
Data quality —

Part 61:

**Data quality management: Process
reference model**

Qualité des données —

*Partie 61: Gestion de la qualité des données: Modèle de référence des
procédés*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 4, *Industrial data*.

ISO 8000 is organized as a series of parts, each published separately. The structure of ISO 8000 is described in ISO/TS 8000-1.

Each part of ISO 8000 is a member of one of the following series: general data quality, master data quality, transactional data quality, and product data quality. This part of ISO 8000 is a member of the general data quality series but is also applicable to the other series.

A list of all parts in the ISO 8000 series can be found on the ISO website.

Introduction

The ability to create, collect, store, maintain, transfer, process and present information and data to support business processes in a timely and cost effective manner requires both an understanding of the characteristics of the information and data that determine its quality, and an ability to measure, manage and report on information and data quality.

ISO 8000 defines characteristics of information and data that determine its quality, and provides methods to manage, measure and improve the quality of information and data.

When assessing the quality of information and data, it is useful to perform the assessment in accordance with documented methods. It is also important to document the tailoring of standardized methods with respect to the expectation and requirements pertinent to the business case at hand.

ISO 8000 includes parts applicable to all types of data and parts applicable to specific types of data. ISO 8000 can be used independently or in conjunction with quality management systems.

There is a limit to data quality improvement when only the nonconformity of data is corrected, since the nonconformity can recur. However, when the root causes of the data nonconformity and the related data are traced and corrected through data quality processes, recurrence of the same type of data nonconformity can be prevented. Therefore, a framework for process-centric data quality management is required to improve data quality more effectively and efficiently. Furthermore, data quality can be improved through assessing processes and improving under-performing processes identified by the assessment.

This part of ISO 8000 specifies the processes required for data quality management. This specification is used as a reference for assessing and improving the capability of the processes or increasing organizational maturity with respect to data quality management.

This part of ISO 8000 can be used on its own or in conjunction with other parts of ISO 8000.

This part of ISO 8000 is intended for use by those actors that have a vested interest in information or data quality, with a focus on one or more information systems both inter- and intra-organization views, throughout all phases of the data life cycle.

[Annex A](#) contains an identifier that unambiguously identifies this part of ISO 8000 in an open information system.

Data quality —

Part 61:

Data quality management: Process reference model

1 Scope

This part of ISO 8000 specifies the processes required for data quality management. Each process is defined by a purpose, outcomes and activities that are to be applied for the assurance of data quality.

The following are within the scope of this part of ISO 8000:

- fundamental principles of data quality management;
- the structure of the data quality management process;
- definitions of the lower level processes for data quality management;
- the relationship between data quality management and data governance;
- implementation requirements.

The following is outside the scope of this part of ISO 8000:

- detailed methods or procedures by which to achieve the outcomes of the defined processes.

This part of ISO 8000 is applicable to managing the quality of digital data sets that include not only structured data stored in databases but also less structured data such as images, audio, video and electronic documents. This part of ISO 8000 can be used by an organization managing data quality at the organization level because, for instance, multiple software applications are sharing and exchanging data.

This part of ISO 8000 is used as a process reference model by internal and external parties, including certification bodies, to assess process capability or organizational maturity for data quality management and to enhance data quality through process improvement.

This part of ISO 8000 can be used in conjunction with, or independently of, quality management systems standards (e.g. ISO 9001).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 8000-2, *Data quality — Part 2: Vocabulary*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8000-2 apply.

3.2 Abbreviated terms

DBMS database management system

4 Fundamental principles of data quality management

The following fundamental principles apply to managing the quality of data.

- Process approach: the processes that use, create and update data are defined and operated. These processes become repeatable and reliable by also defining and operating processes for managing data quality.
- Continuous improvement: data are improved through effective measurement and correction of data nonconformities that arise from data processing. Such improvements, however, do not prevent the same nonconformities occurring repeatedly. Sustained improvement arises from analysing, tracing and removing the root causes of poor data quality, usually requiring the improvement of processes.
- Involvement of people: specific responsibilities for data quality management exist at different levels of the organization. End users have the greatest direct effect on data quality through data processing activities. In addition, data quality specialists perform the necessary intervention and control to implement and embed processes for improvement of data quality across the organization. Finally, oversight by top management ensures the necessary resources are made available and directs the organization towards achieving the vision, goals and objectives for data quality.

5 The data quality management process

5.1 The basic structure of the data quality management process

The basic structure of the data quality management process is as follows.

- The data quality management process consists of Implementation, Data-Related Support, and Resource Provision. This is depicted in [Figure 1](#).
- To achieve continuous improvement of data quality, the Implementation process is performed following the Plan-Do-Check-Act pattern.
- The Data-Related Support process enables the Implementation process by providing information and technology related to data management.
- The Resource Provision process improves the effectiveness and efficiency of the Implementation and the Data-Related Support processes by providing resources and training services at the organizational level.

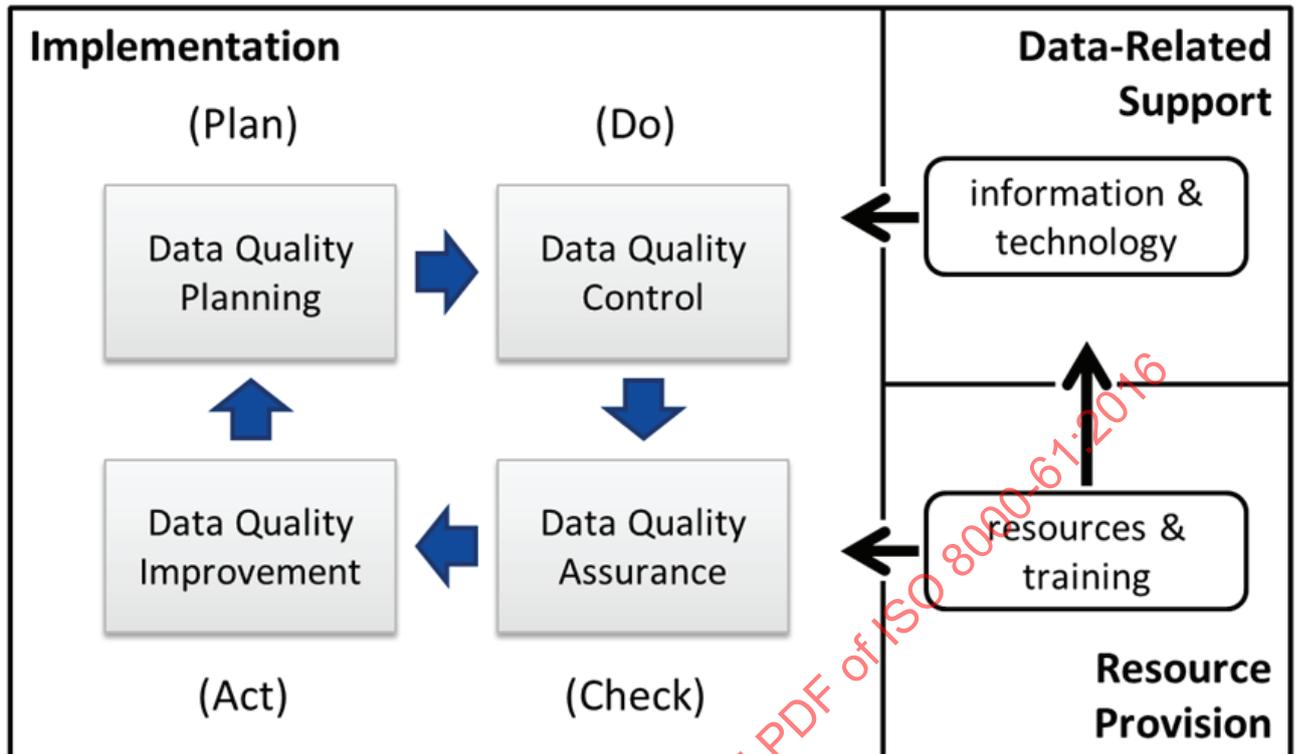


Figure 1 — Basic structure of data quality management

NOTE The structure of Implementation, Data-Related Support, and Resource Provision processes is adapted from the concept of Primary, Support and Organizational processes in ISO 12207:1995 and from the Plan-Do-Check-Act cycle from ISO 9001.

The Plan-Do-Check-Act cycle is also applicable to improving the performance of any of the lower level processes of data quality management. These improvements will contribute to more effective and efficient data quality. The Plan-Do-Check-Act cycle consists of:

- plan: establish the strategy and implementation plans as necessary to deliver results in accordance with data requirements;
- do: implement the processes;
- check: monitor and measure data quality and process performance against the strategy and data requirements and report the results;
- act: take actions to continually improve process performance.

5.2 The detailed structure of the data quality management process

As shown in [Figure 2](#), the data quality management process is a hierarchy of lower level processes, as follows.

- a) The Implementation process consists of four sub-processes based on the “Plan-Do-Check-Act” pattern:
 - 1) Data Quality Planning, corresponding to “Plan”:
 - Requirements Management;
 - Data Quality Strategy Management;

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- Data Quality Policy/Standards/Procedures Management;
 - Data Quality Implementation Planning;
 - 2) Data Quality Control, corresponding to “Do”:
 - Provision of Data Specifications and Work Instructions;
 - Data Processing;
 - Data Quality Monitoring and Control;
 - 3) Data Quality Assurance, corresponding to “Check”:
 - Review of Data Quality Issues;
 - Provision of Measurement Criteria;
 - Measurement of Data Quality and Process Performance;
 - Evaluation of Measurement Results;
 - 4) Data Quality Improvement, corresponding to “Act”:
 - Root Cause Analysis and Solution Development;
 - Data Cleansing;
 - Process Improvement for Data Nonconformity Prevention.
- b) The Data-Related Support process provides Implementation with information, constraints and technology. This process consists of:
- 1) Data Architecture Management;
 - 2) Data Transfer Management;
 - 3) Data Operations Management;
 - 4) Data Security Management.
- c) The Resource Provision process enhances the performance of Implementation and Data-Related Support by providing resources at the organizational level. This process consists of:
- 1) Data Quality Organization Management;
 - 2) Human Resource Management.

The sub-processes of Implementation take place in sequential order, while those of Data-Related Support and Resource Provision take place as and when necessary.

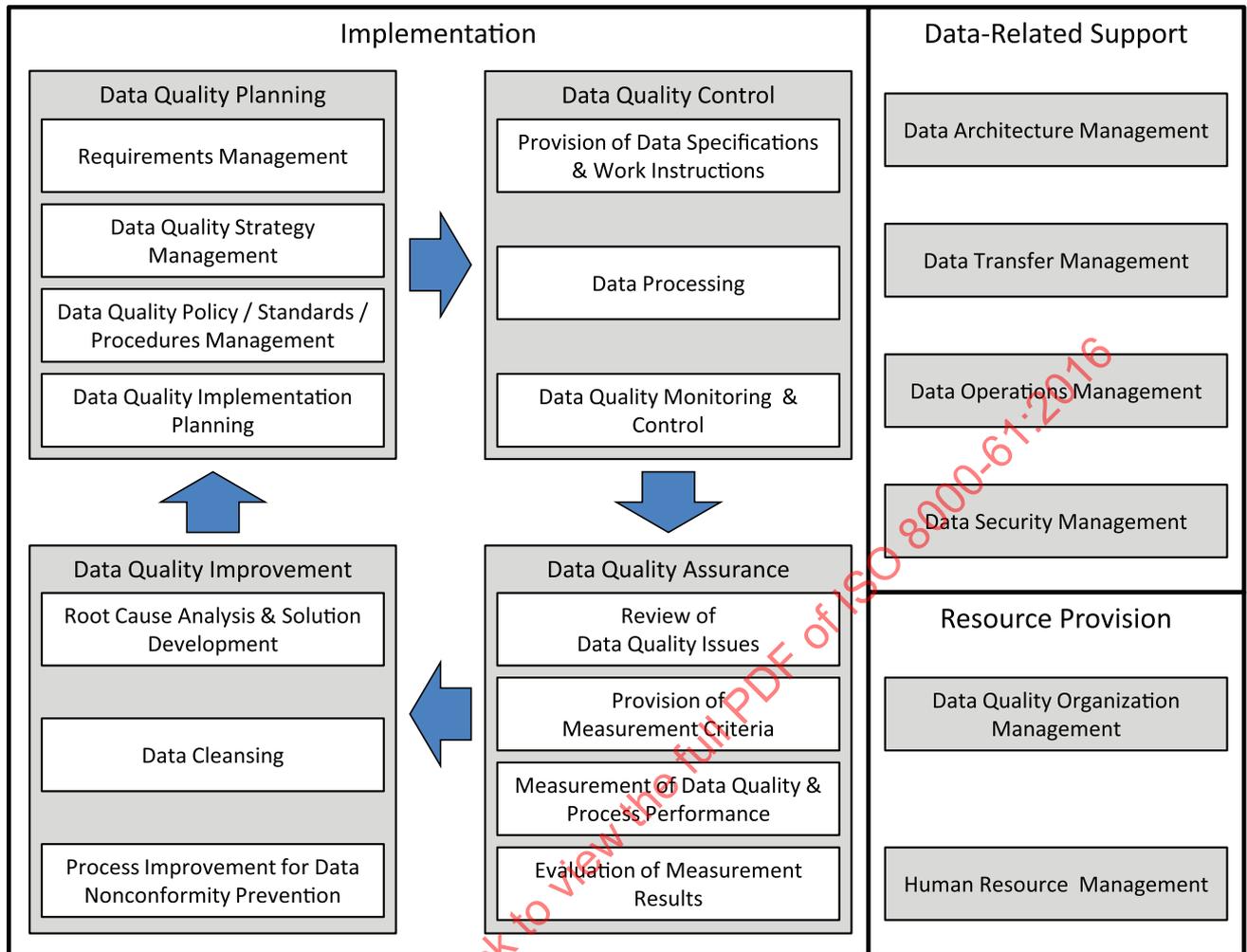


Figure 2 — Detailed structure of data quality management

5.3 The elements of a process description

The process descriptions in the remainder of this part of ISO 8000 consist of the following elements:

- title, which is a descriptive heading for the process;
- purpose, which describes the goal of performing the process;
- outcomes, which express the observable results expected from successful performance of the process;
- activities, which is a list of actions that can achieve the outcomes.

NOTE ISO/IEC/TR 24774 provides further details on these elements.

6 The Implementation process

6.1 Overview of Implementation

The Implementation process identifies data requirements corresponding to the needs of stakeholders, establishes objectives and creates implementation plans to meet those requirements. In line with these plans, end users perform data processing according to data specifications and work instructions, while data quality specialists monitor and control the conformance of data to requirements.

When identical or similar types of data nonconformity are found repeatedly and remain unsolved by monitoring and control, further action is necessary. This action begins with measuring data and processes related to the nonconformities. Subsequently, root causes are identified and improvement solutions are provided. These solutions increase data quality by correcting nonconforming data and improving processes that cause nonconformities to arise.

The sub-processes of Implementation are Data Quality Planning (see 6.2), Data Quality Control (see 6.3), Data Quality Assurance (see 6.4) and Data Quality Improvement (see 6.5).

6.2 Data Quality Planning

6.2.1 Overview of Data Quality Planning

Data Quality Planning establishes data requirements and objectives for data quality, creating plans to achieve the objectives and evaluating the performance of the plans. These plans balance current data quality levels, cost, resources and capabilities across the organization. This process is initiated based on needs and expectations of stakeholders or the feedback of the process improvements performed in Data Quality Improvement (see 6.5).

NOTE Stakeholders can include end users, data quality management specialists, top management, governments, regulatory authorities, suppliers to the organization and customers of the products and services that the organization delivers.

Data Quality Planning consists of Requirements Management (see 6.2.2), Data Quality Strategy Management (see 6.2.3), Data Quality Policy/Standards/Procedures Management (see 6.2.4) and Data Quality Implementation Planning (see 6.2.5).

6.2.2 Requirements Management

a) Purpose

The purpose of Requirements Management is to establish the basis for creating or for refining a data quality strategy that aligns with the needs and expectations of stakeholders.

b) Outcomes

- The needs and expectations of stakeholders with respect to data are collected.
- The needs and expectations are refined into data requirements.

NOTE This refinement can include structuring and classifying requirements in order to improve understanding of the interdependencies of those requirements.

- Requirements are analysed to determine their feasibility in terms of technology, cost, manpower, and schedule.
- Requirements are prioritized and approved.
- The needs of different parts of the organization are balanced and an agreed common set of requirements is achieved.

c) Activities

- Identification of data requirements: Collect the needs and expectations related to data from stakeholders and identify and classify the data requirements.

NOTE See ISO 8000-8 and ISO 8000-110 for further detail on data requirements.

- Prioritization of data requirements: Analyse the feasibility of the requirements identified in terms of technology, cost, timeliness and importance, providing the basis on which to determine implementation priority.

- Validation of data requirements: Trace and evaluate the extent to which the requirements have been satisfied through the data quality management process, and, when necessary, modify requirements through consultation with stakeholders.

6.2.3 Data Quality Strategy Management

a) Purpose

The purpose of Data Quality Strategy Management is to establish the basis on which subsequently to develop policies, standards, procedures and implementation plans that apply to data quality management across the organization and that align with strategic intentions for data quality.

b) Outcomes

- Top management is committed to the improvement of data quality to agreed levels at the organizational level.
- A data quality strategy is created, describing the vision, long term goals, an implementation roadmap and short term objectives, which are defined in terms of quantitative outcomes.
- A framework is created for establishing and reviewing the data quality strategy.
- Results are evaluated to determine the performance of the data quality strategy, leading to the strategy being updated as necessary.
- The data quality strategy is communicated throughout the organization.

c) Activities

- Establishment of data quality strategy: Establish a data quality strategy consisting of the vision, long-term goals and implementation roadmap to secure data quality across the organization in accordance with identified data requirements. Create short-term objectives to achieve the long-term goals. Top management ensures that the quality strategy is appropriate to the goals and objectives of data management and the overall business of the organization.
- Performance evaluation of the data quality strategy: Evaluate whether the data quality strategy has been achieved through the data quality management process. Change the strategy through consultation with stakeholders when necessary.

6.2.4 Data Quality Policy/Standards/Procedures Management

a) Purpose

The purpose of Data Quality Policy/Standards/Procedures Management is to capture rules that apply to performing Data Quality Control, Data Quality Assurance, Data Quality Improvement, Data-Related Support and Resource Provision consistently across the organization.

b) Outcomes

- Policies are defined in terms of fundamental intentions and rules that guide the organization as to which actions are appropriate and which are inappropriate in performing data quality management.
- Standards are defined to support data quality management.

NOTE These standards include those covering: formats for expressing data requirements; measurement methods; how to sustain data quality when changing supporting technology; and the infrastructure of computer hardware and software systems.

- Procedures are defined to specify in detail how the organization performs data quality management.

- Policies, standards and procedures are communicated throughout the organization, covering the consistent application to data quality management.

c) Activities

- Management of quality policies for data quality management: Specify fundamental intentions and rules for data quality management in the organization. Ensure the data quality policies are appropriate for the data quality strategy, comply with data requirements and establish the foundation for continual improvement of the effectiveness and efficiency of data quality management.
- Management of standards for data quality management: Specify the standards related to data quality for the consistent communication and appropriate use of data across the organization.
- Management of procedures related to data quality management: Specify rules and procedures related to data quality for consistent data quality management across the organization.

6.2.5 Data Quality Implementation Planning

a) Purpose

The purpose of Data Quality Implementation Planning is to identify the resources and sequencing by which to perform Data Quality Control, Data Quality Assurance, Data Quality Improvement, Data-Related Support and Resource Provision across the organization.

b) Outcomes

- A scope and target are defined for data quality in accordance with the data quality objectives.
- Implementation plans are established in detail.
- Manpower, financial and technology resources are allocated and managed to ensure successful execution of the implementation plans.
- Roles, responsibilities and authorities are allocated and controlled to cover all aspects of data quality management.

NOTE ISO/TS 8000-150 provides detail on roles and responsibilities that contribute to effective and efficient data quality management.

- Progress is monitored against implementation plans to achieve improved data quality.
- Performance results are evaluated to report to top management on the effectiveness of the implementation plans, with those plans being updated as necessary based on the results.

c) Activities

- Establishment of the data quality implementation plan: Define the scope and target of data quality and prepare detailed implementation plans.
- Resource allocation: Determine and provide the resources needed to implement the plans and achieve data quality objectives.
- Data stewardship allocation: Assign formal accountability to individuals who have appropriate expertise in and authority for business processes. These individuals approve proposals to change data when nonconformities have been identified and proposals to use data for new purposes. This accountability ensures the effective control and use of data sets.
- Implementation of the plan: Implement detailed plans based on the resources and data stewardship allocated.

- Performance evaluation: Monitor the status of the implementation of the plans, evaluate performance results, report those results to top management and, when necessary, update the plans through consultation with stakeholders.

6.3 Data Quality Control

6.3.1 Overview of Data Quality Control

Data Quality Control is carried out based on the implementation plan established in Data Quality Planning (see 6.2). The process, when successful, delivers data that meet requirements. The process involves creating, using and updating data according to specified work instructions and monitoring quality by checking whether the data conform to pre-determined specifications.

Data Quality Control consists of Definition of Data Specifications and Work Instructions for Data Quality (see 6.3.2), Data Processing (see 6.3.3) and Data Quality Monitoring and Control (see 6.3.4).

6.3.2 Provision of Data Specifications and Work Instructions

a) Purpose

The purpose of Provision of Data Specifications and Work Instructions is to establish the basis on which to perform Data Processing and Data Quality Monitoring and Control, taking account of the outcomes of the Data Quality Planning, the Data-Related Support and the Resource Provision processes.

b) Outcomes

- Data specifications are defined to describe the required characteristics of data for Data Processing and Data Quality Monitoring and Control.
- Work instructions are defined to specify the approach to Data Processing.
- Work instructions are defined to specify the approach to Data Quality Monitoring and Control.

NOTE Work instructions for Data Quality Monitoring and Control include methods to measure data nonconformities and process performance.

c) Activities

- Provision of data specifications: Develop specifications that describe characteristics of data and are used for both Data Processing and Data Quality Monitoring and Control.
- Provision of work instructions: Develop work instructions that are used either for Data Processing or for Data Quality Monitoring and Control.

6.3.3 Data Processing

a) Purpose

The purpose of Data Processing is, by following applicable work instructions, to deliver data that meet requirements in the corresponding data specification.

b) Outcomes

- Data Processing has conformed to the applicable work instructions.

NOTE 1 Data Processing is an integral part of many different types of process across the organization.

- Data meets the applicable data specification.

- Records are kept of all Data Processing activity, whether performed by people or by software applications.

NOTE 2 Data logging takes place to a degree that is appropriate to the benefit achieved for the associated processing cost.

c) Activities

- Execution of work instructions: Create, use, update and delete data in accordance with data specifications and work instructions. Execution is improved by educating end users in the application of the specifications and work instructions. When data is processed by software applications, embed the specifications and work instructions within this software.

NOTE 1 Data Processing is an integral part of business processes, being performed by end users across the organization. Therefore, when applying Data Processing within any part of an organization, the approach is specific to the business processes of that part of the organization.

- Data logging: Create and store records of people or software applications, data processing time stamp and a history of data modifications and transfers to help in tracing the root causes of data nonconformities.

NOTE 2 Legal restrictions can apply to data logging activity.

6.3.4 Data Quality Monitoring and Control

a) Purpose

The purpose of Data Quality Monitoring and Control is, by following applicable work instructions, to identify and respond when Data Processing fails to deliver data that meet the requirements in the corresponding data specification.

b) Outcomes

- Risks are identified and quantified against the applicable data specifications, covering the corresponding impacts on the organization or other stakeholders.
- Priorities are identified with respect to monitoring and controlling of risks.
- Records are kept for comparing performance with planned results for processes monitored with respect to identified risks.

NOTE The comparison of performance can take place at intervals or continuously.

- End users are notified when planned results are not achieved for processes, seeking those users to follow data specifications and work instructions more effectively in implementing and maintaining the processes.
- Data nonconformities are identified, classified and corrected.
- Records are kept of actions taken to address data nonconformities.
- Stakeholders are notified of actions taken to address data nonconformities.
- Guidelines, rules and procedures are refined and applied to prevent recurrence of data nonconformities.

c) Activities

- Data quality risk assessment: Identify risks throughout the data life cycle, analyse the impact if each risk was to occur and determine risk priorities to establish the basis for monitoring and control of processes and data.

- Monitoring and control of processes: According to the identified risk priorities, monitor and measure process performance. Monitoring and measuring takes place either at intervals or continuously and in accordance with applicable work instructions. If planned results have not been achieved during Data Processing then, to ensure future conformity of the data, end users respond by updating and maintaining processes.
- Monitoring and control of data: According to the identified risk priorities, monitor and measure conformity of data to the applicable specification. Monitoring and measuring takes place either at intervals or continuously and in accordance with applicable work instructions. If data nonconformities are found then correct the data when viable and distribute to stakeholders a record of the viability and degree of success for each corrective action.
- Prevention of data nonconformity recurrence: Act to prevent recurrence of similar data nonconformities by refining and applying guidelines, rules and procedures.

6.4 Data Quality Assurance

6.4.1 Overview of Data Quality Assurance

Data Quality Assurance measures data quality levels and the process performance related to data nonconformities or other issues that have arisen as a result of Data Quality Planning (see 6.2) or Data Quality Control (see 6.3). This measurement provides evidence by which to evaluate the impact of any identified poor levels of data quality on the effectiveness and efficiency of business processes.

Data Quality Assurance consists of Review of Data Quality Issues (see 6.4.2), Provision of Measurement Criteria (see 6.4.3), Measurement of Data Quality and Process Performance (see 6.4.4) and Evaluation of Measurement Results (see 6.4.5).

6.4.2 Review of Data Quality Issues

a) Purpose

The purpose of Review of Data Quality Issues is to identify the starting point for deciding to measure data quality levels and process performance with the potential to generate opportunities to improve data quality.

b) Outcomes

- Data quality assurance is initiated in response to issues arising as a result of Data Quality Planning or Data Quality Control.

NOTE Various types of issue are possible, including: unresolved data nonconformities; indications of the recurrence of particular types of nonconformity; stakeholders indicating their expectations have not been met; and reports of possible problems with data requirements or the methods for conformance testing of data.

- A set of related data nonconformities is identified as triggering the need for appropriate measurement of data quality levels and process performance as part of Data Quality Assurance.

c) Activities

- Data quality assurance initiation: Respond to the reporting of unresolved data nonconformities from within Data Quality Control, indications of the recurrence of particular types of nonconformity or other issues raised against the results of Data Quality Planning or Data Quality Control.
- Issue analysis: Review nonconformities arising from Data Processing to identify those that are possibly connected to the reported issue that has triggered the need for Data Quality Assurance. This review creates a set of related nonconformities. This set is the basis for further investigation through the measurement of data quality levels and process performance.

NOTE Further investigation addresses aspects of data quality management, including: trends and patterns in the occurrence of data nonconformities; the cause of stakeholder needs not being met; and the ways in which an individual nonconformity can propagate to cause other nonconformities.

6.4.3 Provision of Measurement Criteria

a) Purpose

The purpose of Provision of Measurement Criteria is to establish the basis on which to perform Measurement of Data Quality and Process Performance with respect to the set of data nonconformities output by the Review of Data Quality Issues process.

b) Outcomes

- A scope is defined for the data and processes to be the subject of measuring.
- Metrics are defined relating to the characteristics of data and the performance of the processes.
- Measurement methods are defined by which to determine values for the identified metrics.

c) Activities

- Determination of the data and processes to measure: On the basis of the set of data nonconformities output by the Review of Data Quality Issues process, determine the scope of target data and processes to measure.
- Development of metrics: Develop or select the measurement indicators and corresponding metrics used to measure the quality levels of data and the performance level of processes.
- Development of measurement methods: Develop or select measurement methods related to measuring the data characteristics and process performance.

6.4.4 Measurement of Data Quality and Process Performance

a) Purpose

The purpose of Measurement of Data Quality and Process Performance is, in accordance with the outputs of the Provision of Measurement Criteria process, to generate input for the Evaluation of Measurement Results process.

b) Outcomes

- A plan is established by which to conduct measurement of data quality and process performance.
- Appropriate resources are deployed for the measurement.
- Values are measured for data quality and process performance.

c) Activities

- Establishment of measurement resources: Establish appropriate resources to measure data quality and process performance without disrupting the execution of business processes.
- Measurement of data quality levels: Measure the data quality levels by implementing the measurement plans and determining the measurement results.
- Measurement of process performance levels: Measure the process performance levels by implementing the measurement plans and determining the measurement results.

6.4.5 Evaluation of Measurement Results

a) Purpose

The purpose of Evaluation of Measurement Results is to establish the priorities for performing Data Quality Improvement.

b) Outcomes

- Measurement results are analysed to provide a quantitative perspective on identified data nonconformities.
- An impact is evaluated, indicating the effect of poor levels of data quality or poor process performance on the organization or other stakeholders.

c) Activities

- Analysis of measurement results: Quantitatively analyse measurement results of data quality and process performance. These results are generated by Measurement of Data Quality and Process Performance.
- Evaluation of the impact: Identify the consequences of any identified poor levels of data quality or poor process performance on the organization.

6.5 Data Quality Improvement

6.5.1 Overview of Data Quality Improvement

Data Quality Improvement involves analysing the root causes of data quality issues based on the assessment results derived from Data Quality Assurance (see [6.4](#)). In order to prevent future data nonconformities, Data Quality Improvement corrects existing nonconformities and also transforms processes as appropriate.

Data Quality Improvement consists of Root Cause Analysis and Solution Development (see [6.5.2](#)), Data Cleansing (see [6.5.3](#)) and Process Improvement for Data Nonconformity Prevention (see [6.5.4](#)).

6.5.2 Root Cause Analysis and Solution Development

a) Purpose

The purpose of Root Cause Analysis and Solution Development is to establish, in accordance with the data quality strategy and with the priorities identified by Data Quality Assurance, the basis on which to perform Data Cleansing and/or Process Improvement for Data Nonconformity Prevention.

b) Outcomes

- Root causes and associated impacts are analysed for each identified data quality issue, based on the results from the Data Quality Assurance process and taking account of the data quality strategy.
- Solutions are proposed involving data cleansing and process improvements to prevent recurrence of identified root causes.
- The cost-effectiveness is analysed for each identified solution.
- The priority is determined for each identified solution.
- A plan is established to implement the identified solutions.

c) Activities

- Analysis of root causes of data nonconformities: Analyse the root causes of each data quality issue and assess the effect of the issue on business processes in the organization.

- Development of improvement solutions to eliminate the root causes: Propose solutions to eliminate the root causes and prevent recurrence of nonconformities. Evaluate the feasibility of the proposed improvements through cost-benefit analysis.

6.5.3 Data Cleansing

a) Purpose

The purpose of Data Cleansing is to ensure, in response to the results of Root Cause Analysis and Solution Development, the organization is able to access data sets that contain no nonconformities capable of causing unacceptable disruption to the effectiveness and efficiency of decision making using those data.

b) Outcomes

- A detailed specification is developed for data cleansing to correct each identified data nonconformity.

NOTE Cleansing can involve both human intervention to correct data values and also the use of automated tools to perform systematic actions on data sets.

- A schedule is developed and implemented in consultation with stakeholders to execute the required data cleansing.
- A record is kept of all corrections made to the data.
- Actions are developed to prevent the recurrence of actual or the occurrence of potential data nonconformities.

c) Activities

- Correction of data nonconformities and related data: Correct data nonconformities and related data, implementing developed solutions and make a record of the corrections.
- Prevention of data nonconformity recurrence: Act to prevent the recurrence of each actual or the occurrence of each potential data nonconformity.

6.5.4 Process Improvement for Data Nonconformity Prevention

a) Purpose

The purpose of Process Improvement for Data Nonconformity Prevention is to transform processes, taking account of the results of Root Cause Analysis and Solution Development, and to increase the extent to which the organization achieves a systematic and systemic approach to achieving data quality.

b) Outcomes

- Proposals are produced in detail for process improvements.

NOTE 1 The process improvements can be either improvements of existing processes or suggestions of planned future processes. The process that needs an improvement can be a constituent of the data quality management process, a data management process or any business process performed in the organization.

NOTE 2 Improvements of organization, people, architecture, hardware and software can be specified in the detailed proposals for process improvements.

- A schedule is agreed with stakeholders for implementation of the process improvements.
- The agreed schedule is carried out.
- The effectiveness is evaluated for the process improvements that are implemented.

NOTE 3 This evaluation takes place by measuring the extent to which data nonconformities are reduced compared to before implementation of the improvements.

- The efficiency is evaluated for the process improvements that are implemented.

NOTE 4 This evaluation takes place by measuring the extent to which the resources used are reduced compared to before implementation of the improvements.

c) Activities

- Process improvement: Identify and make improvements to the activities, outcomes and resources of processes with the objective to improve data quality in consultation with stakeholders.
- Validation of process improvements: Evaluate the effectiveness and efficiency of the process improvements implemented.

7 The Data-Related Support process

7.1 Overview of Data-Related Support

The purpose of Data-Related Support is to provide the Implementation process with input data, control information and support for the continuous improvement of data quality.

Data-Related Support consists of Data Architecture Management (see 7.2), Data Transfer Management (see 7.3), Data Operations Management (see 7.4) and Data Security Management (see 7.5).

7.2 Data Architecture Management

a) Purpose

The purpose of Data Architecture Management is to ensure Data Quality Control, Data Quality Assurance, Data Quality Improvement, Data Transfer Management and Data Operations Management can re-use consistent structures and meanings for data across the organization.

b) Outcomes

- Data models are defined to share data among different software applications and different parts of the organization.
- Transport mechanisms are implemented for common data to enable data exchange and sharing.
- Data-related artefacts are created and maintained for common use across the organization.

NOTE These artefacts include master and reference data, naming rules for data, data modelling methods, database designs and data architectures. These artefacts can be based on existing, externally defined standards.

- The data architecture is extended as necessary to support new data requirements.

c) Activities

- Exchange and sharing of organization-wide common data: Enable exchange and sharing of common data among software applications and data stores by defining data models of the common data at the organization level. For successful implementation, it is necessary to use transport mechanisms for common data.
- Management of organization-wide data-related artefacts: Maintain the consistency of data by creating artefacts for common use across the organization.

7.3 Data Transfer Management

a) Purpose

The purpose of Data Transfer Management is to support Data Quality Control, Data Quality Assurance and Data Quality Improvement by ensuring the traceability of all data that flows within, into and out from the organization.

b) Outcomes

- Records are kept of all data transfers.
- The data is tracked to identify those transferred data sets that result in data nonconformities.
- Data transfer is monitored and controlled according to applicable data specifications and work instructions.

c) Activities

- Data transfer recording: Record data transfers for analysis as part of the Data Quality Monitoring and Control process, the Measurement of Data Quality and Process Performance process and the Root Cause Analysis and Solution Development process.
- Data transfer monitoring and control: Check that data transfers meet applicable data specifications and work instructions.

7.4 Data Operations Management

a) Purpose

The purpose of Data Operations Management is to support Data Quality Control, Data Quality Assurance and Data Quality Improvement by ensuring implementation technology is properly configured to sustain data integrity and availability throughout the data life cycle.

b) Outcomes

- Environments are implemented and controlled to support the processing of data.

NOTE 1 These environments include DBMS software and database connectivity, ensuring effective and efficient processing of data across the organization.

- Data is prepared in standard data formats for exchange to and from software applications or external third-party sources.

EXAMPLE ISO 8000-110 provides detailed requirements on the exchange of characteristic data that are master data.

- Mechanisms are implemented for data backup and recovery to guarantee the recoverability of the data when necessary.
- Performance and reliability are ensured for all data operations.

NOTE 2 Performance and reliability are ensured by mechanisms including performance tuning, monitoring, and error reporting.

- Data technologies are installed and supported.

NOTE 3 These technologies include DBMS software, data management utilities, data modelling tools, data quality analysis tools and data cleansing tools.

c) Activities

- Data operations support: Provide environments to ensure effective and efficient processing of data. These environments require operations that include DBMS software updates, management