INTERNATIONAL STANDARD

ISO 8000-150

First edition
2022-05

Data quality —

Part 150: Data quality management: Roles and responsibilities

Reference number
ISO 8000-150:2022(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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 of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 4 *Industrial data*.

This first edition cancels and replaces ISO/TS 8000-150:2011, which has been technically revised.

The main changes are as follows:

— increased emphasis on roles and responsibilities for data quality management;

— removal of being specifically only applicable to master data;

— clarification of the differentiation of this document with ISO 8000-61 (including removing apparent overlaps).

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Digital data deliver value by enhancing all aspects of organizational performance including:

— operational effectiveness and efficiency;

— safety;

— reputation with customers and the wider public;

— compliance with statutory regulations;

— innovation;

— consumer costs, revenues and stock prices.

In addition, many organizations are now addressing these considerations with reference to the United Nations Sustainable Development Goals[1)].

The influence on performance originates from data being the formalized representation of information[2)]. This information enables organizations to make reliable decisions. This decision making can be performed by human beings directly and also by automated data processing including artificial intelligence systems.

Through widespread adoption of digital computing and associated communication technologies, organizations become dependent on digital data. This dependency amplifies the negative consequences of lack of quality in these data. These consequences are the decrease of organizational performance.

The biggest impact of digital data comes from two key factors:

— the data having a structure that reflects the nature of the subject matter;

EXAMPLE 1 A research scientist writes a report using a software application for word processing. This report includes a table that uses a clear, logical layout to show results from an experiment. These results indicate how material properties vary with temperature. The report is read by a designer, who uses the results to create a product that works in a range of different operating temperatures.

— the data being computer processable (machine readable) rather than just being for a person to read and understand.

EXAMPLE 2 A research scientist uses a database system to store the results of experiments on a material. This system controls the format of different values in the data set. The system generates an output file of digital data. This file is processed by a software application for engineering analysis. The application determines the optimum geometry when using the material to make a product.

ISO 9000 explains that quality is not an abstract concept of absolute perfection. Quality is actually the conformance of characteristics to requirements. This actuality means that any item of data can be of high quality for one purpose but not for a different purpose. The quality is different because the requirements are different between the two purposes.

EXAMPLE 3 Time data are processed by calendar applications and also by control systems for propulsion units on spacecraft. These data include start times for meetings in a calendar application and activation times in a control system. These start times require less precision than the activation times.

The nature of digital data is fundamental to establishing requirements that are relevant to the specific decisions that are made by each organization.

EXAMPLE 4 ISO 8000-1 identifies that data have syntactic (format), semantic (meaning) and pragmatic (usefulness) characteristics.

1) https://sdgs.un.org/goals

2) ISO 8000-2 defines information as “knowledge concerning objects, such as facts, events, things, processes, or ideas, including concepts, that within a certain context has a particular meaning”.

To support the delivery of high-quality data, the ISO 8000 series addresses:

— data governance, data quality management and maturity assessment;

EXAMPLE 5 ISO 8000-61 specifies a process reference model for data quality management.

— creating and applying requirements for data and information;

EXAMPLE 6 ISO 8000-110 specifies how to exchange characteristic data that are master data.

— monitoring and measuring information and data quality;

EXAMPLE 7 ISO 8000-8 specifies approaches to measuring information and data quality.

— improving data and, consequently, information quality;

EXAMPLE 8 ISO/TS 8000-81 specifies an approach to data profiling, which identifies opportunities to improve data quality.

— issues that are specific to the type of content in a data set.

EXAMPLE 9 ISO/TS 8000-311 specifies how to address quality considerations for product shape data.

Data quality management covers all aspects of data processing, including creating, collecting, storing, maintaining, transferring, exploiting and presenting data to deliver information.

Effective data quality management is systemic and systematic, requiring an understanding of the root causes of data quality issues. This understanding is the basis for not just correcting existing nonconformities but also implementing solutions that prevent future reoccurrence of those nonconformities.

EXAMPLE 10 If a data set includes dates in multiple formats including “yyyy-mm-dd”, “mm-dd-yy” and “dd-mm-yy”, then data cleansing can correct the consistency of the values. Such cleansing requires additional information, however, to resolve ambiguous entries (such as, “04-05-20”). The cleansing also cannot address any process issues and people issues, including training, that have caused the inconsistency.

As a contribution to this overall capability of the ISO 8000 series, this document addresses key considerations when establishing the roles and responsibilities necessary to deliver effective and efficient data quality management. These considerations are supported by a framework that links role levels to structured groups of responsibility and a model of operations to deliver data quality management. This document also provides example scenarios for deployment of the framework. The role levels and responsibility groups are appropriate for all types of data and all types of organization.

Organizations can use this document on its own or in conjunction with other parts of the ISO 8000 series.

This document supports activities that affect:

— one or more information systems;

— data flows within the organization and with external organizations;

— any phase of the data life cycle.

By implementing parts of the ISO 8000 series, an organization achieves the following benefits:

— objective validation of the foundations for digital transformation of the organization;

— a sustainable basis for data in digital form becoming a fundamental asset class the organization relies on to deliver value;

— securing evidence-based trust from other parties (including supply chain partners and regulators) about the repeatability and reliability of data and information processing in the organization;

— portability of data with resulting protection against loss of intellectual property and reusability across the organization and applications;

— effective and efficient interoperability between all parties in a supply chain to achieve traceability of data back to original sources;

— readiness to acquire or supply services where the other party expects to work with common understanding of explicit data requirements.

ISO 8000-1 provides a detailed explanation of the structure and scope of the whole ISO 8000 series.

ISO 8000-2[3)] specifies the single, common vocabulary for the ISO 8000 series. This vocabulary is ideal reading material by which to understand the overall subject matter of data quality. ISO 8000-2 presents the vocabulary structured by a series of topic areas (for example, terms relating to quality and terms relating to data and information).

Annex A contains an identifier that conforms to ISO/IEC 8824-1. The identifier unambiguously identifies this document in an open information system.

3) The content is available on the ISO Online Browsing Platform. https://www.iso.org/obp

Data quality —

Part 150:
Data quality management: Roles and responsibilities

1 Scope

This document specifies the key considerations for organizations that are establishing appropriate roles and responsibilities for data quality management.

The following are within the scope of this document:

— implementing roles and responsibilities for data quality management;

— providing documentary evidence of this implementation;

— a framework for roles and responsibilities;

— a functional model of roles and responsibilities;

— example deployment scenarios for the framework of roles and responsibilities;

— comparison with the processes specified by ISO 8000-61.

The following are outside the scope of this document:

— process reference models for data quality management (ISO 8000-61 specifies a process reference model for data quality management);

— methods for data quality evaluation and certification;

— models for assessing the maturity of data quality management (ISO 8000-62 and ISO 8000-64 specify approaches to assessing the maturity of data quality management).

This document can be used in conjunction with or independently of standards for quality management systems.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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*

ISO 8000-61, *Data quality — Part 61: Data quality management: Process reference model*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Principles of roles and responsibilities for data quality management

The following key principles apply when an organization implements roles and responsibilities for managing and improving data quality through systemic and systematic processes.

— **An integrated approach across the organization.** The data managed by each organization are scattered throughout the organization. These data also flow to various places through the hands of many persons. This scattering and flow make difficulties for trying to control data quality by concentrating efforts in a single area of the organization. Data nonconformities can occur anywhere data are processed and from any type of such processing (including inserting, updating, and retrieving). It is, therefore, important to identify exactly what is causing any such nonconformity and to perform data quality management across the entire organization. This, in turn, depends on the allocation, communication and understanding of appropriate roles and responsibilities across the entire organization to ensure processes are delivering their intended outputs.

— **High-level commitment for empowerment.** Data quality management takes significant time and effort because of the frequency, severity and complexity of actual and potential data nonconformities. Furthermore, organizations can only prevent recurrence of such nonconformities by changing ways of working. At all levels of an organization, persons who have responsibilities for data quality require resource and authority assigned to achieve such change. This resource and authority is supported by strong commitment from top management, who are responsible for establishing co-ordinated governance to monitor and control management of data quality across the organization.

— **Value-adding cycle of changes.** Requirements for data evolve dynamically, driven by internal and external changes. Appropriate roles and responsibilities identified for data quality management enable a value-adding cycle to respond to the changes quickly.

These principles can be delivered by an organization:

— using a framework of role levels and responsibility groups (see Annex B);

— using appropriate roles to perform each of the responsibility groups as part of a coherent whole (see Annex C);

— addressing a wide range of deployment scenarios (see Annex D).

5 Implementation requirements

An organization shall implement effective roles and responsibilities for data quality management through the following:

— executing processes within the scope of data quality management specified by ISO 8000-61 (see Annex E for a mapping of those processes to the responsibility groups specified by this document);

— identifying one or more roles that will perform the responsibilities for data quality management;

NOTE 1 As appropriate to the size of the organization, organizations can implement roles either by assigning one or more persons to each role and by assigning one or more roles to each person. Any person can also fulfil other roles that are not responsible for data quality management.

EXAMPLE 1 A small organization appoints a single individual, who is responsible for performing all nine responsibility groups in Annex B in addition to other organizational roles.

EXAMPLE 2 A large organization appoints multiple data diagnosis planners, who are each responsible for performing different aspects of the responsibility group data diagnosis planning. These aspects are the diagnosis in different systems across the organization, such as one planner being responsible for customer relationship data and another being responsible for product catalogue data.

— embedding the processes for data quality management within the business processes that are core to the purposes for which the organization exists;

NOTE 2 An individual process for data quality management can be embedded into many different core processes of an organization, where each one of those core processes involves the creation or use of data.

EXAMPLE 3 A manufacturer embeds data quality management into manufacturing processes.

— implementing appropriate other parts of ISO 8000 to address specific requirements of the organization.

EXAMPLE 4 When an organization exchanges master data, ISO 8000-110 addresses requirements for syntax, semantics and conformance to data specification, ISO 8000-115 addresses requirements for identifiers and ISO 8000-120 addresses requirements for representing information about the provenance of the master data.

6 Conformance

To achieve conformance to this document, an organization shall prepare documentary evidence of the following:

— identification of roles for data quality management;

— assignment of those roles to specific persons within the organization;

— allocation of responsibilities to those roles;

EXAMPLE 1 A job description is documentary evidence of a role and responsibility assignment.

— embedding processes for data quality management within other business processes across the organization;

EXAMPLE 2 An organization-wide process model is documentary evidence of embedding data quality management into other business processes.

— execution of the processes for data quality management;

EXAMPLE 3 Documentary evidence for this execution includes specifications of data requirements, results of data quality measurements, a log of nonconformities and a log of root-cause analysis and corresponding corrective actions.

— auditing assigned roles and responsibilities to check performance and, as necessary, to initiate the development and implementation of improvements.

Annex A
(informative)

Document identification

To provide for unambiguous identification of an information object in an open system, the following object identifier is assigned to this document. The meaning of this value is defined in ISO 10303-1.

```
{ iso standard 8000 part(150) version(2) }
```

Annex B
(informative)

Framework of role levels and responsibility groups for data quality management

B.1 Overview of the framework

The fundamental structure of the framework is a 3x3 matrix (see Figure B.1). The framework includes three responsibility groups collections: data implementation, data diagnosis and data improvement (see B.2). Each responsibility group collection consists of three responsibility groups at the next lower level; one responsibility group for each of the three role levels in the framework. These role levels are: managerial, operational and technical (see B.3).

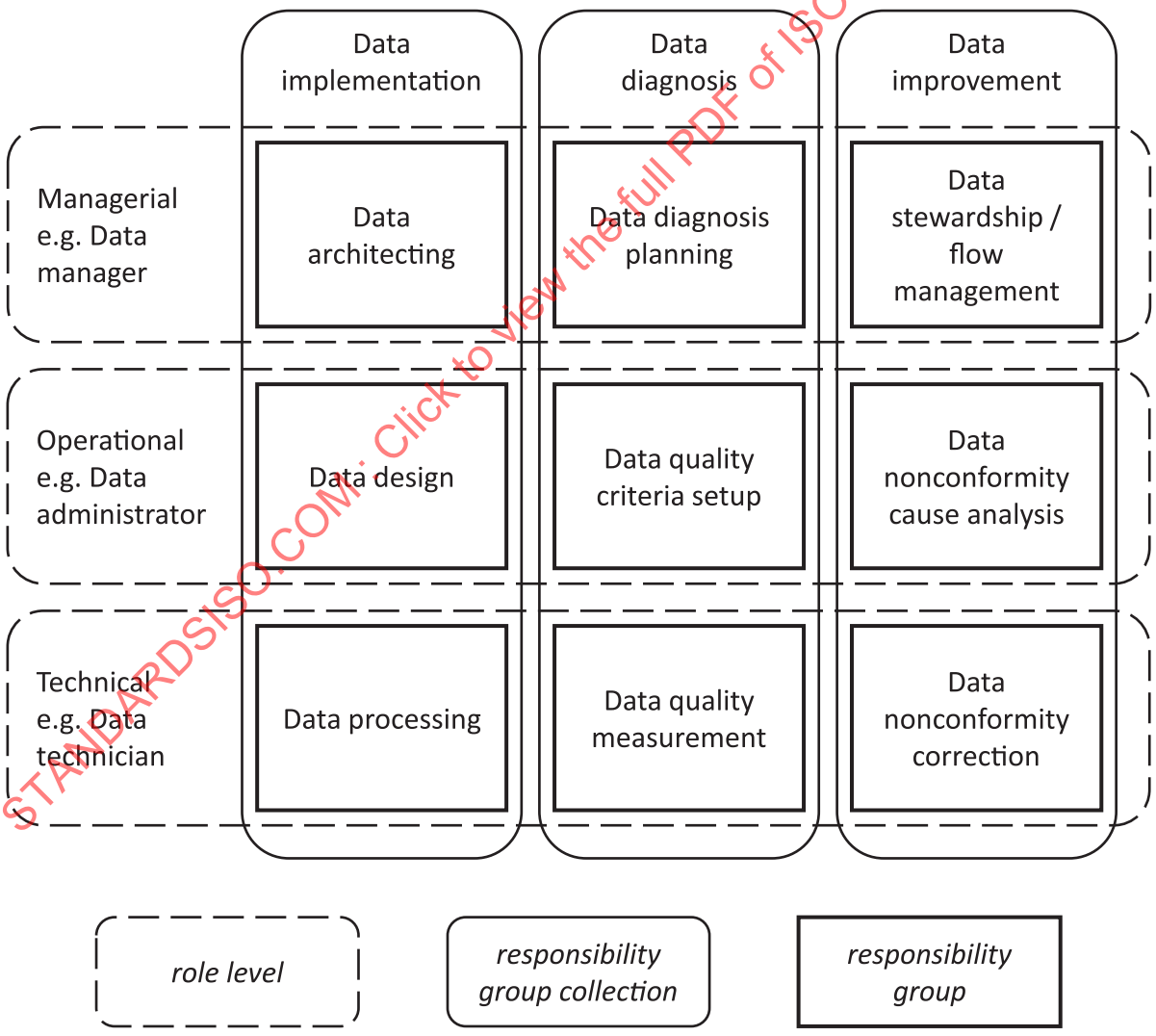


Figure B.1 — Framework of roles and responsibilities for data quality management

In contrast to this framework, ISO 8000-61 specifies a process reference model for data quality management and does not identify responsibility groups and role levels as part of that model.

While the framework shows the three role levels in the order managerial, operational and technical, actual interactions between these levels is not necessarily top to bottom or linear. The framework is supported by a functional model for delivering the responsibility groups (see Annex C). This model provides further detail on information flows between the individual lower-level responsibility groups.

These responsibility groups take place in a context governed by a data quality policy, which aligns with the overall organizational policy for data and information and is the basis for data quality objectives. The data quality policy is the controlling factor that drives performance of the whole framework.

B.2 Responsibility group collections of the framework

B.2.1 General

The three responsibility group collections are:

— data implementation (see B.2.2);

— data diagnosis (see B.2.3);

— data improvement (see B.2.4).

B.2.2 Data implementation

The data implementation responsibility group identifies factors that affect data quality and ensures data are available at the right place in a timely manner.

This responsibility group collection consists of the following responsibility groups.

— Data architecting (see B.4.2): manage organization-wide data architecture from an integrated perspective to use data in distributed information systems with consistency and, therefore, ensure data quality.

— Data design (see B.4.3): create data schemas and implement databases to support users processing data without nonconformities and to ensure data quality.

— Data processing (see B.4.4): create, search, update and delete data in accordance with applicable requirements.

B.2.3 Data diagnosis

The data diagnosis responsibility group identifies data nonconformity through a systematic approach.

This responsibility group collection consists of the following responsibility groups.

— Data diagnosis planning (see B.4.5): set up objectives of data quality in alignment with the strategies of an organization, identify factors to be managed and perform actions to accomplish the objectives. This responsibility group also includes assurance of data quality and adjustment of objectives in response to assurance results.

— Data quality criteria setup (see B.4.6): set criteria including characteristics of data, target data and methods to measure data quality.

— Data quality measurement (see B.4.7): measure target data with the criteria set by the process data quality criteria setup on a real-time basis or periodically.

B.2.4 Data improvement

The data improvement responsibility group corrects data nonconformities and eliminates the root causes of those nonconformities. Improvement often depends on appropriate alignment of data stewardship with flow of data within and beyond the organization. The responsibility group not only

addresses issues with data but also delivers appropriate process improvement, which at the managerial level covers core business processes of the organization and at the operational level covers data management processes.

This responsibility group collection consists of the following responsibility groups.

— Data stewardship / flow management (see B.4.8): analyse data operations and data flows within and between organizations, identify responsible parties and the data processing systems influencing data quality and manage the stewardship of data operations.

— Data nonconformity cause analysis (see B.4.9): analyse root causes of data nonconformities and identify solutions to prevent recurrence of those nonconformities.

— Data nonconformity correction (see B.4.10): modify data that do not conform to requirements.

B.3 Role levels in the framework

B.3.1 General

The following three role levels perform the responsibility groups in the framework:

— managerial role level (see B.3.2);

EXAMPLE 1 A data manager is a role at the managerial role level.

— operational role level (see B.3.3);

EXAMPLE 2 A data administrator is a role at the operational role level.

— technical role level (see B.3.4).

EXAMPLE 3 A data technician is a role at the technical role level.

B.3.2 Managerial role level

The managerial level performs the following responsibility groups:

— data architecting (see B.4.2);

— data diagnosis planning (see B.4.5);

— data stewardship / flow management (see B.4.8).

The managerial level directs the execution of data quality management across an organization, with the primary purpose to set the context within which the operational level performs corresponding responsibility groups. This direction aligns with the overall objectives of the organization.

In particular, the managerial level:

— establishes the basis for data consistency between information systems (data architecting);

— identifies key factors that can affect data quality (data diagnosis planning);

— grants authority to the operational level to trace and correct data.

EXAMPLE An enterprise data architect (managerial level) selects one of the several Product Identification Code (PIC) systems available. While a data administrator (operational level) or a data technician (technical level) operates the PIC system, this enterprise data architect oversees and manages whether the use of the PIC aligns with the objectives of data quality management.

B.3.3 Operational role level

The operational level performs the following responsibility groups:

— data design (see B.4.3);

— data quality criteria setup (see B.4.6);

— data nonconformity cause analysis (see B.4.9).

The operational level acts on the direction from the managerial level, with the primary purpose to set the context within which the technical level performs corresponding responsibility groups. This context consists of:

— appropriate data schemas (data design);

— criteria for use when measuring the quality of data (data quality criteria setup);

— solutions to the root causes of data quality issues (data nonconformity cause analysis).

EXAMPLE Product Identification Codes exist in several systems across an organization, requiring a data administrator (operational level) to identify all the locations of repeated data and to re-design data schemas to prevent this redundancy. In this example, the role of data administrator could equally be replaced by a programme steering committee or a database administrator.

B.3.4 Technical role level

The technical level performs the following responsibility groups:

— data processing (see B.4.4);

— data quality measurement (see B.4.7);

— data nonconformity correction (see B.4.10).

In particular, the technical level:

— creates, reads, modifies, transfers and deletes data (data processing) to meet the requirements applying to data quality management and created by the operational level;

— measures data quality (data quality measurement);

— corrects any nonconformities that are identified by the measurement activities (data nonconformity correction)

— only handles data within an allocated scope of responsibility, while, in contrast, the managerial or operational level can face situations in which data from external sources are flowing into the local environment and these data then require attention.

The technical level covers the activities of either a data user (actually inputting and exploiting data) or a data operator (periodically measuring whether data conform with requirements and correcting any identified data nonconformities).

EXAMPLE A data user applies Product Identification Codes when creating a new record for a product in inventory at an organization, while a data operator periodically examines these codes to verify conformance with the applicable requirements for formatting. This examination can be by using an automated tool or by visual review of the codes.

B.4 Lower-level responsibility groups in the framework

B.4.1 General

The framework includes nine lower-level responsibility groups:

— data architecting (see B.4.2);

— data design (see B.4.3);

— data processing (see B.4.4);

— data diagnosis planning (see B.4.5);

— data quality criteria setup (see B.4.6);

— data quality measurement (see B.4.7);

— data stewardship / flow management (see B.4.8);

— data nonconformity cause analysis (see B.4.9);

— data nonconformity correction (see B.4.10).

The following descriptions of each responsibility group include an overview, the tasks within the responsibility group, the responsibilities of corresponding role levels and any relationships with other responsibility groups in the framework.

These lower-level responsibility groups also appear in a functional model for performing the responsibility groups (see Annex C) and are the basis for deployment scenarios for the framework (see Annex D).

B.4.2 Data architecting

B.4.2.1 Overview of data architecting

In general, data are distributed across any organization and, thus, data quality cannot be ensured without systematic management.

The data architecting responsibility group identifies the key data existing across the organization and defines a data schema to drive data quality inside and outside the organization. This responsibility group prevents discrepancy between the same data that appear in different information systems. The responsibility group also manages the lifecycle of the data identified by the data architecture.

B.4.2.2 Constituent tasks of data architecting

This responsibility group consists of the following tasks.

— Management of organization-wide conceptual data models: these models cover the data that appear in more than one information system across the organization or that are of significant value to the organization and require management. The models enable data mapping and tracing.

NOTE This task includes agreeing and communicating to all stakeholders the existence of master data sources.

— Management of organization-wide data standards: identifies the standards and other rules that apply to data across the organization. These standards and rules govern the scope and content of the data architecture.

B.4.2.3 Required responsibilities for data architecting

To perform this responsibility group, the managerial role level (see B.3.2) has the following specific responsibilities.

— Organization-wide co-ordination: seeking convergence of goals and plans for data quality management amongst those parties who are responsible for those goals and plans. This convergence is then followed by assuring conformance by those parties. As data quality depends heavily on data users across the organization, the managerial level has authority to control and co-ordinate parties in organizational units beyond those that are purely technical in focus.

— Organization-wide sharing and maintenance: issuing conceptual data models and data standards to ensure data quality, while continually maintaining the consistency of those artefacts (for example, modifying data mappings whenever a data schema changes).

NOTE This task includes promptly updating master data sources when changes are necessary and then propagating these changes to slave data stores.

B.4.2.4 Relationship of data architecting to other responsibility groups

This responsibility group has the following relationships to other responsibility groups.

— Between data architecting and data diagnosis planning: the organization-wide data architecture enables development of the plan for data diagnosis. This plan drives the content of conceptual data models and the selection of appropriate data standards.

— Between data architecting and data stewardship / flow management: the organization-wide data architecture drives assignment of appropriate data stewardship. When resolution of data conformities requires change to data stewardship or to data flows then this also requires an update to the data architecture.

— From data architecting to data design: the conceptual data models and data standards are the foundation for developing appropriate data schemas.

NOTE These conceptual data models and data standards establish foundations for master data management and all types of data processing.

B.4.3 Data design

B.4.3.1 Overview of data design

Data quality issues arise from either end-user tasks or from structural inadequacies in the tools and methods for data processing. The former issues are not generally subject to systematic resolution but when the latter cause data nonconformities then re-design of data schemas is the way forward. Such re-design does not, however, easily integrate into in-service information systems, so the data design responsibility group requires a focus on data quality from the very beginning. This focus does not address the needs of individual systems in isolation to avoid creating a data quality approach that is not sustainable across the whole organization. The schemas take account of the balanced requirements from all relevant information systems.

EXAMPLE To support the exchange of master data, ISO 8000-110 addresses requirements for syntax, semantics and conformance to data specification, ISO 8000-115 addresses requirements for identifiers, ISO 8000-120 addresses requirements for statements about provenance, ISO 8000-130 addresses the representation of statements about accuracy and ISO 8000-140 addresses the representation of statements about completeness.

B.4.3.2 Constituent tasks of data design

This responsibility group consists of the following tasks.

— Design to address data characteristics: creation of schemas that identify the types and value ranges of data. These schemas address the needs of the data processing performed by the technical level. Some of this data processing involves physical data structures in existing information systems and, thus, schemas reflect the configuration of those structures.

— Design to address the organization-wide data architecture: creation and change of data schemas to satisfy the needs of the organization-wide data architecture. These needs evolve every time the organization decides to implement a new information system.

B.4.3.3 Required responsibilities for data design

To perform this responsibility group, the operational role level (see B.3.3) has the following specific responsibilities:

— to identify data requirements across the organization by consulting with stakeholders (including users) for internal information systems;

— to identify data dependencies with external information systems by consulting with stakeholders responsible for those systems.

B.4.3.4 Relationship of data design to other responsibility groups

This responsibility group has the following relationships to other responsibility groups.

— From data design to data architecting: detailed data schemas provide feedback on any discrepancies in the outputs of data architecting.

— From data design to data processing: detailed data schemas control the scope and content of outputs from data processing.

— From data design to data quality criteria setup: detailed data schemas are the basis for appropriate data quality criteria.

B.4.4 Data processing

B.4.4.1 Overview of data processing

End users are the most numerous of persons at the technical role level but are also the ones who generally have a narrow focus on the data processing responsibility group to support a core process for which they have responsibility. Such users are less likely to understand the wider implication on data quality from taking shortcuts and often fail to spot the more subtle types of data nonconformity. These limitations drive the need for robust and comprehensive requirements to apply data quality considerations to all data transactions.

Data processing includes manual transactions and also those performed by information systems.

B.4.4.2 Constituent tasks of data processing

This responsibility group consists of the following tasks.

— Data transactions: this task involves creating, reading, updating, transferring or deleting data in accordance with applicable requirements. The task requires competence from end users and this competence is delivered by interactive support from software or by formal training programmes. When this task is an automated function of an information system then requirements are still applicable and the design of such systems involves explicit audit of the correct implementation of those requirements.

— Data logging: to trace every data transaction, this task creates a record of who performs what data processing at what time.

B.4.4.3 Required responsibilities for data processing

To perform this responsibility group, the technical role level (see B.3.4) has the following specific responsibilities.

— applying specialist knowledge of systematic considerations to maximize the extent to which high-quality data propagate across the organization;

— paying close attention to the quality of any data that are critical to the organization.

B.4.4.4 Relationship of data processing to other responsibility groups

This responsibility group has the following relationships to other responsibility groups.

— From data processing to data design: data quality issues provide feedback in the form of opportunities to improve data schemas.

— From data processing to data quality measurement: output data are subject to measurement to assess data quality.

B.4.5 Data diagnosis planning

B.4.5.1 Overview of data diagnosis planning

The data diagnosis plan unifies the approach to satisfying the various perspectives within and beyond an organization on how to deliver effective, relevant data quality. These perspectives are the foundation for specific objectives and demand that the organization seeks a structured policy for data quality management.

B.4.5.2 Constituent tasks of data diagnosis planning

This responsibility group consists of the following tasks.

— Identification and management of objectives: this task collects data requirements from all stakeholders including consumers of the data inside and outside the organization. These requirements form the basis for a coherent set of objectives and lead to assurance that the plan properly implements the objectives.

— Identification and planning of quality management tasks: this task identifies the tasks necessary to achieve the objectives. These tasks sit within a detailed plan of action that also includes scheduling, allocated resources and appropriate identified methods.

B.4.5.3 Required responsibilities for data diagnosis planning

To perform this responsibility group, the managerial role level (see B.3.2) has the following specific responsibilities:

— identification of all applicable quality management factors and sufficient resources to address those factors to ensure a relevant, feasible plan;

— securing the support of top management through effective dialogue to align the plan with overall governance objectives and, thus, achieve consistent implementation of the plan across the organization.

B.4.5.4 Relationship of data diagnosis planning to other responsibility groups

This responsibility group has the following relationships to other responsibility groups.

— From data diagnosis planning to data architecting: scope, tasks, scheduling, required resources and the methods for data diagnosis provide feedback in the form of opportunities to improve the data architecture.

— From data diagnosis planning to data stewardship / flow management: scope, tasks, scheduling, required resources and the methods for data diagnosis establish the basis for identifying data stewards and data flows.

— From data diagnosis planning to data quality criteria setup: scope, tasks, scheduling, required resources and the methods for data diagnosis establish the basis for creating appropriate data quality criteria.

B.4.6 Data quality criteria setup

B.4.6.1 Overview of data quality criteria setup

To deliver a data diagnosis plan, data quality criteria are necessary. These criteria cover the specific relevant considerations of data quality (including provenance, accuracy and completeness), which data are the target of these considerations and the appropriate measurement methods.

The organization adopts continual improvement of criteria with a particular focus on re-using the most insightful criteria across the organization. This improvement strengthens the authority of criteria, refines the allocation of appropriate resources to deliver data quality and makes measurement methods more precise repeatable.

EXAMPLE 1 ISO/TS 8000-81 specifies approaches to data profiling.

EXAMPLE 2 ISO/TS 8000-311 provides guidance on preparing data quality criteria for product shape data.

B.4.6.2 Constituent tasks of data quality criteria setup

This responsibility group consists of the following tasks.

— Identification and specification of data quality criteria: this task generates criteria to address the needs of the organization. Each criterion also requires support from a method to measure a corresponding value of the criterion at a particular point in time for the organization.

— Evaluation of data quality results: this task examines measurement results to validate whether data quality criteria are giving complete and relevant control of the value of data to the organization. When this control is insufficient then a person at the operational role level refines the criteria.

B.4.6.3 Required responsibilities for data quality criteria setup

To perform this responsibility group, the operational role level (see B.3.3) has the following specific responsibilities:

— to understand the requirements of end users of data;

— to form consensus through collaboration with all data stakeholders.

B.4.6.4 Relationship of data quality criteria setup to other responsibility groups

This responsibility group has the following relationships to other responsibility groups.

— To data quality criteria setup from data diagnosis planning: scope, tasks, scheduling, required resources and the methods for data diagnosis establish the basis for creating appropriate data quality criteria.

— From data quality criteria setup to data quality measurement: data quality criteria are the items measured by data quality measurement.

B.4.7 Data quality measurement

B.4.7.1 Overview of data quality measurement

As end users and information systems are not always able to identify data nonconformities consistently and quickly, systematic quality measurement is also necessary. This measurement takes place at a frequency that is appropriate to the corresponding data processing tasks, the time criticality of the data and the needs of the core processes supported by the data.

EXAMPLE ISO 8000-8 specifies approaches for the measurement of data quality.

B.4.7.2 Constituent tasks of data quality measurement

This responsibility group consists of the following tasks.

— Generating measurement results: this task applies data quality criteria using either manual techniques or automated software tools to gather numeric values that characterize the quality of the target data. Tools provide the benefits of consistent repeatability, but some complex effects will require a person to provide analytical expertise.

— Statistical treatment of measurement results: this task generates insight into trends and patterns in the origins of data nonconformities.

B.4.7.3 Required responsibilities for data quality measurement

To perform this responsibility group, the technical role level (see B.3.4) has the specific responsibility to access target data based on allocated authority.

B.4.7.4 Relationship of data quality measurement to other responsibility groups

This responsibility group has the following relationships to other responsibility groups.

— From data quality measurement to data quality criteria setup: the measurement results provide feedback in the form of opportunities to improve the relevance and measurability of the data quality criteria.

— From data quality measurement to data nonconformity cause analysis: any identified data nonconformities and overall statistics of the measurement results form the basis on which to initiate appropriate root-cause analysis.

— From data quality measurement to data nonconformity correction: any identified data nonconformities require resolution.

B.4.8 Data stewardship / flow management

B.4.8.1 Overview of data stewardship / flow management

Useful data in an organization exist in more than one information system. Such data pose a specific challenge for data quality management. This challenge includes gathering a coherent understanding of user requirements for the data and ensuring the correction of all data nonconformities after discovery of a data quality issue.

When multiple users exist for the same data then a single responsible person (a steward) is necessary to adjudicate on the quality considerations for those data.

The managerial level adjusts stewardship and data flows when root-cause analysis determines that these have been the origin of specific data nonconformities.

B.4.8.2 Constituent tasks of data stewardship / flow management

This responsibility group consists of the following tasks.

— Assignment of stewardship: this task allocates persons with the authority and responsibility to manage items of data across the organization. This responsibility requires taking a change to a data value in one information system and applying this change in other systems. If such changes are frequent then the steward implements mechanism to propagate changes automatically based on an understanding of the data flows across the organization.

NOTE Each data steward can be responsible for some or all of the organization and the systems within that organizational scope.

— Management of data flows: this task maintains an understanding of how data transfer and interact between different information systems across the organization. These interdependencies determine how data nonconformities can propagate from one system to another and escalate the impact of data quality issues.

B.4.8.3 Required responsibilities for data stewardship / flow management

To perform this responsibility group, the managerial role level (see B.3.2) has the following specific responsibilities:

— authorization of data processing: to align and restrict the different parts of the organization involved in processing any individual item of data;

— propagation of change: ensuring a co-ordinated response across the whole organization when implementing new information systems or adjusting previous flows of data.

B.4.8.4 Relationship of data stewardship / flow management to other responsibility groups

This responsibility group has the following relationships to other responsibility groups.

— To data stewardship / flow management from data architecting: the organization-wide data architecture drives assignment of appropriate data stewardship.

NOTE Data stewardship includes appropriate responsibility for master data management.

— To data stewardship / flow management from data diagnosis planning: scope, tasks, scheduling, required resources and the methods for data diagnosis establish the basis for identifying data stewards and data flows and resolving any conflicts over stewardship or flow.

— From data stewardship / flow management to data nonconformity cause analysis: stewardship and flows provide key evidence of potential root causes for data nonconformities.

B.4.9 Data nonconformity cause analysis

B.4.9.1 Overview of data nonconformity cause analysis

When a data nonconformity occurs, an organization will not prevent future re-occurrence by only correcting the data values that are subject to the data quality issue. Such prevention requires understanding and resolution of the root causes of the nonconformity. These root causes can be

numerous; some involve a simple, quick resolution, while other resolutions will only be possible through systemic intervention across the organization.

EXAMPLE To support the identification of root causes in processes, ISO 8000-63 specifies an approach to process measurement and ISO 8000-65 specifies a questionnaire to investigate the performance of data quality management.

B.4.9.2 Constituent tasks of data nonconformity cause analysis

This responsibility group consists of the following tasks.

— Cause identification and correction: this task addresses a specific data nonconformity and analyses data schemas, standards and flows of data to discover the cause of the nonconformity. The task creates a record of each investigation to create a body of knowledge to apply when resolving similar incidents in the future.

NOTE This task includes investigating the criteria by which to identify the data nonconformities to analyse for causes. Due to the volume of each type of data nonconformity in an organization and the impact of that type, many nonconformities are of little value to analyse.

— Prevention of recurrence: this task identifies the opportunity to generalize the understanding arising from specific data nonconformities and applying pre-emptive improvements to prevent data quality issues arising from similar circumstances across the organization. These circumstances include data sets, data schemas, organizational structures, data flows, process definitions (including nonconformity detection and correction) and training. The task requires the operational role level to secure appropriate support from the managerial role level and to consult with all relevant stakeholders.

B.4.9.3 Required responsibilities for data nonconformity cause analysis

To perform this responsibility group, the operational role level (see B.3.3) has the following specific responsibilities:

— Identification of root causes: analyse the origin of a data nonconformity. This analysis depends on the operational role level having sufficient knowledge, skills and experience to trace data through a series of information systems and interventions by individual users.

— Elimination of root causes: initiate actions to adjust some aspect of how the organization is currently performing data quality management.

B.4.9.4 Relationship of data nonconformity cause analysis to other responsibility groups

This responsibility group has the following relationships to other responsibility groups.

— From data nonconformity cause analysis to data stewardship / flow management: the analysis results provide evidence for the need to remove root causes by adjusting inappropriate stewardship or flows.

— From data nonconformity cause analysis to data nonconformity correction: the analysis results provide evidence for the need to correct specific nonconformities.

— From data nonconformity cause analysis to data quality criteria setup: the analysis results provide evidence of the opportunity to specify more relevant data quality criteria.

— From data nonconformity cause analysis to data design: the analysis results provide evidence of the opportunity to improve data schemas.

B.4.10 Data nonconformity correction

B.4.10.1 Overview of data nonconformity correction

In response to the outputs of two processes, data quality measurement and data nonconformity cause analysis, this responsibility group corrects data nonconformities. The group addresses not only the data subject to an initial diagnosis of nonconformance in one particular information system but also the same or related data in other information systems, ensuring the consistency of data across the organization.

B.4.10.2 Constituent tasks of data nonconformity correction

This responsibility group consists of the following tasks.

— Assessment of which nonconformities to correct: this assessment determines whether the cost and practicality of correcting each nonconformity is less than the benefits that will arise. The task creates a record of each agreed decision that correction of a nonconformity is not appropriate. If circumstances change, then a review of the record will be necessary to determine whether a different outcome has become appropriate.

— Creation of the solution to correct the nonconformity: this task determines the specific value that is appropriate to replace the nonconformity. The task creates a record of the correction and adds this record to a history of all corrections to support data nonconformity cause analysis.

— Dissemination of corrected data: to improve overall performance of the organization, this task ensures that all instances of a nonconformity are replaced by the updated data.

B.4.10.3 Required responsibilities for data nonconformity correction

To perform this responsibility group, the technical role level (see B.3.4) has the following specific responsibilities:

— consulting with authorized persons to ensure any modifications are in accord with all applicable requirements;

— to ensure all stakeholders understand the potential implications to their own areas of responsibility, communicating the progress and scope of all corrective interventions.

B.4.10.4 Relationship of data nonconformity correction to other responsibility groups

This responsibility group has the following relationships to other responsibility groups.

— From data nonconformity correction to data nonconformity cause analysis: accumulated results from corrective interventions enable analysis of the causes of nonconformities.

— From data nonconformity correction to data processing: improved data enable more effective and efficient data processing.

Annex C
(informative)

Functional model of roles and responsibilities

The framework of roles and responsibilities for data quality management (see Annex B) is supported by a functional model of roles and responsibilities. This model consists of the following diagrams:

— Context diagram for perform managerial, operational and technical aspects of data quality management (see Figure C.1);

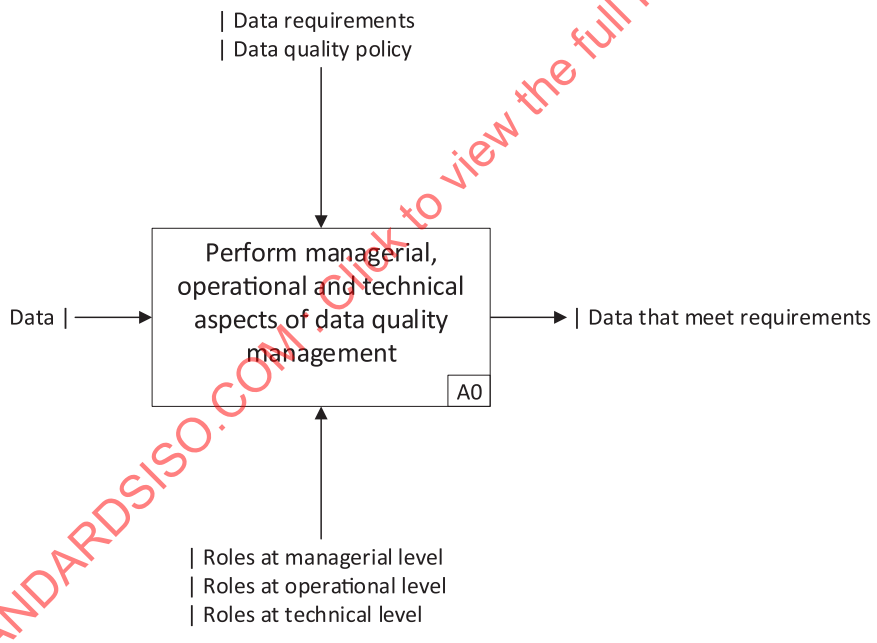
— Perform data quality management (see Figure C.2);

— Perform data implementation (see Figure C.3);

— Perform data diagnosis (see Figure C.4);

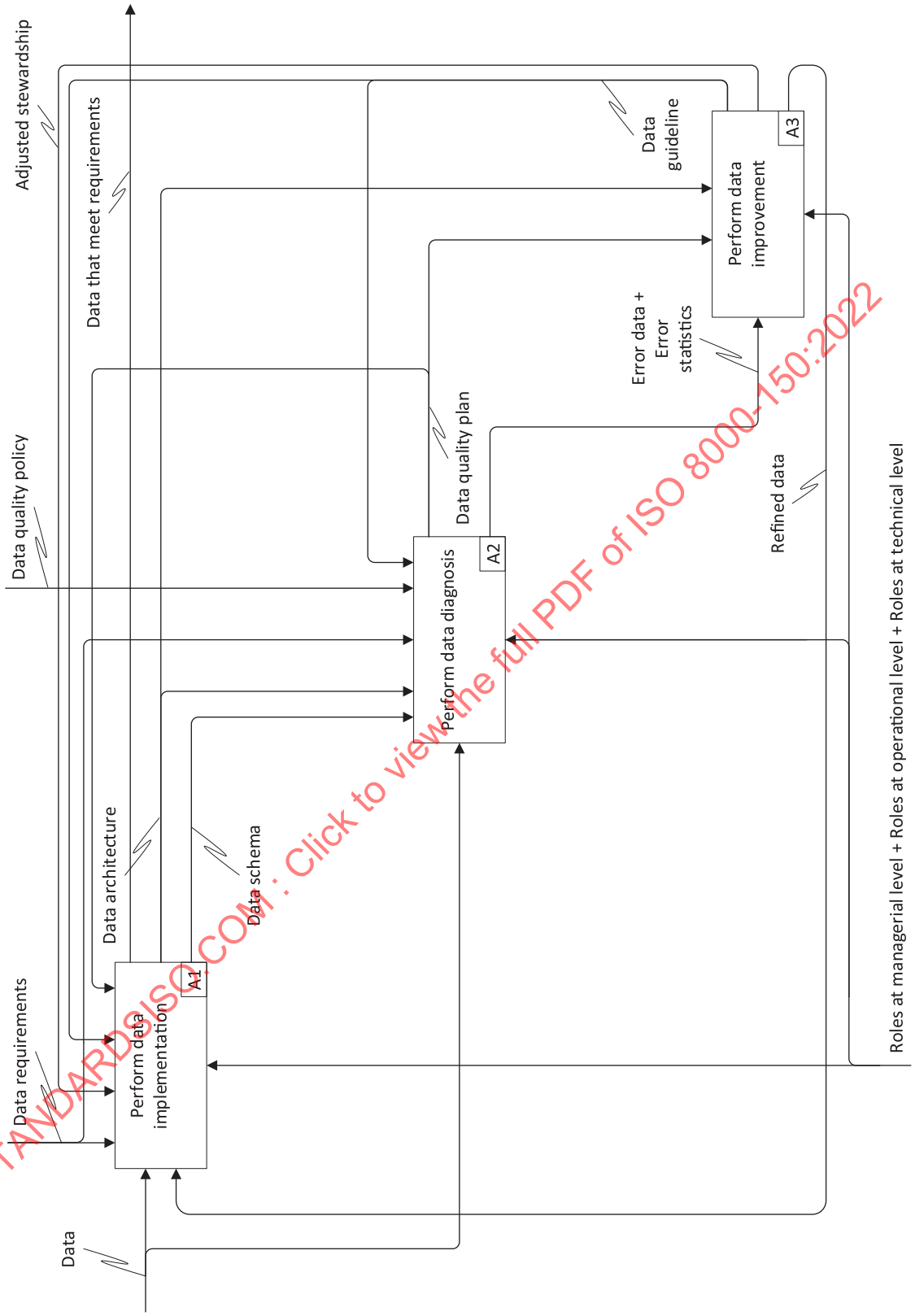
— Perform data improvement (see Figure C.5).

NOTE Figure C.2 is a child diagram of Figure C.1. Figures C.3, C.4 and C.5 are child diagrams of the diagram in Figure C.2.



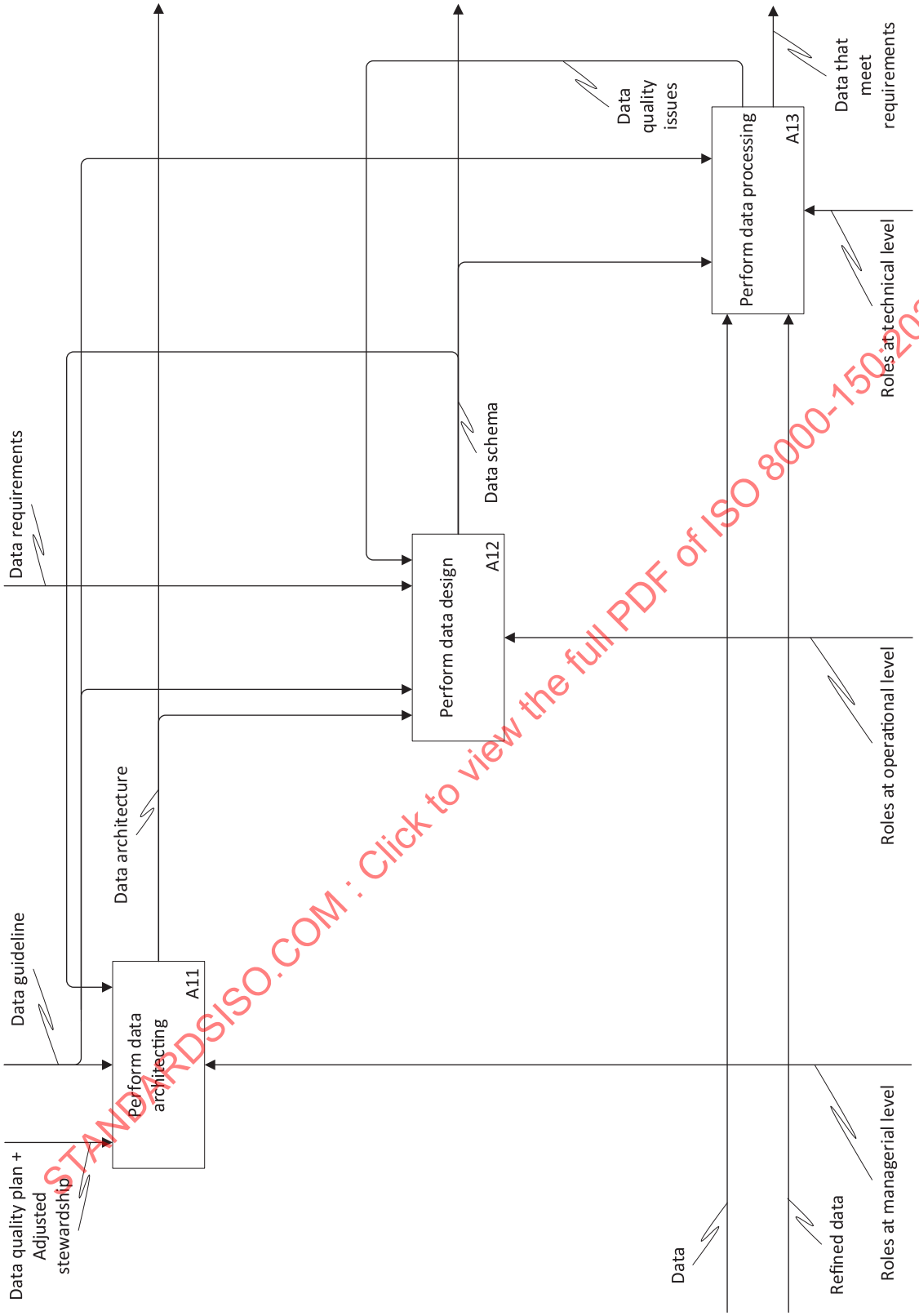
NOTE See ISO/IEC/IEEE 31320-1 for details on the notation in this diagram.

Figure C.1 — Context diagram for perform managerial, operational and technical aspects of data quality management (model diagram A-0)



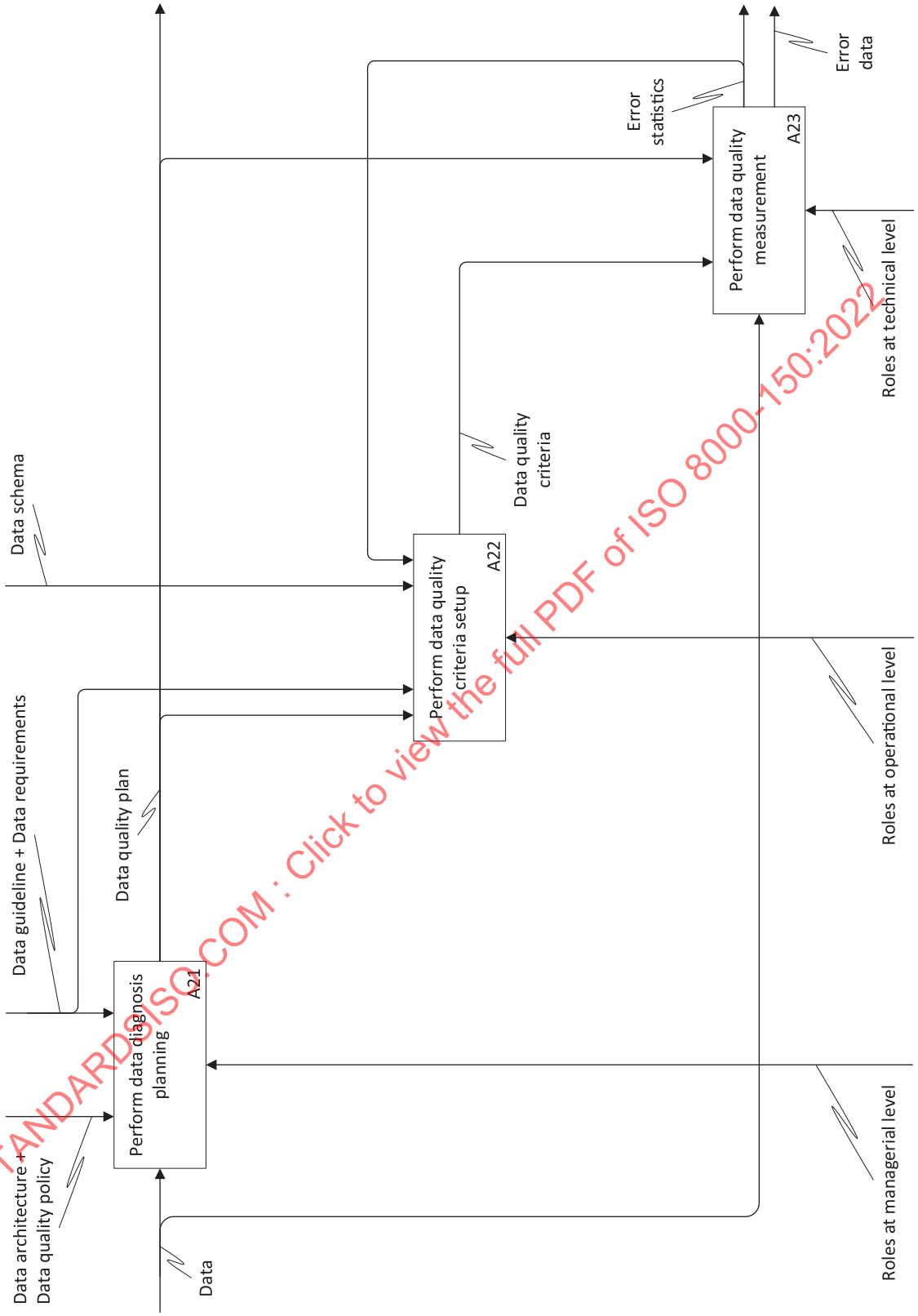
NOTE See ISO/IEC/IEEE 31320-1 for details on the notation in this diagram.

Figure C.2 — Perform managerial, operational and technical aspects of data quality management (model diagram A0)



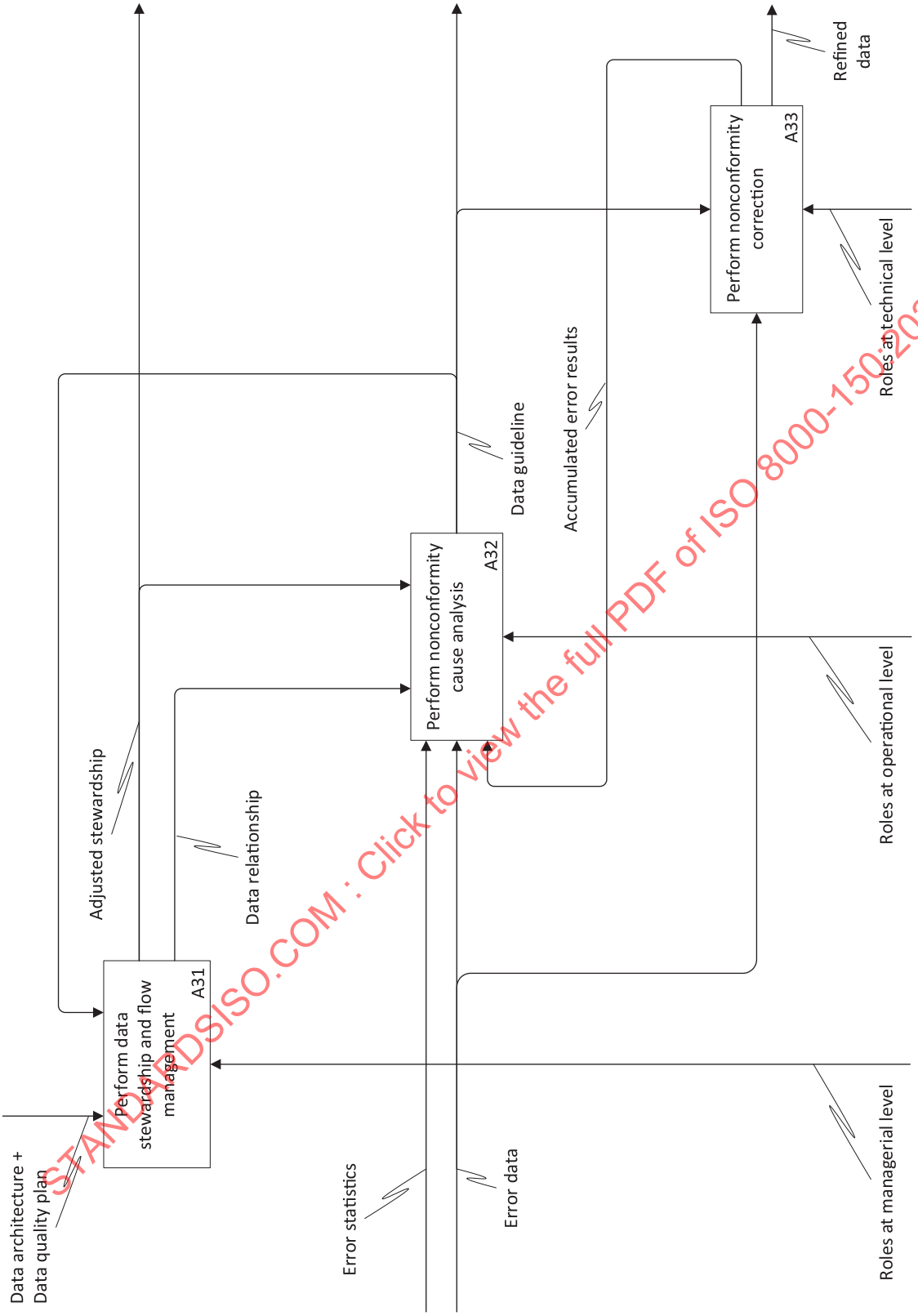
NOTE See ISO/IEC/IEEE 31320-1 for details on the notation in this diagram.

Figure C.3 — Perform data implementation (model diagram A1)



NOTE See ISO/IEC/IEEE 31320-1 for details on the notation in this diagram.

Figure C.4 — Perform data diagnosis (model diagram A2)



NOTE See ISO/IEC/IEEE 31320-1 for details on the notation in this diagram.

Figure C.5 — Perform data improvement (model diagram A3)