
**Information technology — Business
Operational View —**

Part 10:

**IT-enabled coded domains as semantic
components in business transactions**

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Technologies de l'information — Vue opérationnelle d'affaires —

*Partie 10: Domaines codés activés comme composantes sémantiques
dans les transactions d'affaires*

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

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 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 or www.iec.ch/members_experts/refdocs).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC 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) or the IEC list of patent declarations received (see <http://patents.iec.ch>).

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. In the IEC, see www.iec.ch/understanding-standards.

~~The committee responsible for this~~ This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 32, *Data management and interchange*.

This second edition cancels and replaced the first edition (ISO/IEC 15944-10:2013), of which ~~has been technically revised~~ it constitutes a minor revision.

The ~~main changes to normative text compared to the previous editions~~ are as follows:

- ~~— Clause 1~~ (Scope) has been amended to move the detailed description of "Exclusions" and "Aspects not currently addressed" to a separate informative annex;
- ~~— Entries — entries~~ in Clause 2 and Clause 3 have been removed to be more conformant to ISO Directives;
- ~~— Definitions — definitions~~ in Clause 3 have been updated to be aligned with other referenced source definitions;
- ~~— Clauses — clauses~~ and annexes have been aligned to changes in ISO/IEC JTC 1 Directives, Part 2;

~~In addition, there are —~~ minor edits of a temporal nature with respect to dated references, changes in URLs referenced, minor edits, change of font to Cambria, as well as application of the new “ISO House Style”~~”~~, etc.

A list of all parts in the ISO/IEC 15944 series can be found on the ISO ~~website~~ and IEC ~~websites~~.

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~~ www.iso.org/members.html and www.iec.ch/national-committees.

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Introduction

0.1- Overview of purpose and nature of coded domains

Coded domains already exist in ISO/IEC 15944 series eBusiness standards, especially [Parts ISO/IEC 15944-1](#), [ISO/IEC 15944-2](#), [ISO/IEC 15944-5](#) and [ISO/IEC 15944-8](#). There are also widely used standards, specifications, authority files, etc., of a “codes representing X” nature used in business transactions involving the making of (legally-binding) commitments, based on common business practices, and doing so in an IT-enabled manner. The primary purpose of this document is to provide an integrated approach, methodology and tool in a single consolidated document the key concepts and their definitions as well as rules pertaining to coded domains.

This document supports all three strategic directions for standards development of ISO/IEC-JTC1: namely “portability”, “interoperability”, and “cultural adaptability”.

Within an Open-edi context (based on the ISO/IEC 14662 “Open-edi reference model”¹), business transactions are viewed from both a Business Operational View (BOV) and the Functional Services View (FSV). ISO/IEC 15944 focuses on the many requirements of the business operational view aspects of Open-edi in support of electronic business transactions. The primary aspect which distinguishes and differentiates “Open-edi” (and ISO/IEC 14662 Open-edi Reference Model compliant standards) is that they are developed to be able to support the making of commitments among autonomous parties. This requires that the set(s) of recorded (SRIs) information interchanged in the form of Information Bundles (IBs) as well as Semantic Components (SCs), which form part of an IB, are not only IT-enabled and IT-platform neutral. It is especially important that, where these semantics are captured, recorded, referenced and used via a specified coded domain, ~~that~~ these are communicated in a very precise and in an “unambiguous” manner, i.e., at the “level of certainty and explicitness required” to support the goal of the commitment exchange forming the goal of the business transaction.

In addition, the following Open-edi requirements need to be supported:

- a) need for unambiguity in commitment exchange applies especially to semantics of the data interchanged among the parties concerned;
- b) ensure as high a degree of data integrity of the semantics of the data interchanged;
- c) maximize an IT-enabled approach;
- d) maximize granularity and flexibility.

Given the fact that in Open-edi there are many differing internal and external constraints as well as the wide variety of applications and sectors, it is important that the recorded information interchanged among the parties concerned be as “granular” and precise as possible. Here “coded domains” serve as flexible “lego blocks” from which data values can be retrieved and used as unambiguous semantic components.

The concept of “coded domain” is unique in the context of an Open-edi approach and has been defined in an ISO/IEC 15944 context. This concept and its definition ~~represents~~[represent](#) an approach, methodology and tool which is needed to support appropriate level of unambiguity of (electronic) data

¹ ISO/IEC 14662(E/F) is an English/French, side-by-side, International Standard. Its 2010 3rd edition has become a stabilized standard and is now also an ISO/IEC declared “horizontal” standard, i.e., one serving as a base standard for those developing standards in the various fields of EDI, including eBusiness. The stabilized status of ISO/IEC 14662 was re-affirmed for another 10 years by ISO/IEC JTC1 in 2021. ISO/IEC 14662 has since its 1997 1st edition been an ISO/SO freely available standard. [See further <https://standards.iso.org/ittf/PubliclyAvailableStandards/index.html>]

interchange needed to support. The concept of “coded domain” covers several perspectives. For the definition, see entry “D033” in ISO/IEC 15944-7:2009 and ISO/IEC 15944-7:2009, 5.3.2.

- 1) Business and information (modelling) perspective, i.e., those of users and the BOVs;
- 2) IT modelling perspectives such as:
 - a) Entity-relationship modelling where a coded domain is viewed as an entity type functioning as a “domain”; and,
 - b) Object-oriented modelling where a coded domain is viewed as an “object class”.
- 3) An information science (information management, library, records management, etc.) perspective where coded domains are viewed as “schedules”, “authority files”, “tables” (which one at times “attaches” to a concept/term thesauri (or indexing/classification schemes of “instance relationships”;
- 4) An electronic data interchange perspective where coded domains are known as “code sets” i.e., a set of codes representing “xyz”. (pop-ups choices in a data entry module); and,
- 5) Application and implementation perspective (and physical data model) where coded domains are commonly known as (edi) tables (or reference tables).

The term “coded domain” is introduced to differentiate Open-edi, BOV and e-Business requirements from various other concepts and associated terms such as generic (encodable) value domains, “enumerated domains”, code sets, which appear to be similar in nature similar in nature in ISO standards. (See Annex C for more detailed information).

In addition, a key purpose of ~~Part 10~~[this document](#) is to ensure that at the granular level as much information is made available about a semantic component, at whatever level of granularity as is required to ensure unambiguity in a commitment exchange.

Another key purpose of this ~~Part 10~~[document](#) is to maximize the level of “intelligence” at the highest most precise level, i.e., that of the actual data values being interchanged. Here, use of coded domains presents a simple and pragmatic approach. No “expert system”, intelligent interface, use of heuristics, etc., can metamorphose “dumb” fuzzy data into unambiguous data values which are precise enough to be able to serve as EDI IBs or SCs in support of the making of commitments as actualized in a instantiated business transaction. On the other hand, “smart data” within an intelligent structure, i.e., as part of a coded domain, can not only stand on its own but also be much simpler, precise, easier to reference and use.

This approach at the data element level focuses on the development of intelligently coded data elements as part of coded domains. This involves rule-based, structured and pre-defined values whose purpose and use has been stated clearly and unambiguously (hereby facilitating an IT-enabled approach).

0.2- Benefits of the use of coded domains

The benefits of using the construct, methodology and implementation of “coded domains”, in compliance with this ~~Part 10~~[document](#), presented below include (in no order of importance):

- Maximizing1) maximizing if not ensuring unambiguity in semantics among parties to a commitment exchange instantiated as a business transaction;

~~Ensuring~~²⁾ ensuring ability to support Human Interface Equivalencies (HIEs) in support of ~~multilingual~~^{multilingualism} and individual accessibility requirements;

~~Maximize~~³⁾ maximize a ~~Total Quality Management~~^{total quality management} (TQM) approach for data integrity control and trustworthiness and quality assurance;

~~Maximize~~⁴⁾ maximize exchange ability of data among Persons and their applications through computer-to-computer electronic data interchange (EDI) among the IT-systems of the parties involved;

~~Serve~~⁵⁾ serve as a methodology and tool which ~~hits~~^{is} IT-neutral, i.e., ~~Part-ISO/IEC 15944-10~~^{ISO/IEC 15944-10} conformant “coded domains” are completely independent of application software and IT-platforms used;

~~Minimization~~⁶⁾ minimization of data entry costs and simplification data entry processes;

~~Enables~~⁷⁾ enables more efficient and effective search, retrieval and use of recorded information (in multiple languages);

~~Significant~~⁸⁾ significant minimization in costs and duplication of effort due to the inherent shareable nature of coded domains;

~~Increased~~⁹⁾ increased efficiencies and cost reductions in both the internal operations of organizations and public administrations as well as among them via EDI;

~~Promotes~~¹⁰⁾ promotes modularity, re-usability of shared solutions supporting both paperless environments;

~~Increased~~¹¹⁾ increased productivity, through reduction of common (non-competitive) costs at organizations and public administrations as well as at the jurisdictional domain level; and,

~~Serve~~¹²⁾ serve as a methodology in support of the development of consensus building with respect to the development of permitted values of a data element in support of the use of a semantic component in (electronic) data interchange (based on the Pareto principle²⁾).

0.3- Identification, mapping and IT-enablement of existing standards for widely-used code sets

A coded domain consists of entries of “entities” which the responsible Source Authority (SA) has decided to include into its “Set of codes representing X” for the specified and particular purpose for which this SA has decided to establish and maintain the resulting “set of codes representing X” to be

²— This document, which focuses on the more primitive aspects of “coded domain”, also applies the “Pareto Principle” Also ~~known~~^{known} as the “80-20 rule”, or the “law of the vital few”, it states that in many cases 80_% of the effects come from 20_% of the causes. In this context, the concepts and definitions as well as the rules and guidelines presented in this document can be viewed to be the 20_% which covers 80_% of the common user requirements.

used by its members. However, it is recognized that many “Persons” of ~~whatever~~^{different} nature, i.e., either as an “organization” and/or “public administration”, and at times, “individuals” as well use a “Set of codes representing X” for a purpose and in a context which is quite different from that of the purpose and use of the Source Authority which created and maintains that “Set of Codes representing X”.

Two primary examples here are ISO 3166-1 ~~& and~~ ^{ISO 3166-2} and ISO 4217 which from an “object class” methodology perspective contain several distinct object classes (see the ISO/IEC definition for “object class” from ISO/IEC 11179-1:2004~~2023~~, 3.31 (as referenced as entry “D147” in ISO/IEC 15944-7 and so used in all Partsparts of the ISO/IEC 15944 series where applicable including in this document as found in Clause 3.9894). Annex H provides further information on these two examples via the use of a “semantic qualifier”.

In this document, there is frequent use of the phrase “set of codes representing X”. This is because there are many existing and widely used sets of codes which need to be converted into “coded domains” from an Open-edi, eBusiness, commitment exchange, etc., user perspective.

In an Open-edi and/or eBusiness context of the use of an actual values of SRIs, i.e. as instantiations, - that are intended to be used as “coded domains”, are already widely used in existing ISO, IEC, and ITU standards in the form of a “codes representing X” nature, as well as those found in specifications of differing industry sectors. These standards are managed and maintained by recognized authorities and implemented in business practices. From an Open-edi and generic commitment exchange perspective in general as well as that of eBusiness requirements in particular, Open-edi standards support their use and implementation in an IT-enabled form.

As illustrated in Figure 1, the standard for the IT-enablement of the widely used “codes representing X” standards is needed to provide guidance for the transformation and achieve consistency among applications of different standards. Requirements need to be specified for the coded domain, including identification, mapping to existing codes, as well as cultural adaptability features. In this document, these specifications are based on explicitly stated rules and scope of coded domains, rules and guidelines for the construct and characteristics of coded domain and its member codes, especially from the semantic perspectives, to support commitment exchanges of Open-edi.

It is a general rule and practice in ISO/IEC 15944 standards series development that one maximizes the use of Formal Description Techniques (FDTs). The rules and guidelines along with associated definitions of concepts is an approach of using a lexical model as the formal approach to specify requirements from a business operational view (BOV) perspective. The FDTs can also be used to produce the formal models or to describe the rule-base for coded domain, which in turn become a integrate part of coded domains.

This document also specifies that Open-edi coded domains need to be registered as such in compliance with ISO/IEC 15944-2:2015 requirement. (See further Clause 11)).