1. Do not be mean

Above all, users should trust the producer. The brand 'official statistics' should be the same as 'trusted statistics'. If users do not trust the producer, they will not trust the products he or she produces. Paid for by the government does not mean ruled by the government. For outsiders this is not evident, and we need to convince them that we act independently of politicians and government.

In accordance with principle 6 of the European Statistics Code of Practice (CoP):

Equal access to all users at the same time is the cornerstone to ensure that particular users are not privileged.

The so-called **institutional quality** is supported by legislative instruments like national laws on statistics and at the European level by European legislation and the European Code of Practice. To support institutional reliability, producers of official statistics should be open about the methods used in the compilation of statistics, their quality, how mistakes are handled, and show that they have no interest in the values of the statistics themselves. In this respect producers of official statistics can often be distinguished from other producers and providers of information.

Be as open as possible about methods used and the quality of the data disseminated and have a clear policy concerning errors and mistakes.

Within quality assessment, many instruments and tools focus on how to avoid or spot errors and inefficiencies. External views are crucial, together with other instruments such as 'four eyes', changing teams and tracking figures really from beginning to the end.

People can deal with changes but cannot deal with uncertainty. If you are waiting for a train, and a delay of 10 minutes is announced, you feel less frustrated than if you do not know how late the train will be.. Uncertainties can pop up in many fields quality of input data, output data, software performance, position of the employee, etc.

In many fields, certainty, like constant product quality, improves quality.

Say what you do. Do what you say. Prove it. Improve it.
Trust can be based on 'kind blue eyes' or on solid proof. The first is old fashioned and less stable because this kind of trust can disappear in a matter of seconds. If users are interested in quality aspects be as open as possible and try to help them feel comfortable.

Overact if asked to prove you are doing well, and do not try to hide things.

2. Know the use: intended and actual

The statistical authority and the statistics producers deliver a set of products identified as official statistics. The term 'official' can be understood as 'on behalf of the country'. These statistics are to be produced according to an agreed statistical programme, supported by identified needs. When major stakeholders, representatives of the whole society, provide their needs and views in terms of the working programme, this can be considered a good practice. This working programme should not only contain what is to be produced, but also why it is needed.

What users are going to do with these potential statistics should be the first step in the process of compiling a working programme, and what they need for what purpose should be part of the business case. Given this intended use, and once the programme is adopted, the producer of official statistics can design the production process including the required quality level. Other specifications can also be derived from this intended or foreseen use, including when the figures are needed, what the variables and population are, and how accurate they should be - or more generally: what quality level and tolerances should be admitted?

The only way to set the required quality level is to know the intended use of the foreseen users.

After disseminating the figures, one could also monitor whether actual use exceeds intended use, meaning that the product is also used for other purposes than initially foreseen. There is a danger of misuse because the quality level is not sufficient for this additional use. The producer of official statistics should be aware of this situation and assist users by monitoring actual use and cautioning for misuse. One practical way of doing this is specifying intended and permitted actual use in the relevance part of the quality report, and warning for what purpose a figure may not be used. An example of Statistics Netherlands, for the monthly unemployment figures users are warned: *'These statistics are based on a sample survey and are therefore subject to a margin of error. For a more reliable picture of unemployment figures covering a longer period are more appropriate.'*

As explained above, a producer of official statistics cannot guarantee that statistical information can be used for all purposes. It can only guarantee that the figures can be used for the intended use and the additionally agreed actual use. Mark the word 'guarantee'. We really stress this word. Users must be able to trust official statistics.

If figures are disseminated, they are in accord with their specifications and therefore suitable for the indicated use.

If not, a warning should be added or figures should be replaced with the correct ones. There should be an internal policy on how to deal with corrections and revisions. This is also one of the Quality Assurance Framework indicators¹.

¹ Indicator 6.3 of the QAF, Eurostat 2013.

3. Feel chain responsibility

Feel responsible for the chain your products are used. Think together with the users to find answers to their questions. In fact this is a two-way interest: users should also be interested in the product they use and how it is produced, to get an optimal feeling about possible use and limitations. In the previous chapter the focus was on intended use to set the specifications including quality requirements. For this users should be consulted in accordance with principle 11 of the CoP:

At the lowest management level possible managers should be aware about the actual use of statistical information. This way they can anticipate during the production process and also at the moment of dissemination in case of insufficient quality.

There is regular contact with users as well as other stakeholders at different levels of the organisations.

New data sources and new statistical techniques will lead to new possibilities to serve users better.. Old limitations on data sources or statistical techniques could have ended in proxies of concepts which are no longer needed. Process redesign should therefore not only focus on efficiency gains but also on users' original questions. It is easier to identify these new possibilities if the producer of statistical information is aware of the initial needs and use of the users.

The present statistical work programme is the result of negotiations with users and technical or budget limitations of the past, and is not necessarily optimal for the present situation.

4. Be efficient

Efficiency gain means doing more or the same with less. The question is: what do we mean by 'the same'? Do we mean exactly the same product or service or do we mean it serves the same need of the user? An example will make clearer what the difference is. We see quality as a multidimensional concept. This means that if we lower one quality dimension, like timeliness, and keep all other quality aspects equal, total quality will be lower. Suppose we disseminate statistical information on the second Friday of every month but our single but very important user always uses it on the third Friday of the month. Earlier is not the most important need. Suppose furthermore that it is cheaper to produce the statistical indicator if we increase the timeliness to third Friday of the month. In fact this will reduce quality and costs, but does it also reduce usability in practice? For other potential users perhaps, but for our single user it remains the same product with the same quality.

It is efficient to reduce product quality if production costs can be reduced without reducing usability.

In fact producers should search for the optimum balance between quality, costs and usability, and in the case of a positive relationship between costs and quality, this will lead to products with the lowest acceptable quality given the intended use.

Use the user's perspective when looking for efficiency gains.

5. Make use of standards

There are standards in many fields. Generally speaking, using standards has advantages, but it also has some drawbacks. Constructing, adjusting or implementing standards is more difficult and more expensive than tailor-made solutions, and in the case of mistakes, they expand everywhere.

However in most cases the use of standards improves quality or lowers costs and at the EU level we see that the use of standards, like concepts and classifications, improves comparability between countries.

Within a country, coherence between statistics can be improved if the same populations are described. Many statistics use the same statistical units and if these units are grouped in the same way everywhere, it is possible for users to combine these statistics into one table to get the total picture.

Coherence between statistics can be improved by using standard concepts and classifications.

Using standards is a kind of re-use. We not only want to re-use data and metadata, but also tools, methods and processes. In general one could say that re-use improves the quality because mistakes will be discovered more easily if people use the same standards. Therefore the probability of occurrence of an error will decrease, but the impact of the error could be more serious because of the wide use. That is why the total risk, impact multiplied by change, should be estimated to make the right decision about using standards.

Make a business case to balance the advantages and drawbacks of using standards. Be aware that there are not only advantages.

6. Plan-Do-Check-Act: everywhere and always

The basis of quality management can be summarised as follows: 'Say what you do. Do what you say. Prove it. Improve it'. This can be applied not only to the production side, but also to quality management itself. At Statistics Netherlands a diverse set of quality tools is available, one of them being the self-assessments. To know whether self-assessments are effective, we need to be sure that we are asking the right questions, that these questions are well understood by the process owners, that the tool is used by management and that people are willing to give honest answers. In summary: are we doing the right things in the right way?

The quality unit of a statistical organisation should analyse from time to time the suitability of the quality tools available, and whether they are effective

Regarding the use of quality tools like self-assessments, we need to know for instance how to proceed if inadequacies are identified during a self-assessment, and if we expect an action plan for all the identified inadequacies. An explicit risk analysis is part of the statistical audit procedure at Statistics Netherlands, but within self-assessments it is not implicit. Serious inadequacies should be solved first and be part of the action plan, however due to budget constraints or other reasons, some will not be solved immediately. In addition, serious inadequacies are also more difficult to solve. Therefore it is important also to inform higher management about these identified but not tackled inadequacies.

Process owners should give account of identified inadequacies to higher management in terms of both the action plan and the identified but not handled inadequacies.

Identified inadequacies should be collected and analysed to identify organisation-wide inadequacies. This could lead to a more general and standard solution for all processes. Vice versa: are we asking the right questions to minimise failures? The ISO way of working is oriented to record mistakes and to analyse them. Was there a way to ask the right question within a self-assessment to warn the process owner how to avoid the mistake? If the answer is yes, the next question should be whether this new item in the self-assessment is a valid one for other process owners too.

Analyse mistakes to adjust quality tools and to minimise the risk of these kinds of mistakes being reproduced.

There is not always a need to tackle identified inadequacies to prevent future mistakes. It depends on the risk. This is the combination of the probability of occurrence and the impact in the case of occurrence. A good example is the height of the dykes in the Netherlands which are calculated as follows: : the probability of a flood (i.e. the dykes are too low) is once every 10,000 years. This way the risk is reduced, but not zero. Inadequacies in processes could also be approached in this way. An inadequacy with a tiny impact but with a frequency of every month could be more important to prevent than one with a large impact but with an (expected) frequency of once every 5 years.

Risk management is an integrated part of quality management to guide improvement actions.

7. Know the rules

Documentation is a very important tool to fix knowledge and should be available when needed, for example when an experienced member of staff is leaving. Not all day-to-day work needs to be accompanied by documentation on how things were done last year or five years ago, because processes are mainly secured according to the first part of '*say what you do- do what you say - prove it - improve it*'. However, another important part is not included in this fundamental sequence of quality management and that is '*what should you do?*'. For quality tools like auditing, norms are very important and represent all the prerequisites of the subject of the audit. In most cases, these rules are business rules, legal rules, management decisions etc., but they could also include best practices and standards. These rules are not only important for auditors but also for developers of new software and processes and serve as preconditions of the tools and processes. It is very useful for developers to know in advance according to what rules the auditor will later review the process.

Besides ' <i>say what you do</i> ' it is also important to record ' <i>what should you do?</i> '.

8. Set quality levels

As stated above, the intended use of statistical information has consequences for the specifications, including the quality levels to be attained. If we consider indicators, we can distinguish for instance the following types of use:

1. **Direct actions.** Directly, without intervention, based on the outcome of a statistical indicator. For example, the amount or rise of contributions or payments according to a contract or administrative procedure.
2. **Policymaking.** Indicators are used for policymaking or measuring the effects of policymaking.
3. **Rough impression.** The indicator is used together with other indicators to get an impression of a certain phenomenon.
4. **Scientific use** (not for policymaking). Based on aggregated information, a scientist wants to perform some analysis.
5. **Other** explicit use of an indicator.

Each use or kind of use could lead to a specific required quality level. To set the quality level, the foreseen intended use and main users should be known. Nowadays, this is often a neglected or maybe even not recognized task of a producer of statistical information, which requires more understanding and elaboration by the producer. This task is indeed more complicated than just informing users about concepts and quality.

Users and producers should agree on the quality level to be attained. The producer should guarantee that the output of every process run has a product quality sufficient for this intended use.

9. Deliver predictable products with tolerances (constant product quality)

In a highly standardised industry, such as car manufacturing, the key word is 'constant quality'. This means that, within certain limits, every component and every final product is identical. Once designed and once the production line is set up, the task of the production line is to produce every car with practically the same characteristics, according to the specifications set during the design phase. Design and development phases are completely separated from the production phase.

No individual quality report is needed in this case, because the quality is according to the set specifications. In the production of statistics, as in the car industry, these specifications should also include tolerances. For example, in relation to punctuality: *'the indicator is disseminated between 18 and 20 days after the end of the reference period'* or for response: *'the response rate is between 80 and 90 percent'*.

If the quality of the statistics produced does not meet the specifications, the producer should decide what to do. The producer could either disseminate the statistics with a warning, or delay the dissemination to improve the shortcomings, for instance the response rate, and also in this latter case, warn users that the specifications of punctuality or timeliness were not respected.

Product quality is tested during the production process and at the end of the production line. In the case of constant product quality a quality report does not need to be presented for every cycle.

The user has to accept that every product is identical and according to the specifications, always within certain tolerances. If something is really wrong, there is a guarantee that the producer will make a correction.

10. Prepare a business case before process redesign

Process quality refers to the ability to produce continuously units with constant product quality according to the pre-set specifications and against predictable costs. This is called the ex-ante quality of the process. However, we need to be aware of the rationale and the pitfalls behind a redesign of a production process

Improving processes means lowering costs or improving the robustness of the production steps, i.e. making products more identical. It *does not* mean changing the specifications of the product.

One reason for redesign could be that the ex-post quality does not meet the ex-ante quality: the process is not able or no longer able to produce according to the designed parameters. In this case there is a strong need to change the process because the quality of the product is too low or because the product is difficult to produce against predictable efforts.

A second reason could be a change of the ex-ante quality. The specification of the product has to be changed because of new user requirements; however, we need to be aware that comparability in time may be endangered, although one could speak here of a new product. The new process has to meet the new postulated ex-ante quality specifications and the process should be changed only after sound consultations with users.

The third reason is a more internal one, and concerns decreasing costs and/or increasing ex-post quality, without changing the ex-ante quality specification. If a statistical producer is convinced of being able to produce the same for less, or to produce more quality with the same efforts, there is a potential case for process redesign and a business case needs to be prepared in advance. However, in terms of usability the product before the process redesign may not be exactly the same as the product after the redesign. Again here the producer should be aware of the impact of comparability in time.

Process redesign often affects comparability in time, and users should be involved in advance. An appropriate set of quality indicators in addition to the quality of point estimates, should also include the quality of the sequence of these estimates in time.