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Data quality —

Part 118:
Application of ISO 8000-115 to natural location identifiers

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Foreword

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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 document 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).

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

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

0.1 Foundations of the ISO 8000 series

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

— operational effectiveness and efficiency;

— safety and security;

— 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[2] explains that quality is not an abstract concept of absolute perfection. Quality is actually the conformance of characteristics to requirements. This conformance 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.

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

2) ISO 8000-2[1] 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”.

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[3] identifies that data have syntactic (format), semantic (meaning) and pragmatic (usefulness) characteristics.

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[4] specifies a process reference model for data quality management.

— creating and applying requirements for data and information;

EXAMPLE 6 ISO 8000-110[5] specifies how to exchange characteristic data that are master data.

— monitoring and measuring information and data quality;

EXAMPLE 7 ISO 8000-8[6] specifies approaches to measuring information and data quality.

— improving data and, consequently, information quality;

EXAMPLE 8 ISO/TS 8000-81[7] 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[8] 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 for 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”, which can be a representation of many different dates including 4 May 2020, 5 April 2020 and 20 May 2004). The cleansing also cannot address any process issues and people issues, including training, that have caused the inconsistency.

0.2 Understanding more about the ISO 8000 series

ISO 8000-1[3] provides a detailed explanation of the structure and scope of the whole ISO 8000 series.

ISO 8000-2[1][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[1] presents the vocabulary structured by a series of topic areas (for example, terms relating to quality and terms relating to data and information).

ISO has identified ISO 8000-1[3], ISO 8000-2[1] and ISO 8000-8[6] as horizontal deliverables[4)].

0.3 Role of this document

As a contribution to the overall capability of the ISO 8000 series, this document specifies how to generate an unambiguous natural location identifier.

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

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

4) Deliverable dealing with a subject relevant to a number of committees or sectors or of crucial importance to ensure coherence across standardization deliverables.

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.

Annex A contains an identifier that conforms to ISO/IEC 8824-1[9]. The identifier unambiguously identifies this document in an open information system.

0.4 Benefits of the ISO 8000 series

By implementing parts of the ISO 8000 series to improve organizational performance, 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 that 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 re-usability 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.

Data quality —

Part 118:
Application of ISO 8000-115 to natural location identifiers

1 Scope

This document specifies requirements for natural location identifiers. These requirements supplement those of ISO 8000-115[10].

The following are within the scope of this document:

— requirements for the prefix element and a single sub-domain element in a location identifier;

— requirements for representing latitude, longitude and storey or elevation of a location.

The following are outside the scope of this document:

— methods to identify latitude, longitude and elevation.

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 8000-115, *Data quality — Part 115: Master data: Exchange of quality identifiers: Syntactic, semantic and resolution requirements*

3 Terms and definitions

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

ISO and IEC maintain terminological 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 Fundamental principles and assumptions

4.1 Types of identifiers

4.1.1 General

Organizations issue identifiers for many purposes. Identifiers are one of two types:

a) controlled identifiers (see 4.1.2);

b) natural identifiers (see 4.1.3).

4.1.2 Controlled identifiers

Controlled identifiers are issued by an organization that maintains the characteristic data associated with the identifier. These identifiers are, therefore, managed by the organization, which is also responsible for maintaining an identifier registry.

EXAMPLE 1 Controlled identifiers include part numbers, batch numbers and serial numbers, each of which are issued by manufacturers.

EXAMPLE 2 Controlled identifiers include personal identifiers issued by governments, universities and companies.

Each controlled identifier depends on completion of a master data record containing characteristic data to differentiate the identified item within a particular domain. This dependence means resolution of the identifier requires access to the underlying master data that are controlled by the issuing organization.

A controlled identifier is created by, and therefore belongs to, the issuing organization.

4.1.3 Natural identifiers

A natural identifier derives from the characteristics of the identified item, where those characteristics make the item unique within a particular domain. The identifier can be created by applying an algorithm to the characteristics of the item.

EXAMPLE 1 Natural identifiers include life science identifiers, which are persistent, globally unique identifiers for biological objects.

EXAMPLE 2 Natural identifiers include those generated by cryptographic hash functions (to create document and virus signatures) and cyclic redundancy check digits (error-detecting codes to highlight changes to raw data in data transfers).

As a natural identifier derives from accessible information, the identifier is not subject to the control of one owning organization.

4.2 Ownership and usability of identifiers

Controlled identifiers belong to the issuing organization.

Unless the controlled identifier is in the public domain, data containing controlled identifiers can end up becoming a joint work under copyright law.

The issuing organization for a controlled identifier can, for instance, restrict use of the identifier only to retrieve licensed content provided by the issuer of the identifier.

For natural identifiers, if the algorithm used to generate it is proprietary, then the resulting identifier is proprietary. In this case, both the use of the algorithm and the resulting identifier will be subject to license.

If the natural identifier uses an algorithm that is in the public domain, published as an open standard or can be used without license, then the resulting identifier is a public or open identifier that is usable without license.

4.3 Geographic location identifiers

A geographic location identifier represents the identity of a geographical point location.

In order to identify a geographic point location on Earth, a unique, natural identifier can be generated from the corresponding coordinate of the location within a geodetic coordinate reference system.

Geographic location identifiers are bound to a particular geodetic coordinate reference system as a datum (which is also known as a "reference frame").

NOTE There are multiple realizations of geodetic datums. These realizations include the series of the World Geodetic System (WGS)[11], which is used by the Global Positioning System (GPS)[12], the International Terrestrial Reference Frame (ITRF), which is a precise scientific realization[13]; and the European Terrestrial Reference Frame (ETRF), which is the EU-recommended reference frame[14].

Clients of global navigation satellite systems have become pervasive, not only in mapping devices and surveying equipment but also in mobile phones and Internet-of-Things devices. These clients can easily calculate geographic location identifiers on demand by using a simple, open algorithm.

5 Natural location identifier representation

5.1 General

The natural location identifier is a geographic location identifier that provides a unique identifier for a geographic point location in three dimensions.

The natural location identifier is a natural identifier because the identifier is generated from intrinsic characteristics of a geographic point location. These characteristics are the coordinates of the location within a geodetic coordinate system. The characteristics are not assigned by an individual person or an organization.

In practice, the natural location identifier provides a lossless conversion of the coordinates for a geographic point location, allowing the translation of the identifier to the original coordinates within the chosen geodetic coordinate system and corresponding reference frame.

5.2 Representation

This document uses the following characteristics as the basis for the natural location identifier:

— the coordinates (latitude and longitude) of the location according to the World Geodetic System 1984[11];

— elevation coordinates, in the form of either ground-level distance or a storey identifier.

A natural location identifier consists of the following elements:

— a prefix element as the string "ISO";

— a sub-domain element as the string ".NLI";

— an identifier element consisting of the character ":" followed by the encoding of the coordinates and elevation using the algorithms specified by 5.3 and Clause 6.

NOTE 1 The identifier conforms to requirements of ISO 8000-115[10] by consisting of a prefix element, an optional sub-domain element and an identifier element.

For an example of the encoding and representation of a natural location identifier described in this document, see Annex C.

NOTE 2 Data tables used for encoding values of the natural location identifier provided in Annex B are provided in the public domain and not subject to copyright (see Annex E).

5.3 Algorithms

5.3.1 General

A core set of algorithms enable generation of a natural location identifier (see Table 5-1).