

## Implementing the Data Quality Framework including the Data Quality Protocol

### Introducing the Data Quality Protocol

Good quality data is foundational to collaborative commerce and global data synchronization. Good quality data means that all master data is complete, consistent, accurate, time-stamped and industry standards-based. By improving the quality of data, trading partners reduce costs, improve productivity and accelerate speed to market.

The Data Quality Protocol, as part of the Data Quality Framework, describes how an organisation can implement a data quality management system to achieve good quality data. When implementing a Global Data Synchronisation programme it is advisable to consider the requirements of the Data Quality Framework. Further guidance can be found on [http://www.gs1.org/productssolutions/gdsn/implementation/data\\_quality.html](http://www.gs1.org/productssolutions/gdsn/implementation/data_quality.html) and from the GS1 Member Organisations.

The requirements for the data quality management system can be found in Chapter 3 of the Data Quality Framework, the Data Quality Management System Requirements (DQMSR). These requirements are written in such a way that they can be implemented as a stand-alone system, or as part of any existing quality management system, such as one based on ISO 9000:2005.

Compliance to the DQMSR can be demonstrated in various ways, depending on market demands. Chapter 4 describes how organisations can demonstrate compliance by means of self-declaration, while Chapter 5 contains the requirements for third-party organisations how to audit and possibly certify compliant organisations.

To be able to claim compliance it is important that an organisation cannot only demonstrate that its system functions, but also that its output – data – corresponds to actual product. Chapter 6, the Data Inspection Procedure, describes how this part of an audit (internal or external) needs to be executed. The limited list of attributes involved can be found in Annex 4 to this chapter. If needed this procedure can be used as a stand-alone quick 'snapshot' of an organisation's compliance.

## The Data Quality Management System Requirements (DQMSR)

Implementing data quality affects the entire organisation right from the start. If pursued with dedication, it results in a cultural transition towards an atmosphere of continual improvement.

The process of implementing data quality depends on:

- The sophistication of the existing quality management programme,
- The size of the organisation, and
- The complexity of its processes.

The 12 essential steps, briefly described below, when followed through help to implement a data quality management system successfully. The corresponding paragraphs in the DQMSR are provided in brackets.

- Step 1: Top management commitment
- Step 2: Appoint responsible managers
- Step 3: Start data quality awareness programmes
- Step 4: Provide training
- Step 5: Create Data Quality Management Processes
- Step 6: Develop data quality management system documentation
- Step 7: Document control
- Step 8: Implementation and operation
- Step 9: Internal data quality audit
- Step 10: Management review
- Step 11: Conformity assessment
- Step 12: Continual improvement

### **Step 1: Top Management Commitment (3.2.1-3.2.2)**

Top management (managing director or chief executive) should demonstrate commitment and determination to implement a data quality management system in the organisation. Without top management commitment, no data quality initiative can succeed. Top management must be convinced that a compliance statement will enable the organisation to demonstrate to its customers a visible commitment to data quality. It should realise that a data quality management system will improve overall business efficiency.

Top management should provide evidence of its commitment to the development and implementation of the data quality management system and continually improve its effectiveness by:

- Communicating to the organisation the importance of meeting the requirements of DQMSR, other GS1 requirements and customer requirements,
- Defining the organisation's data quality policy and make this known to every employee,
- Ensuring that data quality objectives are established at all levels and functions,
- Ensuring the availability of resources required for the development and implementation of the data quality management system,
- Appointing a management representative to coordinate data quality management system activities, and
- Conducting management review.

This type of top management commitment may be driven by:

- Direct marketplace pressure: requirements of crucial customers.
- Indirect marketplace pressure: increased quality levels and visibility among competitors.
- Growth ambitions: desire to exploit market opportunities.
- Personal belief in the value of data quality as a goal and data quality management systems as a means of reaching that goal.

The top management should identify the goals to be achieved through the data quality management system and document these. Typical goals may be:

- Be more efficient and profitable
- Produce products and services that consistently meet customers' needs and expectations
- Achieve customers satisfaction
- Increase market share
- Reduce costs and liabilities
- Increase confidence in the production system

This information should be accessible to all employees and other relevant parties.

## **Step 2: Appoint responsible manager(s)** **(3.2.4.1)**

Data quality management systems are implemented by people. The first phase of implementation calls for the commitment of top management. The next step is to appoint a manager or managers who will be responsible for implementing and operating the data quality management system.

The manager is the person within the organisation who acts as the interface between organisation management and operations. The manager should also act as the organisation's "data quality management system champion," and must be a person with:

- Total backing from the CEO,
- Genuine and passionate commitment to quality in general and the data quality management system in particular,
- The authority - resulting from rank, seniority, or both - to influence managers and others of all levels and functions,
- Detailed knowledge of quality methods in general and data quality in particular.

### **Step 3: Start Data Quality Awareness Programmes (3.2.4.4)**

Data quality awareness programmes should be conducted to communicate to the employees the aim of the data quality management system; the advantage it offers to employees, customers and the organisation; how it will work; and their roles and responsibilities within the system.

The awareness programme should emphasize the benefits that the organisation expects to realise through its data quality management system. The programmes could be run either by the implementation team or by experts hired to talk to different levels of employees.

### **Step 4: Provide Training (3.2.4.3)**

Since data quality management systems affect many areas in the organisation, training programmes should be devised for different categories of employees. The data quality implementation plan should make provision for this training. The training should cover the basic concepts of data quality management systems and the standard and their overall impact on the strategic goals of the organisation, the changed processes, and the likely work culture implications of the system. In addition, initial training may also be necessary on writing data quality manuals, procedures and work instruction; auditing principles; calibration; testing procedures, etc.

### **Step 5: Create Data Quality Management Processes (3.2.4.5.1)**

In essence this is the implementation and operational plan. This thorough and specific plan should cover all the objectives established by the top management. It should include:

- The availability of information that describes the origin of the data

- Work instructions
- The use of suitable equipment
- The availability and use of monitoring and measuring processes and devices
- The implementation of monitoring and measurement
- The implementation of release, delivery and post delivery activities.

In addition, the organisation should determine its product data database and IT infrastructure, which should include:

- The security of the integrity of the data
- Suitable formatting for data processing and storage
- Accessibility for review and verification purposes
- Access provisions and limitations
- Traceability of amendments
- Suitability for internal and external data exchange.

Then a Data Publishing Procedure should be established, detailing:

- The process how to get to data publishing with sufficient safeguards for accuracy, integrity and completeness
- Data verification prior to publishing where the resulting output cannot be verified by measurement
- Data publishing co-ordination throughout the organisation and its production locations, business units, divisions and departments
- Appropriate authorisation
- Traceability back to source for verification and correction
- Adherence to GTIN-allocation rules.

## **Step 6: Develop Quality Management System Documentation (3.2.1.2)**

Documentation is the foundation on which a data quality management system is built. It is the most common area of non-conformance among organisations wishing to implement quality management systems.

Documentation of the data quality management system should include:

- Documented statements of a data quality policy and data quality objectives
- A data quality manual
- Documented procedures and records required by the DQMSR
- Documents needed by the organisation to ensure the effective planning, operation and control of its processes.

Quality documentation is generally prepared in the three levels indicated in the box below.

Level A: Data quality manual

- States the scope of the quality management system; describes the processes of the data quality management system and their interaction. Generally gives an organisation profile; presents the organisational relationships and responsibilities of persons whose work affects data quality and outlines the main procedures. It may also describe organisation's data quality policy and data quality objectives.

Level B: Data quality management system procedures

- Describes the activities of individual departments, how data quality is controlled in each department and the checks that are carried out.

Level C: Data quality documents (forms, reports, work instructions, etc.)

- Work instructions describe in detail how specific tasks are performed; include drawing standards, methods of tests, customer's specifications, etc.
- Presents forms to be used for recording observations, etc.

A list of the documents to be prepared should be drawn up and the responsibility for writing the documents should be assigned to the persons concerned in various functional departments. They should be advised to prepare the drafts within a specific time frame.

Documentation of the output of the system comprises the records of the organisation. This documentation verifies the validity of the process from which it came – the proof - and is the basis for an (internal) audit.

### Step 7: Document Control (3.2.1.2)

Once the necessary quality management system documentation has been generated, a documented system should be created to control it. Control is simply a means of managing the creation, approval, distribution, revision, storage, and disposal of the various types of documentation. Document control systems should be as simple and as easy to operate as possible - sufficient to meet DQMSR.

Document control should include:

- Approval for adequacy by authorised person(s) before issue,
- Review, updating and re-approval of documents by authorised person(s),

- Identification of changes and of the revision status of documents,
- Availability of relevant versions of documents at points of use,
- Identification and control of documents of external origin,
- Assurance of legibility and identifiability of documents, and
- Prevention of unintended use of obsolete documents. Remember, that when anything changes, whether it is the system, the procedures or DQMSR itself, the documentation needs to be changed as well.

The principle of document control is that employees should have access to the documentation and records needed to fulfil their responsibilities.

### **Step 8: Implementation and operation (3.2.4.5/3.2.5)**

The implementation progress should be monitored to ensure that the data quality management system is effective, conforms to the DQMSR and meets the data quality policy objectives. A monitoring method should be established. The activities include:

- A documented procedure for dealing with user feedback
- Operational control
- Data verification
- A review of the data input and processing procedures
- Product master data management
- Preventive action

The preventive action should include provisions to:

- Review data quality issues (including user feedback)
- Determine the causes of data quality issues
- Evaluate the need for action to ensure that data quality issues do not recur
- Determine and implement action needed
- Correct data in the product master data
- Record the result of action taken and
- Review corrective action taken.

In general, when planned results are not achieved, corrective action should be taken as appropriate to ensure conformity of the data quality management system.

## **Step 9: Internal Data Quality Audit (3.2.5.5)**

As the system is being installed, its effectiveness should be checked by regular internal data quality audits. Internal data quality audits are conducted to verify that the installed quality management system:

- Conforms to the planned arrangements, to the requirements of DQMSR and to the data quality management system requirements established by the organisation
- Is effectively implemented and maintained.

Even after the system stabilises and starts functioning, internal audits should be planned and performed as part of an ongoing strategy.

A few staff members should be trained to carry out internal auditing.

## **Step 10: Management Review (3.2.6)**

When the installed data quality management system has been operating for three to six months, an internal audit and management review should be conducted and corrective actions implemented. The management reviews are conducted to ensure the continuing suitability, adequacy and effectiveness of the quality management system. The review should include assessing opportunities for improvement and the need for changes to the quality management system, including the quality policy and quality objectives.

The input to management review should include information on:

- Results of audits,
- Reports from data quality management inspections
- Data user and stakeholder feedback,
- Process performance and data and product conformity,
- Status of preventive and corrective actions,
- Follow-up actions from previous management reviews,
- Changes that could affect the quality management system, and
- Recommendations for improvements.

Management reviews should also address:

- Improvement of the effectiveness of the data quality management system and its processes to ensure data quality and accuracy
- Improvement of customer related requirements with respect to data quality management
- Resource needs.

- Pitfalls to effective implementation, like lack of CEO commitment, failure to involve everyone in the process, and failure to monitor progress and enforce deadlines.

## **Step 11: Conformity assessment (4/5/6)**

When system deficiencies are no longer visible, it is normally time to do a conformity assessment. Depending on market demands, this could be done internally, possibly leading to a self-declaration of conformity, or externally, by means of a third party audit.

In the latter case, once the data quality management system has been in operation for a few months and has stabilised, a formal application for certification should be made to a selected certification agency. However, before doing so, a pre-assessment audit could be arranged with an independent and qualified auditor. The certification agency first carries out an audit of the documents (referred to as an "adequacy audit"). If the documents conform to the requirements of the quality standard, then on-site audit is carried out. This audit includes an inspection of actual product and its corresponding data, in line with the Inspection Procedure described in Chapter 6. If the certification body finds the system to be working satisfactorily, it awards the organisation a certificate for a period of three years. During this three-year period, it will carry out yearly surveillance to ensure that the system is continuing to operate satisfactorily.

## **Step 12: Continual Improvement**

Certification against DQMSR should not be an end. You should continually seek to improve the effectiveness and suitability of the data quality management system through the use of:

- Quality policy
- Quality objectives
- Audit results
- Analysis of data
- Corrective and preventive actions
- Management review