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## **A QUALITY ASSURANCE FRAMEWORK FOR EUROSTAT**

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### **1. INTRODUCTION**

There is a need to bring different quality initiatives under a common framework as identified in the report of the 550<sup>th</sup> Directors' Meeting of 18 November 2005 (item 1.3) in order to ensure that the right quality assurance procedures (methods and tools) are put in place and that the current and future quality activities are well integrated. A quality assurance framework would contribute to the effective management of quality and Eurostat compliance with the Code of Practice, thus, enhancing the credibility of European statistics.

Many efforts have been undertaken for developing quality management tools and methods in Eurostat and the European Statistical System (ESS), for supporting the production of high-quality European statistics. In the past, the Eurostat approach focused on general Total Quality Management (TQM), and more recently on compliance with the European Statistics Code of Practice (CoP).

The CoP was adopted by the Statistical Programme Committee on 24 February 2005 and promulgated in the Commission Recommendation of 25 May 2005 [European Commission, 2005] on the independence, integrity and accountability of the national and Community statistical authorities. The CoP provides an encompassing conceptual common ground in the quality field and sets standards regarding the institutional environment, the statistical processes and the statistical outputs for the ESS and also for Eurostat. The CoP is considered to be more suitable frame than TQM for official statistics in the sense that institutional and legal aspect are taken as an integral part of the framework and not necessary considered as external constraints, not under control of the organisation.

The CoP can be seen as the general super-structure supporting improvement of quality for the statistical system and thus enhancing the credibility of the statistics but it needs to be put into concrete quality requirements for individual statistics at the level of the specific statistical processes and the corresponding statistical outputs. Eurostat and National Statistical Institutes (NSIs) are developing methods and tools that in the end can evaluate and ensure the quality of the output disseminated.

This document describes the main features of quality assurance frameworks and the concrete adaptations and actions needed for its implementation in Eurostat. In chapter 2, the concept of quality assurance is introduced and its relation to TQM and the Code of Practice is explained, Chapter 3 focus on concepts, assessment methods and tools and their application, Chapter 4 describes how to implement the quality assurance framework in Eurostat, based on existing and new tools to be developed. Finally, Chapter 5 is dedicated to the work ahead in Eurostat. The quality assurance framework builds heavily on several recent

implementation efforts of quality management tools and methods the ESS. In particular, the results of the Eurostat granted development projects for implementing the Leadership Expert Group (LEG) on Quality recommendations for attained quality in the ESS [Eurostat, 2002] and the forthcoming Handbook on Data Quality Assessment Methods and Tools – DatQAM [Eurostat, 2007].

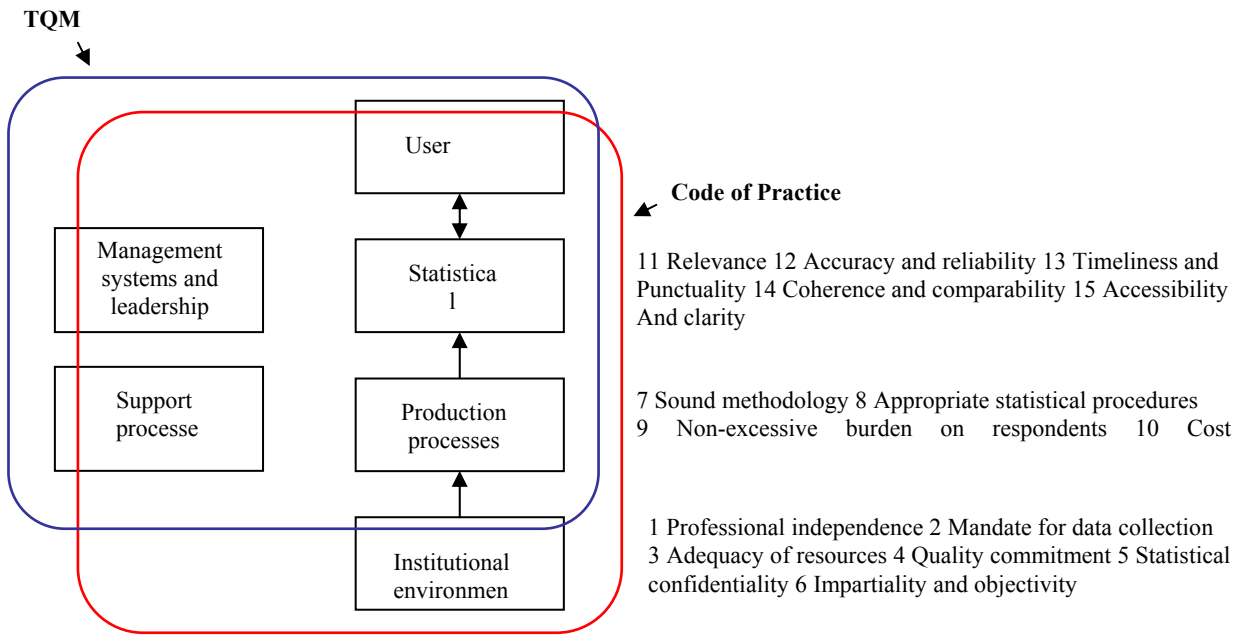
## **2. THE CONTEXT OF TOTAL QUALITY MANAGEMENT (TQM)**

A TQM model, in general, defines areas of activity and criteria which have to be taken into consideration in quality management. The most important point of reference is the use made of the final output (user needs). Output characteristics and the design of the production processes have to be streamlined according to the requirements in terms of quality, time and cost.

As encompassing model, TQM also has a systematic look at the factors which determine output and processes more indirectly: leadership (including policy and also cultural aspects), management systems (e. g. corporate planning) and support processes (partnerships, financial management, human resource management etc.). Whereas all these elements are extensively covered in the focus of total quality management models, institutional aspects (like the political and legal frameworks) are not considered as part of the model and are normally regarded as external constraints, given that they are not under direct control of the organisation. They are, however, very important in the context of official statistics as they ensure the fundamental principles such as professional independence, legal mandate for data collection, data protection, impartiality, etc.

Many elements of total quality management models have been applied to the ESS in the context of the Code of Practice. Figure 1 summarises the scope of a simplified general quality management model and the relation to the Code of Practice.

Figure 1. Scope and elements of general TQM models and the Code of Practice



N.B. Figure derived from draft Handbook on Data Quality Assessment Methods and Tools (DatQAM), version 31.01.2007.

The strategic core in the total quality management model is continuous improvement of the organisation as a whole including management systems and support processes. In practice, the CoP covers many of the TQM aspects, tailoring them to the production of official statistics and at the same time paying specific attention to institutional matters.

Focussing on Eurostat, TQM was implemented in the past decade under the umbrella of the Qualistat approach. Other initiatives included in the Commission Reform have also resulted in the development of management tools that complement the implementation of the Principles of the CoP. Such tools are the process, project and risk management as well as the Internal Controls Standards (ICS) adopted by the Commission in 2001. The latter follow the logical management process of an administrative organisation (control environment; performance and risk management; information and communication; control activities; and audit and evaluation). The development of these Commission tools has contributed to enhance the Eurostat management system.

### 3. QUALITY ASSURANCE FRAMEWORKS

#### 3.1. Background

A quality assurance framework builds upon the approaches mentioned above (TQM/CoP) by providing more detailed guidelines for improvements at output and process levels which are the cornerstones for ensuring the quality of statistical products. Its objective is to establish a system of coordinated methods and tools guaranteeing the adherence to minimum requirements concerning, mainly, the statistical processes and outputs including some kind of assessment. The main focus is at the level of individual statistical domains rather than the quality of the statistical system as a whole.

Consequently, quality assurance comprises aspects like:

- Documentation
- Standardisation of processes and statistical methods
- Quality measurement
- Strategic planning and control
- Improvement actions

Effective methods and procedures for the assessment of all these aspects are key factors of the quality assurance framework. Furthermore, the tools and methods for assessment have to be fully integrated. The quality assurance framework builds heavily on the results from statistical data quality measurement which should provide input to strategic planning and improvement actions.

The data quality assessment methods, based on the results of the quality measurement and documentation of processes and statistical outputs, provide information that enables to systematically analyse data quality in each individual statistical domain. The results of data quality assessment are the main input to improvement actions.

The data quality assessment needs, as a frame of reference, some definition of minimum requirements, guidelines or recommendations. Therefore, a standardisation of production processes largely facilitates effective data quality assessment.

Quality assurance should not be confused with quality control, which is limited to controlling whether the products meet the quality requirements. Quality assurance, in contrast means regular evaluations of the production performance. A set of concrete measures (e.g. periodic reviews, self assessments, quality documentation etc.) have to be defined and decided how to achieve them.

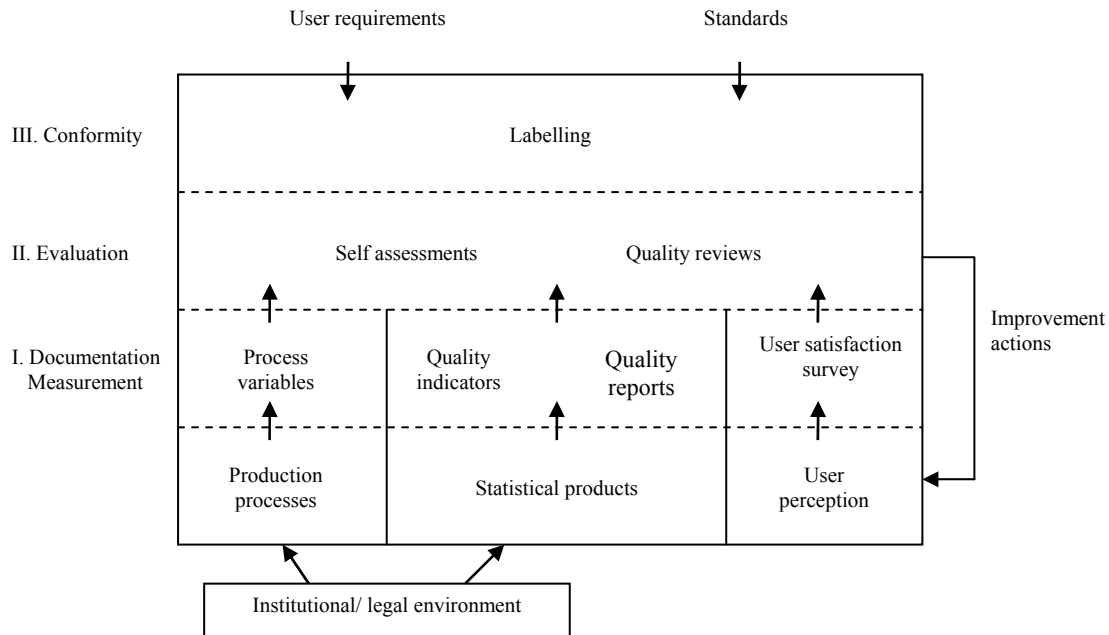
### **3.2 Methods and tools for the assessment of statistics production systems**

The methods and tools presented below facilitate the assessments of the statistical outputs, the statistics compilation processes, as well as the user perception of the released statistics. To a certain degree, the methods rely on a number of preconditions. On the one hand, the application of quality assessment methods always requires some basic information on the outputs and processes under consideration. For this reason, at least a basic systematic quality measurement regarding processes and outputs has to be in place. There also has to be a documentation system giving access to key characteristics of the outputs and processes. On the other hand, quality assessment methods require an (internal or external) standard as a reference against which the assessment can be carried out. Such reference can be provided in the form of general guidelines, policies, minimum standards, process specific guidelines and product specific quality standards defined e.g. by legal requirements.

As figure 2 shows, the different quality assurance methods tend to be either closer to the documentation for the producer side or closer to the standards and user requirements for the user side. On the way from the documentation of production to standards and user requirements, information is being more and more condensed and hence more appropriate

for the information of managers and users. Here, three layers of quality assessment methods are distinguished.

Figure 2. A structure for tools and methods for assessment of statistics production systems



N.B. Figure derived from draft Handbook on Data Quality Assessment Methods and Tools (DatQAM), version 31.01.2007.

#### a) Documentation and measurement

In the first layer, the complex information obtained from measurement and documentation has to be selected and structured in order to become meaningful for quality assessment. For this purpose, methods like key process variables (such as resources used, time used, error rates and response burden), quality indicators (like revision size, coefficient of variation, response rates), quality reports, and user satisfaction surveys are being used. The user satisfaction surveys are less based on information from documentation (maybe in the case of a complaint management system), but still measure directly the user perception of specific statistics.

#### b) Evaluation

Based on the information compiled in the first layer, the conformity of statistics is evaluated against (internal or external) standards. Evaluations can range from self-assessments to quality reviews of different intensity in their scope and external involvement. In a self assessment, the assessment is carried out by the domain manager (or the team) often assisted by the "quality team" of the organisation. On the other hand, the concept of quality reviews do introduce a neutral (and sometimes external) expert and cover both rolling reviews and peer reviews<sup>1</sup>. In particular for rolling reviews which are more comprehensive exercises,

<sup>1</sup> Note: The Directors' Meeting of 18 November 2005 (item 3) stressed the need to differentiate the levels of assessments and to incorporate the evaluation activities into the centralised approach.

several methods and tools are combined in order to have a better assessment of statistical products including its relevance for producers and users.

Self assessments and quality reviews might use specifically designed checklists (e.g. Development of a Self Assessment Programme, DESAP<sup>2</sup>; for NSIs or the adapted version for international organisations) in order to present the information needed in a more structured and accessible way. In general, they show a broader picture with less detail than process variables, quality indicators, quality reports and user satisfaction surveys. They also provide an overall picture of the adherence of a given statistics with the standards. At the same time, they still provide information on various quality dimensions or main processes.

### c) Conformity

The methods of labelling further condense the information and ensure to users and the general public the compliance with a whole set of defined standards and requirements. Labelling – as the term indicates – consists of providing any kind of label to the statistics or processes that meet pre-defined quality requirements. It is a way of showing the users which statistics fulfil strict quality criteria and which ones have to be used with some caution. The label thus provides a type of highly condensed information regarding the statistics released. Furthermore it can help to enhance trust and credibility in official statistics.

### 3.3. How to apply the assessment methods

Quality assessment should build on a general implementation strategy and be applied in a step-wise way. However, the implementation has also to be tailored further according to the institutional and the statistical activity. Such preconditions for quality assessment concern the standards of what has to be assessed, often expressed in legislations, and the size and importance of the statistical activity. The assessment of a minor statistical activity might only require basic documentation and measurement, while a major activity (in terms of political importance) might require more comprehensive quality assessments guaranteeing the quality of statistics, including labelling.

The use of the assessment methods can be tailored according to the relative importance of a statistical activity taking into account:

- The office-wide quality management approach.
- Institutional preconditions (procedures and legislations).
- Assessment methods already in use.
- Relevance (size and importance) of the statistics including production periodicity and the existence of specific legal framework.

Figure 3 shows how the battery of assessment methods can be applied to statistical activities depending on how they fulfil the above criteria.

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<sup>2</sup> It builds on the Development of a Self Assessment Programme (DESAP) for NSI's [Eurostat, 2003b].

Figure 3. The quality assessment packages

	Labelling	<b>Advanced package</b>
	Key process variables	
	User satisfaction surveys	<b>Intermediate package</b>
	Quality reviews	
	Quality indicators	<b>Fundamental package</b>
	Self assessments	
	Quality reports	
Process descriptions, product documentation, quality guidelines		

N.B. Figure derived from draft Handbook on Data Quality Assessment Methods and Tools (DatQAM), version 31.01.2007.

The fundamental package is based on basic documentation of the production processes and the statistical outputs. The quality reports should follow the ESS standard structure - relevance, accuracy, timeliness and punctuality, accessibility and clarity, comparability, and coherence [Eurostat, 2003a] - and should include quantitative indicators where possible. Despite quality assessments for the various quality components, quality reports are largely descriptive in character. The fundamental package should in any case include elements of an evaluation. For this purpose, self assessments are the appropriate method since they are easy to implement and have a low burden for their completion. The fundamental package is thought to be applied to all statistics. For some statistical domains, with low periodicity and under gentlemen agreements, it might be enough to use these tools. For other statistical activities, the methods of the intermediate package are necessary in order to validate the assessment (based on the expert appraisal in the fundamental package) with the help of objective information (quality indicators) as well as an evaluation by (external or internal) experts in reviews and by users in user satisfaction surveys.

Any substantial quality improvement will necessitate changes in the production processes. Quality assessment should therefore also take into account the processes. Process quality is normally at least in part covered by self assessments and quality reviews. Continuous process improvement in addition requires systematic measurement of the performance of the processes. Key process variables can be used for an assessment of process quality and they should be conceived together with the quality indicators. If a standard set of key process variables are to be used, at least a certain degree of process standardisation is necessary.

Labelling is no quality assessment in the strict sense, but a special way of communicating quality standards to the users. The implementation of labelling can only start if the necessary standards are in place. Consequently, the focus regarding labelling is on proving that the statistical institute meets external standards. In the case of labelling, the standard will

normally be (co-)defined by the statistical institute. The process of labelling will be restricted to key European aggregates.

#### **4. IMPLEMENTATION OF QUALITY ASSURANCE IN EUROSTAT**

One could argue that full compliance with the CoP Principles related to the statistical processes and outputs disseminated by Eurostat would require the application of all the quality assessment tools and methods (except, maybe, labelling). At the same time, it is of utmost important that implementation efforts build on the methods which are already in place and aim at stepwise standardisation within a systematic and regular approach.

There are also logical interrelations between the methods. For example, there is a strong link between quality reports, quality indicators and process variables on the one hand and self assessments and quality reviews on the other which can use common tools such as the Checklist. Some of the tools are also a preliminary step towards the process of granting a label, e.g. the concept of Quality profiles.

##### **4.1. The assessment tools and methods**

The following tools and methods are considered of strategic core to be embedded into the quality assurance framework for Eurostat:

###### **a) Documentation and measurement**

- Process descriptions (identification, documentation, and analyses of processes) based on the Eurostat process improvement methodology.
- Standard Quality Reports for harmonisation of quality reporting across the European Statistical System. Its purpose is to enable cross-country quality comparisons of national surveys in the same statistical domain and to respond to quality requirements formulated in the Commission Regulations etc.
- Quality profiles for user-oriented summaries of the main quality features of statistical indicators. The quality profiles target (sets of) indicators to establish in how far they are suited for the intended use drawing upon the quality features of the underlying statistics including their relevance.
- User satisfaction surveys to key users and the public as done for the free dissemination of statistics and the Eurostat user satisfaction survey.

###### **b) Evaluation**

- Self assessments for internal review of statistical production processes by the use of an adapted version of the DESAP checklist for international organisations for the identification of strengths and weaknesses
- Quality reviews in the form of assessment assisted by the quality team, assessments incorporating external expertise (either from Eurostat or NSIs) and rolling reviews of selected statistical production domains conducted by external contractors.

###### **c) Conformity**

- Process for labelling of European aggregates.

An approach for labelling of European aggregates is being developed, aiming to inform users, in a clear and simple way, on statistics complying with the CoP

The ongoing standardisation of the statistics production processes, as undertaken within the Eurostat data-life-cycle (CVD) project activities, are important for effective quality improvement and, thus, forms a cornerstone of any quality assurance framework.

Along these lines, statistical quality assurance also promotes the development and implementation of Current Best Methods for statistics production and protocols and policy documents.

The strategic elements resulting from self-assessments and quality reviews should also be incorporated into the Annual Management Plan (AMP) of Eurostat and be used for enhancement of office wide improvement actions. By having an integrated and office-wide approach, quality improvement can be achieved in a systematic way including comparability between different statistics and of different times.

## **4.2 Application of the assessment methods**

Assessment methods for statistical processes and outputs in Eurostat are planned to be tailored according to the relative importance of a statistical activity: This requires as a first step, the identification of the statistical processes and their characteristics and the mapping of the processes with the types of quality assessments to be used. The next paragraphs outline the procedure:

### **a) Identification of the relevance of the statistical process**

Statistical processes are quite divers and need to be characterized according to some basic criteria. The relevance of the output produced is a key element for assessing the relevance of the process. The production of key outputs, (Euro indicators, Structural and sustainable development indicators, Laeken indicators, etc., or contributions to officials reports from the Commission or other Institutions) are important elements for deciding the relevance of the statistical processes.

However, this is not the only aspect to be taken into consideration. Human resources involved in the process, the periodicity of outputs, whether a legal basis exist or not, the type of data (surveys, administrative/accounting, or mixed data), the intervention of NSI in the data collection and transmission to Eurostat, and the degree of Eurostat control in the management of the process, need to be taken into account when planning quality assessments

### **b) Characterisation of the quality assessments**

The next paragraphs describe the procedures and main elements of the different types of quality assessments to be implemented in Eurostat. The quality assessment Checklist is the common tool to be used to collect the quality information.

#### **b1. Self-assessments**

- The process manager fills in the assessment Checklist based on the available quality information, such as quality reports, process descriptions, reports to the Council/EP etc.
- The quality team provides support on request to assure a correct interpretation of the different elements of the checklist.
- The process manager compiles the strengths and weaknesses of the process/outputs and the list of improvement actions and the quality diagram.

## **b2. Quality reviews**

- Assessments supported by the quality team
  - The quality team pre-fills the assessment Checklist with as much information as possible.
  - A first meeting between the process manager and the quality team takes place to complete the information needed for the Checklist.
  - The quality team draft a first version of the strengths and weaknesses and the list of improvement actions and the quality diagram.
  - In a second meeting, which foresees the participation of the Head of Unit responsible for the process, the outcome from the assessment are further discussed in order to arrive to a list of improvement actions and to a quality diagram accepted by the process owner.
  - The active involvement of the quality team supporting the assessment will reduce the burden for the process manager for filling in the Checklist and at the same time contribute to coherent assessments across domains.
- Assessments with external interventions

Similar procedure as for the supported assessments but incorporating an external element which should participate and contribute to the meetings programmed for the assessment. The inclusion of external reviewers can be motivated by two different reasons:

- To provide technical expertise in the domain being assessed. In that case experts within Eurostat working in other statistical domains can act as reviewers, for example Eurostat senior statisticians.
- To further support the objectivity and validate the results of the review for statistics where this element is important. In that case experts should be searched outside Eurostat, for example in NSIs. This kind of review may also be named peer quality review.

- Rolling reviews

Rolling reviews are quality reviews of more intensity where the external intervention is essential. External contractors monitored by Eurostat are selected to perform the review and the existing information on quality is complemented with user's surveys and contacts with producers. The checklist still remains the main tool to collect harmonized information while

the outcome from the review goes beyond those from the quality assessment (improvement actions, quality diagram) including cost/benefit analysis.

### **c) Mapping of statistical processes with types of quality assessments**

For processes considered to be assessed, the same type of quality assessment should be applied for all processes having the same characteristics. Eurostat will apply the following basic criteria for mapping groups of processes with type of quality assessment:

- For processes with low periodicity, no legal regulation and producing low visibility outputs, self-assessments (which are the bottom line of quality assessments) seems to be suitable. For these processes the availability of limited quality reports, previous to the self-assessment might be enough, given the investment needed for producing full quality reports.
- For processes involving important financial resources and a high number of staff, with short-term or yearly periodicity, which are in the front line of user's demands of statistical outputs, rolling reviews (which is the most intensive quality assessment) should be reserved. Such rolling reviews are quite resource intensive and therefore limited to five statistical domains in the Eurostat planning for 2008.
- For other processes, quality assessments (with external interventions or not) should be chosen but allowing some flexibility in order to take into account the specificities of the process and the opinions/demands of the process owners.

As mentioned in 3.2, quality measurement regarding processes and outputs has to be in place before quality assessments are conducted. For Eurostat this means in practice that quality reports, either in the form of national quality reports or EU quality reports (synthetic information from the national reports), are available. This implies in practice that processes without quality reports, in principle would need to be excluded from quality assessments until quality reports are available. An exception could be self-assessments (in the context of applying the fundamental package) where a basic data quality information may be sufficient.

## **5. THE WORK AHEAD**

The elements of a quality assurance framework have the objective to establish a system of coordinated methods and tools guaranteeing the adherence to CoP minimum requirements concerning, in particular, the statistical processes and statistical outputs. Given the importance of having the necessary quality assurance methods and tools in place, Eurostat is implementing the framework following the roadmap outlined below:

### **5.1. Further development and integration of existing methods and tools for the quality assurance framework:**

#### *- Guidelines for data quality reporting in Community statistical legislation*

A proposal for a general article in EP/Council Regulations in relation to quality, which also makes quality reporting compulsory has been discussed and agreed by the Council Working party during the German presidency. Eurostat has adopted in March 2007 a model for the implementation of a Commission regulation on quality

and evaluation that includes a template with entries to be chosen when drafting specific regulations.

*- Adaptation of the DESAP checklist for international organisations.*

The Checklist has been adapted to the specific Eurostat needs and piloted in two domains: SILC and STS retail trade turnover. A final version of the checklist should be available by October 2007.

*- Establishing methods and procedures to be used for quality assessments*

In item 4.2 of this document some ideas are proposed for conducting the quality assessments. First, it is outlined how to identify the relevance of the statistical processes, then described the different types of quality assessments and some basic criteria for the mapping of processes with quality assessments. A more elaborated version should also be ready by October 2007.

*- Setting a plan for quality assessments*

Once the statistical processes are mapped with the types of quality assessments, a detailed implementation plan needs to be organized, ideally linked to the 2008-2012 statistical programs. Quality assessments should be planned along this period taking into account the human and financial resources (rolling reviews) involved.

*- Analysing the results of the Eurostat user's survey*

Eurostat website user satisfaction survey was conducted in June 2007 among registered users and main users from the Commission Groups of the Council and the International organisations. Results will be analysed during August and should be available by mid September.

*- Revision of the guidelines for quality reporting.*

This project has been externalized and the work is expected to be conducted in 2008 and the guidelines will be available by the end of the year.

*- Approach for labelling of European aggregates.*

The main elements of an approach for labelling of European aggregates have already been presented to the Directors Meeting in Eurostat, to the Task Forces CoP and Statistical Challenges and to the SPC Partnership Group. Development work is going on in Eurostat and the methodology for labelling European aggregates is included as a new project in the 2008 Commission statistical program.

## **5.2. Implementation of office wide management tools for monitoring of quality across domains and over time**

*- Performance scoreboard for Eurostat statistical products and services.*

The 2006/2007 version of the Performance scoreboard has been released in July 2007, and contains new and more detailed information in relation to the 2005

version. Information on data quality is excluded as it has been integrated in the Quality Barometer mentioned below. The scoreboard also provided analysis of the result indicators and the targets set in the Annual Management Program (AMP), going in more detail, including graphics and sometimes breakdowns by Eurostat Directorates/ Units or statistical domains.

- *Quality Barometer summarising the quality of the statistics produced in the ESS.*

The Quality Barometer was released in May 2007 providing detailed information about the quality of the outputs produced in the ESS. This first quality Barometer was quite restricted given the limited quality information available in the form of quality reports and was considered as a pilot. A Eurostat internal Task Force will analyze several aspects such as the structure, content and how to present quality information for the ESS. The internal Task Force will produce recommendations for future improvements to be incorporated in the Quality Barometer to be drafted in 2008.

Finally, it should be noted that the institutional aspects of the quality assurance framework also need to be tackled and most of them will be covered by the upcoming CoP peer review of Eurostat in October 2007.

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All references are available on the Eurostat Quality site:

<http://europa.eu.int/comm/eurostat/quality> .