The creation and application of a new quality management model

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Summary

In 2007 Statistics Netherlands (SN) started a project to select a quality management model in order to improve compliance with the Code of Practice, as a follow up to the Peer Review conducted in 2006. In this project several existing models, e.g. EFQM, ISO 9001, Balanced Score Card, COSO ERM and A&K, were assessed. We learned that all these models have advantages and disadvantages. Using some interesting structural elements of the above-mentioned models, SN developed a new model: Object oriented Quality Management (OQM model). This OQM model will be further implemented at SN in the course of 2009 and 2010.

This paper gives introduction to the OQM model, discusses its characteristics and advantages, and describes the applications of the model up to now.

1 Introduction to the creation of the OQM model

SN endorses the *European Statistics Code of Practice for statistical authorities* (Eurostat, 2005) as well as the *Quality Declaration of the European Statistical System* (Eurostat, 2002). This is published in the *CBS Quality Declaration* (CBS, 2008),

In April 2006 the institutional framework of SN underwent a peer review by Byfuglien et al. (2006). This review team, consisting of staff from other national statistical institutes, found that principle 4 of the Code of Practice on Quality Commitment was not fully met by SN (see figures 1 and 2).

Figure 1. Principle 4 of the European Statistics Code of Practice

Quality Commitment - All ESS members commit themselves to work and co-operate according to the principles fixed in the Quality Declaration of the European Statistical System.

Figure 2. Citations from the Peer Review Report on SN

"There does not exist an overall approach of quality "
"Statistics Netherlands has not developed a TQM approach"

This prompted SN to look for a quality management model that could be applied to meet principle 4. In this search we looked at several quality models: *EFQM Excellence Model* (2003), *ISO 9001*, *the Balanced Scorecard* (Kaplan, 1996) *COSO ERM* (2004) and *the Dependency and Vulnerability Analysis* (A&K, 1998), a Dutch model. The A&K model was already applied at SN in the context of the *Regulation for Information Security for Government* (VIR, 2007).

We found that these existing models all had one or more disadvantages:

- rich in content, which makes the model only applicable in a specific domain;
- rough delineation of areas, which makes it difficult to check completeness of measures within these areas;
- no explanation for why prescriptions should be met;
- irrelevant or missing areas (over and under-coverage).
- poor structure; e.g. no risk analysis;
- high in-house administrative burden;
- consultants are needed for assistance.

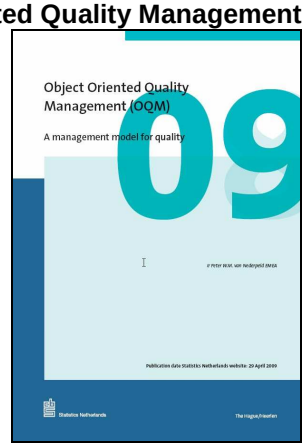
This gave us a reason to see whether we could create a new model from components of the existing models, without the disadvantages mentioned above. The result was the Object Oriented Quality Management model (OQM model).

Earlier this year, the OQM model was presented in the Coaching Community of Eurostat's Working Group on Quality, and published on Eurostat's CIRCA site.

2 Characteristics of the OQM model

In this section some of the characteristics of the OQM model will be explained. A complete description of the model can be found on the SN website (van Nederpelt, 2009).

Figure 3. Cover of the Object Oriented Quality Management (OQM) publication



2.1 Objects

The metaphor or paradigm that the OQM model uses is that an organisation and its environment can be seen as a collection of objects that relate to each other. This is why 'object oriented' is used in the name of the model.

Objects can be concrete objects as well as abstractions: people, things, concepts, events and actions. *National and international cooperation*, for example, is a rather abstract object that is relevant for statistical institutes.

Objects can be found both inside and outside the organisation. *Respondents* and *customers* are examples of objects outside the organisation. Objects are certainly not limited to the final product of an organisation.

Examples of objects are *customers, respondents, products, processes, staff, methods, data, information systems* (see figure 4). Every noun that can be preceded by the words "*the quality of …"* can be seen as an object in our model.

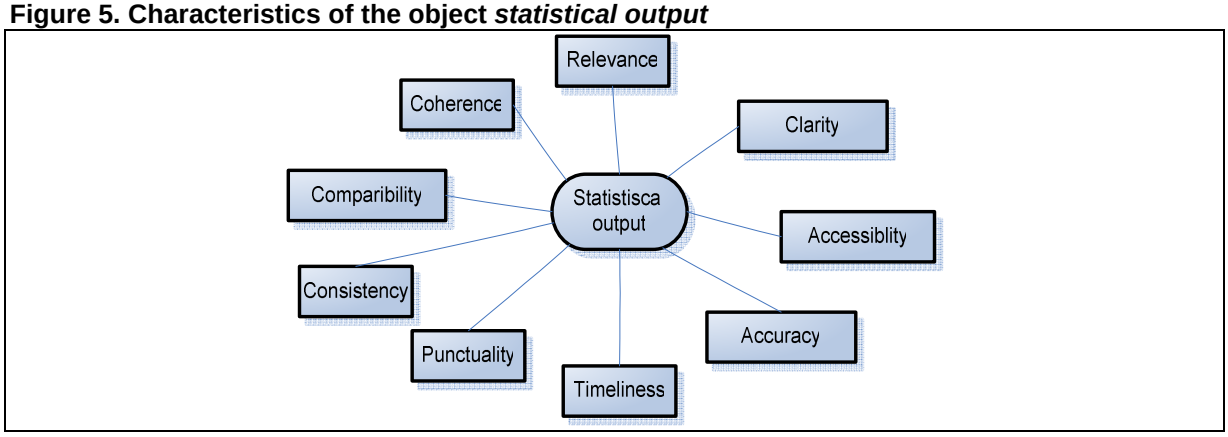
Figure 4. Objects inside and outside the organisation

2.2 Characteristics

Another assumption of the OQM model is that all objects have characteristics also known as dimensions. These characteristics are specific to the object. For example, the object *staff* has different characteristics than the object *statistical output.*

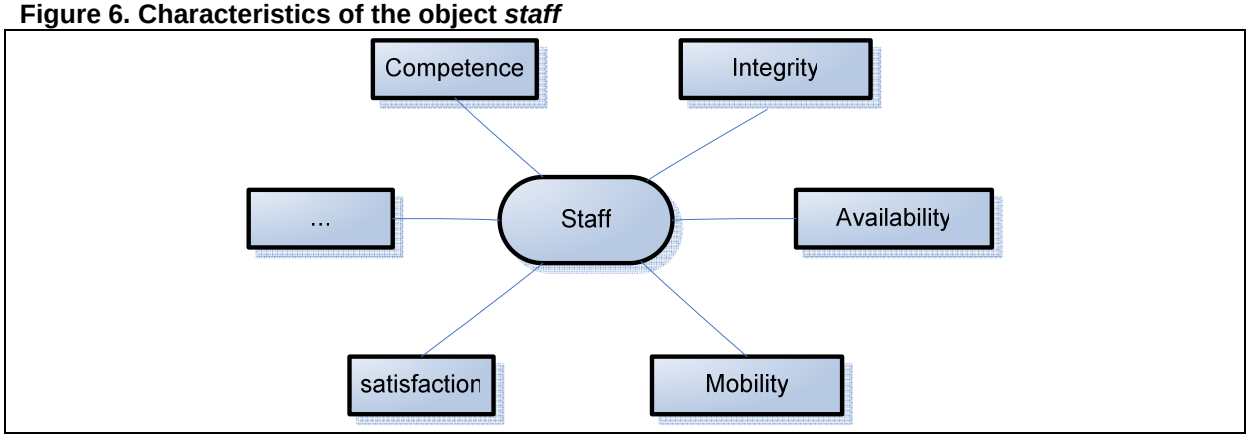
The object statistical output has well-known characteristics like *relevance, accuracy, coherence, comparability, consistency, timeliness, punctuality, accessibility* and *clarity* (see figure 5).

Figure 5. Characteristics of the object *statistical output*



Characteristics of the object staff, for example, are *competence, availability, integrity, satisfaction* and *mobility* (see figure 6).

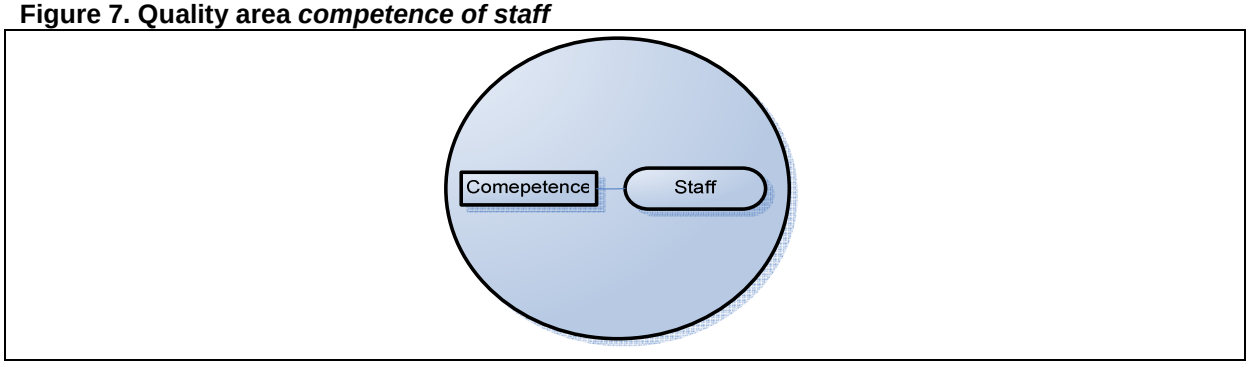
Figure 6. Characteristics of the object *staff*



2.3 Quality areas

A combination of an object and a related characteristic is labelled as a quality area. So the *competence of staff* is a quality area (see figure 7). *Staff* is the object and *competence* is the characteristic.

Figure 7. Quality area *competence of staff*



Other random examples of quality areas are:

- *safety of housing*
- *satisfaction of customers*
- *accuracy of statistical output*
- *efficiency of processes*
- *independence of the organisation*

The term *quality area* is central to the model. Within a quality area we look for measures to control the quality in the area. For example: how can we manage the *competence of staff*?

The OQM model assumes that quality areas promote an optimal choice of measures. Users can focus on one quality area at a time. It is possible to look at each quality area from different angles before determining the measures needed for implementation.

A set of quality areas can be chosen that suits certain needs. Users determines the coverage of the organisation's quality framework.

If we look at the principles of European Statistics Code of Practice (CoP), a set of quality areas are *hidden* in the code. Each principle contains one or two quality areas.

As an example, in principle 1 of the Code of Practice, we see two quality areas: *professional independence of statistical authorities* and *credibility of European statistics* (see figure 8). There is even a dependency between these two quality areas: the latter quality area is dependent on the former.

Figure 8. Principle 1 of the Code of Practice

Professional independence - The *professional independence of statistical authorities* from other policy, regulatory or administrative departments and bodies, as well as from private sector operators, ensures the *credibility of European statistics*.

A quality area can be chosen as large or as small as a user of the model wants. It is for example possible to distinguish the relevance the statistical program, the relevance of one statistic and the relevance of each variable within this statistic. It depends on what level the model will be applied which level of detail is right. If the model will be applied on the level of the organization than the relevance of the statistical program is in our view the right quality area.

2.4 No domain knowledge

It is important to know that the OQM model has no content: prescriptions, rules, requirements, etc. This model is empty. It contains no knowledge of any domain. Users of the model will add content. It is a manual to help structure thoughts, and should be seen as an empty frame, which has yet to be filled by the user.

The main thought behind the OQM model is that it enables users to provide content. Users often know their own organisation best and are well equipped to determine the measures ultimately required for that organisation. This model is just a tool to help users find the right measures.

In addition to putting users in charge of content and possible measures to be taken, the model gives users the freedom to apply it to any quality areas they can think of. The OQM model is generic and thus widely applicable. It can be applied in statistical domains, but also in business domains like human resources, finance, housing, IT, cooperation with external parties, etc.

2.5 Scope of the user's framework

The first step for a user of the OQM model is to determine the quality area to be covered. This determines the scope of his or her framework. The scope can be as narrow as one quality area, it can be concentrated around one object, e.g. all quality dimensions of statistical output, but it is also possible to cover a whole company or a department.

2.6 Definitions

Sometimes it is necessary to define the meaning of a quality area. This is especially the case when the name of a quality area is ambiguous. For example, what do *integrity of staff* or *relevance of statistical output* actually signify?

2.7 Ownership

Each quality area should have an owner. It must be possible to make somebody accountable for a quality area. Furthermore, it is possible that responsibilities are distributed among other parties than the owner of the quality area.

2.8 Requirements

Another premise of the model is that it should be clear what the requirements are for each quality area. These requirements should be clear before adopting measures to be taken. Requirements may be standards, regulations, rules, laws, conditions, decisions, etc. Two examples are given below.

The first example concerns the quality area *timeliness of statistical output.* A company standard may be that the output should be published within a certain period of time after the reference period. A monthly statistic should be published not later than one month after the end of the reference period ('one-to-one standard').

The second example concerns the quality area *availability of staff.* A rule may be that staff must be present in the office between 9 am and 4 pm.

2.9 Risk analysis

One concept of the model is that a risk analysis should be carried out for each quality area. The purpose of this analysis is to get a clear picture of the causes and effects of problems in the quality area concerned.

For example, what are the causes of problems with the *accuracy of statistical output*? A long list of causes could be mentioned, but the list can be summed up as sample and non-sample errors.

The effect of problems with the accuracy of statistical output ('total error') largely depends on the specific output. Errors in the consumer price index, for example, have a large impact on government policy and society.

2.10 Indicators

It is possible to use (quantitative) indicators for each quality area. The indicators make it possible to measure whether the organisation is in control of the quality area. It should be clear which standard should be met, and whether it is met. Sometimes the organisation is asked just to report the value of an indicator to a stakeholder.

2.11 Measures

The OQM model is aimed at determining an appropriate set of measures to be in control of each quality area chosen. This is the most important step of the model.

For each quality area can be checked if all steps of the Deming cycle are covered: Plan Do Check Act. If one or more steps are missing, there is some risk involved. The question is if this risk is acceptable for the user of the model or not.

In practice there are few quality areas where no measures have already been taken to control the quality. But measures should be determined so that **all requirements are met** and **the residual risk is acceptable** for the organisation. The residual risk is the risk that remains when all measures have been taken.

As a result of this step the user determines whether the set of measures already taken should be adjusted. The quality area is mature if adjustment of the set of measures is not necessary. The percentage of mature quality areas determines the maturity level of the area covered by the selected quality areas.

2.12 Other perspectives

Different kind of relationships can be distinguished between quality areas: 'part of', 'cause – effect', 'trade off's'. For example there is a trade off between the accuracy of data and timeliness of data. Satisfaction of staff has a positive effect on the availability of staff. Relevance of a statistic is part of the relevance of all products and services of a statistical institute. These relationships show the coherence of quality areas.

The OQM model also distinguishes other perspectives, such as the significance of a quality area for the goals of the organisation, relations between quality areas, opportunities of a quality area for the organisation. More information on these perspectives can be found in Van Nederpelt (2009a).

2.13 Result

The result of the application of the model is a user's framework. This framework can be summarised in a table (see table 1). The cells of the table are filled by the user.

Table 1. User's framework

Quality Area	Definition	Ownership	Require-ments	Risk Analysis	Indicators	Measures

Of course the user is free to use another format.

3 Advantages and disadvantages

The OQM model is constructed in such a way that it does not have the disadvantages of the models mentioned in section 1 of this paper.

- The OQM model has **no content** and can therefore be applied in any domain or part of the organisation.
- The **areas are well defined** and small enough to see whether an appropriate set of measures is taken.
- All measures are chosen in the context of a quality area and based on an analysis of the requirements and based on a risk analysis. It is therefore **clear why a measures is chosen**.
- The **scope** or coverage of the framework is chosen by the users themselves. This makes under or over-coverage less likely. The model is flexible is this respect. The user's framework is custom-made.
- The model is **rich in structure**. Risk analysis is part of the model.
- The **administrative burden** is limited. No superfluous activities are necessary. Also the result of the application of the model is **easy to maintain** and change management can be applied at a rate that suits the user.
- Help from consultants is not really necessary. The model is relatively **easy to understand**. This is what experts in the field see as an advantage of the model.

Furthermore:
- The CoP and the OQM model are fully **compatible**. The CoP can easily be integrated in the OQM model.
- The result of the application of the model can be used to **report to stakeholders**. Management can show to what degree they are in control of the quality areas chosen.
- The model is **available** to the public. It is published in English (and Dutch) on the website of Statistic Netherlands.

One disadvantage of the model is that it does not enable certification by an independent external party. For some organisations this is an necessity. However, the results of the application of the model can always be used as input for a certification process.

In the *CBS Quality Framework*, all quality areas will be mapped on the nine *criteria* of the EFQM Excellence Model. Also, the criteria and sub-criteria of EFQM Excellence Model will be used to check whether all important areas are covered. This way a strong relationship with the public EFQM Excellence Model will be created.

Recently, three Dutch authors in the field of quality management were asked for their opinions on the OQM model. In their view, the model is easier to understand than ISO 9001 and EFQM. Furthermore, the result of the application of the model is easy to maintain, which according to one author, is a problem in EFQM. One expert said that this model is meant for users that want to do their things their own way.

4 Application of the OQM model

In recent years, all statistical processes at SN have been assured. Each process has been described, and a standard set of measures has been taken based on a risk analysis. The result of this exercise is a *Quality Document*. This document has to be updated every year or every two years, depending on the significance of the statistics concerned. The OQM model is used implicitly here, but in a highly standardised way through the use of templates for process descriptions, risk analysis and measures etc.

Last year the model was used in a manual on the quality of statistical output, called *Checklist* (Van Nederpelt, 2009b). The manual describes all quality dimensions of statistical output, based on the structure of the model. The manual, published as a good practice on the Eurostat website, was referred to by Eurostat as follows: *".. the Checklist is definitely of general interest for the ESS…".*

Recently a project was started at SN to apply the model to the whole organisation. The project *CBS Quality Framework* is meant to create an overall TQM approach. In August 2009 this project drafted a (long) list of more than 300 quality areas. The next step will be the selection of the quality areas that contribute substantially to the goals of the organisation. All quality areas related to the CoP will certainly be in this selected set.

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