ISO/TC 68 Financial services - Standards Best Practices

1 INTRODUCTION

The need for Standards Best Practices is an extension of the recognition by ISO/TC 68 to more efficiently and effectively focus on the development and maintenance of ISO/TC68 standards. The standards under ISO/TC 68 include security, reference data standards and financial services modeling and messaging standards, which includes ISO 20022.

In considering the restructuring of ISO/TC 68, our members observed that as financial services became more connected, there was a trend towards use of standards across business domains and that grouping our standards together by type and function would result in more coordinated standards coverage, development and review. Also recognized as an important driver is interoperability as our standards are used together with and within other industry standards.

These Standards Best Practices are meant to represent guidelines, to be a record of best practices that ISO/TC 68 should aspire to and should be considered by working groups when developing and maintaining its standards. These Standards Best Practices will be provided so that newly developed standards can incorporate these practices.

For existing standards, the Standards Best Practices should be considered and applied at the time of their next revision. In certain circumstances, other considerations such as backward compatibility also must be taken into account.

Principles in terms of governance of standards also apply to the maintenance of standards by ISO Registration Authorities or ISO Maintenance Agencies but are not meant to be complete operational procedures for the development and maintenance of ISO/TC 68 standards.

1.1 History

This document is based on the version submitted to TC 68 on January 4, 2021 updated to reflect SBPAG discussions to date regarding specific standards and discussion topics in section 3.0 Specific Guidelines.
2 STANDARDS BEST PRACTICES

2.1 Principles for ensuring ISO standards are consistent

- The reference data standards of ISO/TC 68 should use consistent Notations of the same concepts across the catalogue of reference data standards.

For Example, the Notation of the simple concept of “Alphanumeric” should be the same across the catalogue of the reference data standards. Refer to section 3.0 Specific Guidelines.

- A common glossary should be considered for ISO/TC 68. The goal would be that all concepts would be captured within this common glossary.

- Each Data record element in the data records should be defined formally.

  When the same Data record element is used in more than one data record of ISO/TC 68 standards, the definition should be analyzed to ensure that the definition is consistent across the catalogue of standards whenever that Data record element is used. For example, the definition of the concept Alphanumeric should be the same across the catalogue of standards. Refer to section 3.0 Specific Guidelines.

ISO/TC 68 standards should use other ISO standards (e.g., ISO 3166 (Country Codes), ISO 4217 (Currency Codes), ISO 8601 (Date and time formats – refer to section 3.0 Specific Guidelines) or ISO 18774 (Financial Instrument Short Name)), where available, to represent Data record elements.

For example, the ISO 3166 standard should be used to represent countries and related Data record elements in other ISO/TC68 standards.

- An Identifier code should be interoperable with other relevant and existing ISO standards and Reference data attributes, so that it can be leveraged by other standards used in a related business domain.


For Data record elements that are not represented by other ISO standards, the Technical format of these Data record elements should be specified in the ISO/TC 68 standard.
ISO standards defining datatypes, such as ISO 11404 (General Purpose Datatypes), are being considered for use to ensure consistent Technical format for all Data record elements in ISO/TC 68 standards. Refer to section 3.0 Specific Guidelines.

ISO/TC68 standards could leverage other ISO standards, especially ISO/IEC Joint Technical Committee 1 Information Technology (JTC 1) https://www.iso.org/isoiec-jtc-1.html, and work on adapting these standards for use in financial services.

For example, SC 2, would continue to leverage the general information security standards of JTC 1. This does not preclude use of non-ISO standards in areas where no appropriate ISO standards exist.

- The Specifications of the Technical format of Data record elements should include Cardinality, which would specify mandatory and conditional Data record elements as well as whether a Data record elements can be repetitive.

- ISO/TC68 reference data standards can make use of levels, hierarchies and validation criteria within the same standard to adequately support the identification requirements of a standard.

For example, ISO 10383 (Market Identifier codes) standard uses a hierarchy to identify both trading platforms and their operators, if applicable. ISO 3166 has representations of names of countries and subdivisions. ISO 10962 (Classification of financial instruments) also make use of hierarchies.
2.2 Principles for the design and allocation of Identifier codes and Classification codes

2.2.1 Unique Identifier codes and Classification codes

Identifier codes and Classification codes assigned under a standard should be unique within the scope as defined by the standard.

- To ensure that Identifier codes and Classification codes are unique, processes should be in place to assign identifiers only once and to prevent duplicates from being assigned. Reissuance of Identifier codes and Classification codes is not permitted. Identifier codes and Classification codes must be permanent but may be retired and can be accessed.

- An Identifier code should be of sufficient length to ensure that Identifier codes are unique over the intended life span during which Identifier codes are assigned, taking into account the number of objects to which Identifier codes will be assigned under a Identification scheme.

- A specific Classification code should be linked to one and only one underlying class of objects within the scope that is defined for the respective Classification scheme.

2.2.2 Use of metadata and embedded intelligence for Identifier and Classification codes

Identifier codes should have no embedded intelligence about the object being identified.

- The object being referenced by an Identifier code should be represented by Reference data attributes composed at a minimum of the essential Data record elements needed to identify the unique object being identified.

- The Reference data attributes, and Data record elements should be specified and defined in a consistent way within all applicable standards.

- A set of Metadata of technical or administrative nature should be used for example to indicate the type of Identifier code, to promote machine readability and processing of the Identifier code and the associated Reference data attributes and Data record elements.

- To satisfy this principle, any other existing Identifier code from another standard or source should not be embedded within the Identifier code, e.g., the ISO 3166 Country Code to identify a location or origin of the Identifier code should not be embedded in an Identifier code. The key reason to avoid embedded intelligence in the Identifier code itself is that such information might change over the life of the
Identifier code thereby potentially leading to misinformation being visible in the Identifier code.

- Classification codes may contain intelligence about the class object.

2.2.3 Persistent Identifier codes and Classification codes

- Identifier codes should be persistent, should exist for an indefinite period of time and not be changed as a result of events or actions if the underlying object itself being identified has not changed.

- For example, a new Identifier code for the same financial instrument should not be issued due to an event or action, unless the event or action changes the financial instrument such that its Reference data attributes and Data record elements would be that of a new/different financial instrument, as could be the case with derivative financial instruments.

Another example is the ISO 17442 Legal Entity Identifier (LEI) code which should persist when updates/changes are made to the LEI data record if the legal entity itself has not changed.

Identification schemes and Classification schemes should be persistent to the extent possible. This principle would ensure that Identifier codes and Classification codes can be traced over the life of the object and historical data reconstruction is possible over the life of the object.

2.2.4 Extensibility

The Identifier code should be designed to maximize possible implementation in the broadest number of uses for which the Identifier code is relevant.

For example, ISO 23897 Unique Transaction Identifier (UTI), originally was developed to identify transactions involving derivatives but could be used to identify transactions involving other financial instruments and business domains.

Aspects such as capacity must be consideration when developing a standard.
2.3 Principles for managing user requirements and access

2.3.1 User requirements

There should be no limitations on use or redistribution of ISO/TC 68 standards, including Identifier codes, Classification codes, models and Data record elements. ISO RAND (Reasonable and Non-Discriminatory) principles should be followed.

For example:
Identifier codes and their related Data record elements should meet the operational and data requirements of the users of the standards.

The number of Identifier codes expected to be issued also should be considered when developing or designing a standard.

Frequency and timelines (real time, near real time, etc.) of the assignment of Identifier codes and their related Data record elements should be considered when implementing a standard.

2.3.2 Access

Access to the Repository of Identifier codes and their Data record elements should be available according to the operational and data requirements of the users of the standards. A dedicated website with search capability and functions is required. Download of the Repository should be available to users of the standards, with a default frequency for daily updates, unless the operational and data requirements of the users require more frequent Access and updates.

Depending on the requirements, Access to Identifier codes and their Data record elements through use of Application Programming Interfaces (APIs) could replace or supplement search capability and functions.
2.4 Principles for supporting maintenance of standards

When a standard is managed by an ISO Registration Authority or an ISO Maintenance Agency, the accompanying Registration procedures or Maintenance Agency guidelines for a standard should be published on the website of the standard.

The ISO Working Group developing the standard should remain activated during the drafting of the ISO Registration Authority procedures and the implementation of the standard by an ISO Registration Authority for purposes of consultation and questions.

When an ISO Maintenance Agency is required for a standard, the ISO Working Group should draft the initial version of the Maintenance Agency guidelines based upon the agreed Standards Best Practices in order to promote consistent operation across standards.

For example, the ISO Maintenance Agency guidelines in draft were included with the standard by the Working Group for ISO 20275 Entity Legal Form.

When a standard is managed by an ISO Registration Authority, the scope and key principles of a standard should still be defined within the standard itself (and not only within the ISO Registration Authority procedures) in line with the persistent principle described above. This should strike a balance between the scope and key principles within the standard and the more detailed implementation procedures that should be addressed by an ISO Registration Authority. The ISO Registration Authority procedures should be flexible to be adjusted as requirements change or as exceptions are identified.

2.5 Principles for linking reference data standards and financial messaging standards

The link with the financial messaging standards of ISO/TC 68 should be established. To deliver the goal of consistent and fit-for-purpose standards that are interoperable with each other to support financial services, the Notation and definition of each Data record element of the ISO/TC 68 reference data standards should become concepts in the ISO 20022 Business Model as a matter of course, and also would become available to be included as elements, as applicable, in financial messages.

Full details regarding the ISO 20022 Business Model can be found here: https://www.iso20022.org/iso20022-repository/business-model

These ISO 20022 concepts representing Data record elements of ISO/TC 68 reference data standards also will be available for Re-use as needed in the development of new reference data standards. Often this will be achieved by Web Ontology Language (OWL) for the metadata required by the standard.
Working Group Conveners should inform the Chair and Committee Manager of their relevant subcommittee of any new Data record elements arising from the development of a new or revised standard. TC 68/SC 9 Chair and Committee Manager should submit the request through the established process within ISO 20022 to request registration of these Data record elements.

Establishing and maintaining this consistent process will add further value to the ISO 20022 standard, particularly in regard to reference data, as the powerful industry-wide knowledge Repository for financial services.

In the ISO 20022 Repository, references to the ISO/TC 68 standard(s) in which each Data record element is used should be referenced in a consistent identifiable manner.

### 2.6 Principles for promoting automation

- Identifier codes and their Data record elements should be represented in a way that can be consumed or accessed in an automated manner. This may include APIs, representation in models, such as:
  - Unified Modeling Language (UML) [https://www.uml.org](https://www.uml.org),
  - Resource Definition Framework (RDF) [https://www.w3.org/RDF/](https://www.w3.org/RDF/),
  - Web Ontology Language (OWL) [https://www.w3.org/OWL/](https://www.w3.org/OWL/),
  - Extensible Markup Language (XML) schema [https://www.w3.org/XML/](https://www.w3.org/XML/).

- The process and Algorithms for the assignment of Identifier codes of ISO/TC 68 reference data standards should leverage automated solutions. Assignment should be based on automated processes using the Technical format and Notations specified in the standard. Leveraging automated solutions will ensure automatic compliance with the principle for Identifier codes and Classification codes to be unique by ensuring that Identifier codes and Classification codes are not duplicated or re-issued.

- ISO standards for Check characters can be used to ensure the accuracy of the assignment of the Identifier codes. The Working Group has considered ISO/IEC 7064 (MOD 97-10) to determine an approved check digit method of ISO/IEC 7064 to be used (refer to Section 3.0 Specific Guidelines).

- Identity standards and systems, such as the Digital Object Identifier (DOI), ISO 26324, and the Handle System [http://www.handle.net](http://www.handle.net), also should be considered.
3 Specific Guidelines

3.1 Alphanumeric character guidelines

3.1.1 Principle: Nominal numbers as the canonical form of identifiers

When an identifier is specified, its canonical form should be a nominal number, with a mapping defined between the nominal number and any script used to represent it. This enables the identifier to appear encoded in short forms convenient for transcription, and in local scripts.

For example, many of the standards of TC 68 have defined alphanumeric forms using the Basic Latin alphabet and Western Arabic numerals. Some of the standards have already selected or defined checksum schemes, which specify a mapping to and from to nominal numerals, in order to calculate a number or character to confirm accuracy.

When an alphanumeric identification scheme does not specify a mapping to nominal numbers, a numeric base encoding scheme should be used.

Recommendation: Alphanumeric encodings for Basic Latin and Western Arabic

- When 32 hexadecimal characters and 4 hyphens is an acceptable length, use universally unique identifier (UUID) version 4 variant 1 for randomly assigned identifiers with a 122-bit range (https://www.itu.int/rec/T-REC-X.667-201210-I/en).

- When the range of nominal numbers is a binary power, use The Base16, Base32, and Base64 Data Encodings (ietf.org rfc4648).

- When all Basic Latin characters and Western Arabic numerals are desired:
  - Use Base 62 when the full range of both upper- and lower-case Basic Latin is used. A-Z, a-z, 0-9 ➞ 0-25, 26-51, 52-61. https://en.wikipedia.org/wiki/Base62
  - Use Base 36 when the full range of either upper- and lower-case Basic Latin is used, or the encoding is case insensitive. 0-9, A-Z or a-z ➞ 0-9, 11-35 https://en.wikipedia.org/wiki/Senary#Base_36_as_senary_compression

- To reduce transcription errors when identifiers are handwritten, use a base 32 code omitting O,I,Z and U. https://en.wikipedia.org/wiki/Alphanumeric

Example with UK IBANs:

The United Kingdom’s International Bank Account Number format specifies a checksum using a positional base 36 conversion of an alphanumeric identifier into a nominal number. e.g.

MIDL 400515 12345674 GB 00 ➞ 22181321 400515 12345674 1611 00
3.2 Guidelines for the Evaluation Process for Check Sums

First, a Working Group should consider if a check sum is needed for a particular standard. Second, depending on the nature and construction of the code, the Working Group should consider what is the appropriate check digit calculation for a code.

Finally, the Working Group should determine if there is an appropriate ISO standard for the appropriate check digit calculation. ISO 7064 could be used as a starting point as this standard contains calculations for both 1 and 2 decimal check digits.

3.3 Guidelines for ISO 8601 – Date and time format

3.3.1 General

TC 68 Standards should in any event require that data/time-related attributes be expressed in ways that are consistent with the ISO 8601 standard.

Dates and times should be represented in their “extended” formats as described in Clause 5 of ISO 8601-1. i.e., With “-“ and “:“ separators for the elements of date and time respectively.

3.3.2 Date

Dates should be expressed as described in Clause 5.2 of ISO 8601-1, as follows:

YYYY-MM-DD Example: 1985-04-12

Reduced precision dates may be expressed as follows:

YYYY-MM

YYYY

3.3.3 Time

Times should be expressed as described in Clause of ISO 8601-1, as follows:

hh:mm:ss Example: 23:20:30

Reduced precision times may be expressed as follows:

hh:mm

hh

Where there is a need to provide for a decimal fraction of the smallest unit, the period (‘.’) separator should be used, e.g.,:

hh:mm:ss.y Example: 23:20:30.123

(where ‘y’ represents a fixed or maximum number of decimals)
3.3.4 Date and time

Date and time as a single attribute should be expressed as described in Clause 5.4 of ISO 8601-1, as follows:

YYYY-MM-DDThh:mm:ss Example: 1985-04-12T23:20:30

The time prefix ‘T’ separates the date and time components while also ensuring a continuous string of characters.

Such representations may include reduced precision times as described in subsection 3.3.5.

3.3.5 Universal Coordinated Time (UTC) and local offsets

Any of the above representations may be supplemented as required, either with ‘Z’ to denote that the date/time is expressed in UTC or a time shift between the local time and UTC, as described in Clauses 5.3.3 and 5.3.4 of ISO 8601-1. If neither is added, the time would relate to the relevant local time zone.

For Example: 1985-04-12T23:20:20Z [UTC]
1985-04-12T23:20:20+4:00 [UTC + 4 hours]
1985-04-12T23:20:20 [local time]

3.4 ISO 8000-1 (Data Quality – Part 1: Overview) guidelines for code lists

Maintenance of code lists in Excel is not a best practice. For publication, multiple formats (in addition to Excel) could be rendered from code set registries – e.g., SDMX (can support hierarchical code lists), ISO 8000-1, SKOS, JSON LD, XBRL – to ensure machine readability and processing, including metadata, structured data quality provenance and versioning. Also, automatic alerts for changes to code lists should be available. Semantic shifts in the meaning of codes also should be tracked (in the case where the code remains the same but the meaning changes).

3.5 Guidelines for ISO/IEC 14957 Notation of format for data element values

The SBPAG is supportive of adding the equivalent codification represented by ISO/IEC 14957 of the notation that also is described in the standard. This could be the beginning of a section of equivalent representation of the notations in our standard as informative. Including this codification in our standards would aid machine readability, coding by developers and the ability to data mine.
3.6 Guidelines for ISO 11179 Metadata Registries (MDR) in regard to structure of metadata and metadata registries

The SBPAG thinks that ISO 11179 could help in modeling data elements/terms especially for ease of discovery of terms/data elements across standards. SC 9 WG 1 is evaluating use of ISO 11179 which will be the focus of Technical Reports. The SBPAG will rely on the outcome of this work since the technical expertise for this evaluation is present in WG1.

3.7 Use of dates in references to ISO standards guidelines provided by ISO Central Secretariat

Knowledge of and acceptance of ISO conventions for these references, when it is appropriate to append the date and when it is not.

Response from ISO CS:
ISO CS references to section ‘Cross-references to a numbered document’ from the House Style document

When referring to the whole document, use an undated document number unless it is necessary that the user refers to a specific edition”
   Example: “...in accordance with ISO 12345”

Use the order of “document number: date, element” when referring to a specific element:
   Examples:
   - “...in accordance with ISO 12345:2018, 4.3.9.”
   - “...in accordance with ISO/IEC TR 6789:2020, Table 3.”
   - “...in accordance with ISO 12345:2018/Amd.1:2019, Figure C.1.

3.8 Guidelines for ISO RFC 5141 Uniform Resource Names (URNs)

The SBPAG supports the proposed use of ISO URNs to identify uniquely items produced/registered by ISO Registration Authorities or ISO Maintenance Agencies and recommends use by ISO RAs and MAs.
3.9 Specific guidelines under consideration

3.9.1 ISO 11404 General – Purpose Datatypes (GPD)

Datatypes are the most fundamental units in the definitions of data structures and message components. Previously, datatypes in ISO 20022 were based on W3C recommendations in the XML Schema specification. The logic at the time was that XML and HTML were the encodings of the Internet. However, those encodings were never concise or efficient for computing. Now, there are efforts to encode ISO 220022 messages in JSON and other encodings. Ultimately, this will land on binary encodings that are the most efficient for computer-to-computer conversations.

We propose that ISO 11404 General-Purpose Datatypes offers the way forward. It provides a taxonomy of datatypes that are defined semantically by their value space, the domain of possible values for each type. Thus, their essence is independent of programming language or platform. For each type, a message encoding protocol maps a value space with a lexical space—the rules for how bytes are encoded on the wire. With this foundation, ISO 20022 messaging will be able to adapt to communication protocols of the future, e.g. JSON, while keeping back-compatibility with current encodings.

3.10 No specific guidelines made by the SBPAG

3.10.1 ISO/TC 154 standards in the area of machine readability

3.10.2 ISO 15000-5 Electronic Business Extensible Markup Language – Part 5

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algorithm</td>
<td>A set of rules that, if followed, will generate a prescribed result</td>
</tr>
<tr>
<td>Alphanumeric</td>
<td>Character set consisting of letters and digits</td>
</tr>
<tr>
<td>Identifier code</td>
<td>A code type that identifies an object</td>
</tr>
<tr>
<td>Cardinality</td>
<td>Indication of whether a reference data attribute is mandatory (shall be present in all cases), conditional (shall be present if applicable)</td>
</tr>
<tr>
<td>Check Character</td>
<td>Added alpha or numerical character which may be used to verify the accuracy of a standard code through a mathematical relationship to the characters contained in that code. If</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Classification Code</td>
<td>numeric only, can be referred to as a check digit.</td>
</tr>
<tr>
<td>Classification Scheme</td>
<td>A code type that classifies an object</td>
</tr>
<tr>
<td>Data record element</td>
<td>An item of data within a data set</td>
</tr>
<tr>
<td>Identification Scheme</td>
<td>Method by which an identifier code is assigned to an object</td>
</tr>
<tr>
<td>Notation</td>
<td>Symbol used to represent a type of character, e.g., alphanumeric, within a format of an identifier or classification code</td>
</tr>
<tr>
<td>RAND principle</td>
<td>Reasonable and Non-Discriminatory principle</td>
</tr>
<tr>
<td>Reference data attribute</td>
<td>Data needed to represent data record elements</td>
</tr>
<tr>
<td>Repository</td>
<td>The list of identifier or classification codes or values and their associated reference or descriptive data that should be published by the relevant Registration Authority or Maintenance Agency (or equivalent body in cases where the registration or maintenance activity is not carried out under contract to ISO)</td>
</tr>
<tr>
<td>SBPAG</td>
<td>Standards Best Practices Advisory Group ISO/TC 68/AG 3</td>
</tr>
<tr>
<td>Technical Format</td>
<td>The length and structure of an identification or classification code, or reference data attribute</td>
</tr>
</tbody>
</table>
4  Annex A - Version History
1.0 2023-11-22 Prepared for publication.
0.2 2023-04-28 Approved for publication by resolution 23/583 of TC 68.