

ISO/IEC JTC 1/SC 32 N 0930

Date: 2003-01-13

REPLACES: --

<p style="text-align: center;">ISO/IEC JTC 1/SC 32</p> <p style="text-align: center;">Data Management and Interchange</p> <p style="text-align: center;">Secretariat: United States of America (ANSI)</p> <p style="text-align: center;">Administered by Pacific Northwest National Laboratory on behalf of ANSI</p>
--

DOCUMENT TYPE	Other document (Open)
TITLE	What is a "Coded Domain"?
SOURCE	Dr. Jake V.Th. Knoppers (Canada) Tel: +1-613-234-3244; E-mail: <mpereira@istar.ca>; David Clemis (Canada) Tel: +1-613-946-1279; E-mail: <clemis.david@ic.gc.ca>
PROJECT NUMBER	1.32.18.01.00.00
STATUS	Revised Expert Contribution to Standards Development Work of ISO/IEC JTC1/SC32/WG1 on ISO/IEC CD 15944-2, and joint SC32/WG1 and SC32/WG2 Development Work on ISO/IEC 2nd WD 18022.
REFERENCES	
ACTION ID.	FYI
REQUESTED ACTION	
DUE DATE	
Number of Pages	46
LANGUAGE USED	English
DISTRIBUTION	P & L Members SC Chair WG Conveners and Secretaries

Douglas Mann, Secretariat, ISO/IEC JTC 1/SC 32

Pacific Northwest National Laboratory *, 13600 Angelica Court, Chantilly, VA, 20151-3360,
United States of America

Telephone: +1 202-566-2126; Facsimile: +1 202-566-1639; E-mail: MannD@battelle.org
available from the JTC 1/SC 32 WebSite <http://www.jtc1sc32.org/>

*Pacific Northwest National Laboratory (PNL) administers the ISO/IEC JTC 1/SC 32 Secretariat on behalf of ANSI

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
<i>Introductory Notes</i>	<i>ii</i>
1.0 PURPOSE	1
2.0 NEED/CONTEXT	3
2.1 Overview - Business Transaction Context	3
2.2 Business Transaction Perspective: Predefined and Structured Data Elements	5
2.3 SC32/WG2 - Metadata Context	7
2.4 SC32/WG1 - "Jurisdictional Domain" Context	10
3.0 APPROACH AND SOLUTION TO "CODE" AND "CODED DOMAIN: RULE-BASED	11
3.1 Overview	12
3.2 What is a "Code"?	12
3.3 What is a "Coded Domain"?	16
4.0 SUMMARY ANALYSIS OF EXISTING USES AND MEANINGS OF "DOMAIN" AS WELL AS "DOMAIN" AS PART OF COMPOUND TERMS	23
4.1 Introduction	23
4.2 Summary Results	24
ANNEXES	
Annex A - Dictionary Definitions	27
Annex B - International Standard Definitions	31
Annex C - User View - Canadian Federal Government	36
Annex D - User View - Canadian Province: Quebec	39
Annex E - ISO/IEC FPDTR 20943-3:200x (E) Information Technology - Procedures for achieving metadata registry content consistency - Part 3: Value domains	40

1.0 Introductory Notes

1.1 Purpose

In summary, the purpose of this contribution is five-fold:

- *to present the results of detailed analysis undertaken on the questions "What is a "Code"?", and "What is a "Domain"?" in order to develop a working definition for "coded domain" and associated terms and definitions as part of development work on ISO/IEC 18022;*
- *to serve as a bridge between: (a) SC32/WG1 work and need for this standard in the context of Open-edi (and business transactions); and, (b) SC32/WG1 work on metadata (and value domains);*
- *to provide the background to and need for some key new terms and definitions being introduced in ISO/IEC 18022;*

[Note: ISO/IEC 18022 and ISO/IEC 18038 are being developed in parallel and involve the same Project Editors. Consequently, relevant terms and definitions from ISO/IEC 18038 are also presented].

- *to solicit feedback and comments from SC32/WG1 and SC32/WG2 members as part of the activities of the co-Project Editors in developing a 2nd WD of ISO/IEC 18022 for review and discussion at the January, 2003 Santa Fé meeting of these two WGs. The objective is to promote this 2nd WD document (as amended) to the CD ballot stage following the Santa Fé, NM (USA) Plenary Meeting; and,*
- *to serve as a reference document to the development of new ISO/IEC 18022 "IT-enablement for Widely Used Coded Domains".*

A much shorter version of this contribution, amended as required based on comments received, may serve as an informative annex to ISO/IEC 18022.

1.2 List of Key New Terms and Definitions

1.2.1 ISO/IEC 18022

The following new terms and definitions are being introduced in ISO/IEC 18022. The following is a list of key terms in alphabetical order. In Chapter 3.2 and 3.3 below the definitions for these terms are provided.

- *code (in coded domain)*
- *code set*
- *coded domain*

- *pivot code*

1.2.2 *ISO/IEC 18038 (to become ISO/IEC 15944-5)*

New terms and definitions are also being introduced as part of new ISO/IEC 18038 (to become ISO/IEC 15944-5). A number of these are utilized in ISO/IEC 18022. The following is a list of these key terms in alphabetical order. In Chapter 2.4 and 3.3 below, the definitions for these terms are provided.

- *IT-enablement (+ 15944-2)*
- *jurisdictional domain*
- *multilingualism*
- *rule*
- *rulebase*
- *Source Authority.*

1.3 *Need for a Harmonized Approach*

1.3.1 *Overview*

In this section, we summarize the need for a harmonized approach at different levels within JTC1/SC32.

1.3.2 *"Coded Domains" (ISO/IEC 18022) and "Jurisdictional Domains" (ISO/IEC 18038)*

Both ISO/IEC 18022 and ISO/IEC 18038 were identified as high priority new work items in support of e-commerce. A harmonized approach among both is needed. They address separate aspects of e-business standardization needs but these standards to be able to interoperate seamlessly not only from a "metadata" perspective but even more so from an "Open-edi" (and business transaction) perspective. Both standards in turn need to be harmonized with the standards and work of SC32/WG1 and SC32/WG2.

1.3.3 *Harmonizing ISO/IEC 18022 with SC32/WG1 Work*

This expert contribution arose from Canadian work in preparing ballot comments on the CD 15944-2. Preparation of these CD ballot comments coincide with development work on ISO/IEC 18022 and ISO/IEC 18038.

This expert contribution replaces the working draft of SC32/WG1 N0237 (2002-09-24) which should no longer be referenced. At the 30 September - 4 October, 2002 Ottawa Plenary Meeting of SC32/WG1, this earlier draft was discussed and comments received. These comments have been incorporated into this version.

The SC32/WG1 Resolutions resulting from the Ottawa Plenary Meeting contain two relevant to ISO/IEC 18022 standards development; namely:

Resolution WG 1 / 21: Request for Comments on SC32/WG1 N0237 draft contribution “What is a Coded Domain”

SC32/WG1 appreciates the draft contribution of the Project Editors of WG1 N0237 title “What is a Coded Domain?” SC32/WG1 requests that its members provide comments on this draft to the Project Editors by 18 October 2002. SC32/WG1 requests the Project Editors incorporate these comments and the results of the discussions at the Ottawa meeting into a final version for wider distribution including SC32/WG2.

Resolution WG 1 / 22: Development of 2nd WD of ISO/IEC 18022 “IT-Enablement of Widely-Used Coded Domains”

SC32/WG1 requests the Project Editors incorporate into the development of the 2nd WD of ISO/IEC 18022, the revised SC32/WG1 N0237 document, ISO/IEC 15944-1 and CD ISO/IEC 15944-2 document including resolution of ballot comments. SC32/WG1 looks forward to reviewing this 2nd WD with the objective of promoting it to CD ballot stage following the SC32 Santa Fe (USA) Plenary Meeting, January 2002.

1.3.4 Harmonizing ISO/IEC 18022 Work with SC32/WG2 Work

SC32/WG2 - Metadata has the ISO/IEC 11179 series of standards which now focus on Metadata Registries (MDR). Here “Part 3 - Registry Metamodel and Basic Attributes” has been issued for FDIS ballot. A key concept in metadata is “Value Domain” defined as “as set of permissible values”. In addition, SC32/WG2 recently issued ISO/IEC FPDTR 20943-3:200x (E) Information Technology - Procedures for achieving metadata registry content consistency - Part 3: Value domains, for FCD ballot. [Ref. 32N0870].

1.4 Need to Support Commitment Exchange in Addition to Information Exchange

In standards development work of ISO/IEC 18022 “IT-enablement of Widely Used Coded Domains” which is a SC32/WG2 project, but in close liaison with SC32/WG1, the Project Editors have had difficulty in getting SC32/WG2 metadata experts to realize that “value domain” from a metadata and information exchange perspective is quite different from the use of sets of codes as “coded domains” for use in commitment exchange in business transactions. A key element and objective here is that a “coded domain” can link/map a directly to a “semantic component”, an “information bundle”, a “role”, and/or a “scenario attribute” in the ISO/IEC 15944 series of standards on business agreement semantic descriptive techniques.

As this contribution demonstrates, “coded domain” is a concept/term/definition unique to the context and needs of Open-edi (and business transactions). From a SC32/WG2 11179

*perspective any "coded domain" contains at least one set of codes which can be viewed as an "enumerated value domain". **However, the reverse is not true.***

This contribution attempts to address these gaps, build a bridge between SC32/WG1 Open-edi, (business transaction focused) standardization work, and SC32/WG2 - Metadata, standardization work.

It is very likely that the "value domain" concept and the "coded domain" concept are very complementary. They just have two different approaches. Value domain can be considered a "metadata" based bottom-up approach, with the "domain" consisting of, i.e., being, the sum of its parts, i.e., list of permitted values.

Coded domain can be considered an "Open-edi"-based top-down approach where the rules of a Source Authority determine which entities can be/are members of the coded domain, i.e., list of member entities identified through their identifiers which also serve as a set of codes.

1.5 Appreciation

The co-project Editors appreciate the inputs and critiques received from Doug Mann, Ray Gates, and M. Janice Pereira on earlier drafts of this contribution. Most likely more will follow.

1.0 PURPOSE

The purpose of this contribution is to:

- assist those working in the area of metadata, primarily SC32/WG2, to understand how the concept/term/definition of "coded domain" relates to the "value domain" concept of ISO/IEC FDIS 11179-3:2002 (3.3.137) but is significantly different from it;
- address the issues of "What is a "code"?" and "What is a "Domain"?" and bring forward the results of this investigation. Then use the results to answer the question "What is a Coded Domain"?
- use the resulting definition for the concept/term "coded domain" (and related terms/definitions) consistently in: (1) the joint SC32/WG1 and SC32/WG2 work on the ISO/IEC 18022 standard; and, (2) all SC32/WG1 standardization work particularly in the ISO/IEC 15944 multipart standard and the ISO/IEC 18038; and,
- bring forward in a single paper relevant parts of existing ISO/IEC 14662, and ISO/IEC 15944-1 standards as well as development work in support of ISO/IEC 15944-2, 15944-4, and ISO/IEC 18038 pertaining to "coded domain".

In summary, "domain" by itself as a term has basically two broad meanings:

- (1) one as a sphere of activity, of thought, that is of a conceptual perspective (with "concept" as a "unit of thought");
- (2) one as that of govern, control, etc., that is rule-based and under the control of its owner.

On the whole, SC32/WG2 standardization work utilizes the "conceptual" perspective of "domain" and "SC32/WG1 standardization work utilizes the "rule-based/govern" perspective of "domain". In this "coded domain" standard, the focus is on open electronic data interchange (Open-edi), commitment exchange and a Source Authority which establishes a set of identifiers for the members of its domain.

These "identifiers" for entities as members of a rule-based/govern domain, i.e., a "coded domain", are commonly known and referred to as "code sets".

In the SC32/WG2 Metadata Registry work, the focus and link is that to value domains and more specifically that of enumerated value domains.

From a "metadata" and "information exchange" perspective, a set of codes forming part of a coded domain can be viewed simply as a value domain which is enumerated, i.e., as an "enumerated value domain". However, from an "Open-edi" business transaction standardization perspective there is a requirement for more precise and unambiguous semantics as required to support "automated" decision-making (including legal requirement), i.e., as "semantic

components" forming part of the "information bundles" interchanged as "business objects", among autonomous parties engaged in Open-edi. An ISO/IEC 18022-based IT-enabled "coded domain" will have these properties and behaviours based on the same set of rules.

Notes to Readers of this Document:

- (1) *This contribution, in revised and shortened form, will likely serve as an Informative Annex to ISO/IEC 18022, i.e., of the nature of Annex C "Unambiguous identification of entities in (electronic) business transactions" as found in ISO/IEC 15944-1:2002.*

- (2) *It is assumed that those reading this document will have familiarized themselves with the contents of the document JTC1/SC32 N0695 ISO/IEC WD 18022:200x IT-Enablement for Widely-Used Coded Domains. If not, please do so in order to understand this paper.*

- (3) *Readers of this document will also benefit from familiarizing themselves with*
 - *ISO/IEC 14662:1997 (E/F) Information technology - Open-edi Reference Model/Technologies de l'information - Modèle de référence EDI-ouvert.*

This standard is freely available via the ISO/IEC JTC1 website <www.jtc1.org>
 - *ISO/IEC FDIS 15944-1:2002 Information Technology - Business Agreement Semantic Descriptive Techniques - Part 1: Operational Aspects of Open-edi for Implementation.*

The FDIS version of this standard is available as SC32 document 32 N0740. This FDIS ballot received 100% approval of P-members voting. This standard will also be made freely available.
 - *ISO/IEC FDIS 11179-3:200x Information Technology Metadata Registries (MDR) - Part 3: Registry Metamodel and basic attributes.*

This standard will also be made freely available;
 - *ISO/IEC FPDTR 20943:3:2002 (E) Information Technology - Procedures for achieving Metadata Registry Content consistency - Part 3: Value Domains. {See further Annex E below}.*

2.0 NEED/CONTEXT

2.1 OVERVIEW - BUSINESS TRANSACTION CONTEXT

The primary driving force behind the ISO/IEC 18022 standards development work is "e-commerce", i.e., (electronic) business transactions¹.

Business transactions are rule-based and make extensive use of codes, often through tables, representing sets of predefined possible choices to common aspects of business transactions. A business transaction involves two or more autonomous parties who as Persons² engage in making "commitments"³.

¹For the standardization perspective on what is "e-commerce", "e-business", "e-government", etc., see Clause 0.3 "Business Operational View (BOV), Open-edi and e-Commerce, e-Business, etc., in ISO/IEC FDIS 15944-1:2002 *Information Technology - Business Agreement Semantic Descriptive Techniques - Part 1: Operational Aspects of Open-edi for Implementation*.

²**Person:** an entity, i.e., a natural or legal person, recognized by law as having legal rights and duties, able to make commitment(s), assume and fulfil resulting obligation(s), and able of being held accountable for its action(s).

NOTE 1 Synonyms for "legal person" include "artificial person", "body corporate", etc., depending on the terminology used in competent jurisdictions.

NOTE 2 Person is capitalized to indicate that it is being utilized as formally defined in the standards and to differentiate it from its day-to-day use.

NOTE 3 Minimum and common external constraints applicable to a business transaction often require one to differentiate among three common subtypes of Person, namely "individual", "organization", and "public administration".

Personne: entité, c-à-d. une personne physique ou morale, reconnue par la loi comme ayant des droits et des devoirs, capable de faire des engagements, d'assumer et de remplir les obligations résultantes, et capable d'être tenue responsable de ses actions.

NOTE 1 Parmi les synonymes de «personne morale», on trouve «personne juridique», «personne fictive», «corporation», etc., selon la terminologie utilisée par les juridictions compétentes.

NOTE 2 « Personne » prend la majuscule pour indiquer que ce terme est utilisé tel que défini officiellement dans les normes et par le différencier de son usage ordinaire.

NOTE 3 Les exigences minima et communes applicables aux transactions d'affaires obligent souvent à faire une différence entre les trois sous-catégories communes de « Personne », notamment « individu », « organisation », « administration publique ».

[ISO/IEC FDIS 15944-1:2002 (3.47)]

³**commitment:** the making or accepting of a right, obligation, liability or responsibility by a Person that is capable of enforcement in the jurisdiction in which the commitment is made.

engagement: création ou acceptation d'un droit, d'une obligation, d'une dette ou d'une responsabilité par une Personne qui est apte à appliquer la juridiction conformément à laquelle l'engagement est pris.

[ISO/IEC FDIS 15944-1:2002 (3.9)]

The source, rationale and business case for the need for a new standard on "coded domains", i.e., ISO/IEC 18022, is found in the identification of high priority standardization work items of the Report of the ISO/IEC JTC1 Business Team on Electronic Commerce {See ISO/IEC JTC1 N 5296} and the resulting NWI (New Work Item) proposal which was accepted. {See ISO/IEC JTC1 N 5847}.

The original title of ISO/IEC 18022 as found in the ISO/IEC JTC1 approved NWI {See JTC1 N 5847} was "*Identification, Mapping and IT-enablement of Existing Standards for Widely Used Encodable Value Domains*". The title has now been amended and shortened to become "*IT-enablement for Widely Used Coded Domains*". The multipart "e-business" standard ISO/IEC 15944 is already incorporating the coded domain approach in development of ISO/IEC 15944-2. {See the CD Ballot document JTC1/SC32 N847}.

A key characteristic of a business transaction is that it adds commitment exchange to information exchange.⁴ Business transactions involve commitment exchange among autonomous parties involving acceptance of rights and obligations, liability, responsibilities, etc., enacted or invoked via a "Decision Making Application (DMA)"⁵ of the Persons involved, i.e., via their IT systems. It is, therefore, vital that all parties concerned have a common and unambiguous⁶ understanding of the meaning and decision making impact of the semantic components⁷ interchanged, as part of the information bundles⁸ comprising a business transaction, i.e., they must have semantic interoperability.

⁴See further Clause 6.1.3 "Business Transaction: Commitment Exchange added to Information Exchange" in ISO/IEC FDIS 15944-1:2002 *Information Technology - Business Agreement Semantic Descriptive Techniques - Part 1: Operational Aspects of Open-edi for Implementation* (pp. 16-20).

⁵**Decision Making Application (DMA):** the model of that part of an Open-edi system that makes decisions corresponding to the role(s) that the Open-edi Party plays, as well as originating, receiving and managing data values contained in instantiated information bundles, which is not required to be visible to the other Open-edi Party(ies).

Application à pouvoir de décision: modèle de la partie d'un système d'EDI-ouvert qui prend les décisions correspondant au rôle ou aux rôles que joue le partenaire d'EDI-ouvert; elle est aussi source, récepteur et gestionnaire des valeurs des données contenues dans les instances de faisceaux d'informations; elle n'a pas à être rendue visible au(x) autre(s) partenaire(s) d'EDI-ouvert.

[ISO/IEC 14662:2002 N0830 (4.2.1)]

⁶**unambiguous:** the level of certainty and explicitness required in the completeness of the semantics of the recorded information interchanged appropriate to the goal of a business transaction.

non-ambigu: niveau de certitude et d'explicité exigé dans la complétude de la sémantique d'une information enregistrée et échangée dans le but d'une transaction d'affaires.

[ISO/IEC FDIS 15944-1:2002 (3.66)]

⁷**Semantic Component (SC):** a unit of recorded information unambiguously defined in the context of the business goal of the business transaction.

2.2 BUSINESS TRANSACTION PERSPECTIVE: PREDEFINED AND STRUCTURED DATA ELEMENTS

The Business Transaction Model has three components; namely: "Persons", "process", and "data" and requires all three. {See Clause 6.1.5, ISO/IEC 15944-1}. "Coded domains" therefore apply to "Persons", (e.g., with respect to "roles"), and to business "processes" as well as "data"⁹. Data element is defined in ISO/IEC FDIS 11179-3:200x as:

***data element:** a unit of data for which the definition, identification, representation and permissible values are specified by means of a set of attributes.*

From a business transaction perspective, the focus is on those data elements which are structured and where the content of the values are predefined¹⁰. {See Clause 6.4.2 ISO/IEC 15944-1}. Quoting Rule 48 and accompanying Guidelines from ISO/IEC 15944-1:2002:

Start of quoted text: -----

Rule 48:

A SC may be atomic or composed of other SCs.

Composant sémantique (SC): unité d'information enregistrée définie de manière non ambiguë dans le contexte de l'objectif d'affaires de la transaction d'affaires.

Un SC peut être atomique ou composé d'autres SC.

[ISO/IEC 14662:2002 N0830 (4.1.2.2)]

⁸**Information Bundle (IB):** the formal description of the semantics of the information to be exchanged by Open-edi Parties playing roles in an Open-edi scenario.

Faisceau d'informations: description formelle de la valeur sémantique des informations échangées entre partenaires d'EDI-ouvert jouant un rôle dans un scénario d'EDI-ouvert.

[ISO/IEC 14662:2002 N0830 (4.1.2.2)]

⁹Here from a "data" component perspective the focus is on data elements.

¹⁰In addition, in order to ensure semantic interoperability of data elements with predefined contents, i.e., as semantic components, it is important to ensure that such semantic components are unambiguously identified.

Standards development work in support of electronic business transactions shall incorporate and support data granularity requirements. The level of granularity reflects the degree of detail appropriate to the level of certainty required in the data being interchanged among the parties participating in a business transaction.

Guideline 48G1:

The greater the degree to which data is structured and predefined, i.e., is "data-element-based", the less ambiguity and the higher the degree of cost-effectiveness and efficiencies in the utilization of information technologies in support of Open-edi.

Guideline 48G2:

The degree to which "ambiguity" in (electronic) business transactions can be minimized is directly related to the ability to reuse scenario components reliably, thus realizing the opportunities in and potential of Open-edi as well as its widespread adoption and use in various application areas, (e.g., e-commerce, e-administration, e-government, e-business, e-logistics, etc.).

Guideline 48G3:

With respect to Open-edi standards development pertaining to the data component, the priority is be placed on data which is of the nature of data elements and within this context, data elements which are (or should be) predefined and structured.

Data of this nature already exists and is used extensively in business transactions world-wide and they are commonly known as "code sets".

End of quoted text.

From a metadata perspective most of these sets of codes are simply "enumerated value domains" in that these are viewed as sets of permissible values, i.e., as "lists". However, in many cases, the codes in such a list represent entities whose properties and behaviours are not the same, do not follow or are part of the same set of rules, as those of other entities represented on the list, etc. Consequently, such sets of permissible values cannot be utilized as is in Open-edi business transactions.

For example, near 25% of the "codes" (as permissible values) in the ISO 3166-1 "Country Code" set pertain to entities which are not countries. Similarly, in the ISO 4217 "Currency Code" set are found "codes" as permissible values, which pertain to entities which are not currencies.

Many other code sets of a "Codes Representing X" nature which are widely used have similar characteristics. This means that currently they cannot be utilized "as is" as re-usable "business objects" in support of IT-enabled commitment exchange, "automated" and decision-making while

ensuring semantic interoperability among the IT systems of the autonomous parties in electronic business transactions.

In summary, the purpose of ISO/IEC 18022 is to serve as a methodology and tool for the IT-enablement of widely used standards and specifications of a "codes representing "X" nature (and new ones as well), resulting from common business practices which (1) are rule-based; (2) have a Source Authority; and, (3) are utilized in support of commitment exchange among Persons engaged in electronic business transactions through their IT systems, i.e., as a "coded domain". {See further forthcoming 2nd WD for ISO/IEC 18022}

2.3 SC32/WG2 - METADATA CONTEXT

SC32/WG2 standards are undergoing a major revision. The first and lead result of this work is ISO/IEC FDIS 11179-3:200x (E) *Information technology - Metadata Registries (MDR) - Part 3: Registry Metamodel and basic attributes*. This standard provides the following relevant terms/definitions of "value domain" in the context of "metadata":

Value Domain:

a set of **Permissible Values**.

NOTE 1 Metamodel construct is Class.

NOTE 2 The Value Domain provides representation, but has no implication as to what Data Element Concept the Values may be associated with nor what the Values mean.

NOTE 3 The Permissible Values may either be enumerated or expressed via a description.

[ISO/IEC FDIS 11179-3:200x (3.3.137)]

Permissible Value:

an expression of a **Value Meaning** in a specific **Value Domain**.

[ISO/IEC FDIS 11179-3:200x (3.3.99)]

value meaning:

the meaning or semantic content of a **value**.

[ISO/IEC FDIS 11179-3:200x (3.3.145)]

value:

a data value.

[ISO/IEC FDIS 11179-3:200x (3.3.134)]

From a "meta" perspective and in support of information exchange, a **"value domain"** is **basically any set of permissible values**. It is either enumerated, i.e., as a list of data values, or non-enumerated, i.e., expressed via a description.

Enumerated Value Domain:

a **Value Domain** that is specified by a list of all its **Value Meanings**.

NOTE 1 Metamodel construct is Class.

[ISO/IEC FDIS 11179-3:200x (3.3.72)]

Non-enumerated Value Domain:

a **Value Domain** that is specified by a description rather than a list of all **Permissible Values**.

[ISO/IEC FDIS 11179-3:200x (3.3.86)]

non-enumerated value domain description:

a description or specification of a rule, reference, or range for a set of all **Permissible Values** for the **Value Domain**.

NOTE Metamodel construct is Attribute of Non-enumerated Value Domain.

[ISO/IEC FDIS 11179-3:200x (3.3.87)]

In addition, in the Registry Metamodel there are also found the terms/definitions for "Conceptual Domain", "Enumerated Conceptual Domain", and "non-enumerated conceptual domain description".

Conceptual Domain:

a set of valid **Value Meanings**.

NOTE 1 Metamodel construct is Class

NOTE 2 The Value Meanings may either be enumerated or expressed via a descriptions.

[ISO/IEC FDIS 11179-3:200x (3.3.21)]

Enumerated Conceptual Domain:

a **Conceptual Domain** that is specified by a list of **Value Meanings**.

[ISO/IEC FDIS 11179-3:200x (3.3.71)]

Non-enumerated Conceptual Domain:

a **Conceptual Domain** that is not specified by a list of all valid **Value Meanings**.

NOTE Metamodel construct is Class.

[ISO/IEC FDIS 11179-3:200x (3.3.84)]

non-enumerated conceptual domain description:

a description or specification of a rule, reference, or range for a set of all **Value Meanings** for the **Conceptual Domain**.

NOTE Metamodel construct is Attribute of Non-enumerated Conceptual Domain.

[ISO/IEC FDIS 11179-3:200x (3.3.85)]

[Note: ISO/IEC JTC1/SC32 has also launched a FCD ballot for *"ISO/IEC FPDTR 230943-3:200x (E) Information technology - Procedures for achieving metadata registry content consistency - Part 3: Value domains"*. Annex E to this contribution utilizes this FPDTR document to highlight similarities and differences between "value domains" and "coded domains"].

However, from an Open-edi (and business transaction) requirements perspective, the following types of questions remain unanswered.

- Who decides what is a "permissible" value?;
- What rules apply to be able to determine whether a data value is permissible or not?
- Who controls the "domain"?, etc.
- What are the impacts of the use of these lists of data values as sets of codes on "(automated)" decision-making?, etc. when interchanged among autonomous parties in support of commitment exchange?
- Who decides and on what basis, i.e., set of rules and process, (1) whether or not an entity became (can become) a member of a coded domain; and, (2) assigns an ID, i.e., in the form of "code" to that entity now as member of a coded domain?
- Other Issues?

The ISO/IEC 18022 standardization project addresses these and related issues and does so from an Open-edi requirements, i.e., e-business, perspective while utilizing applicable elements of metadata standardization work.

2.4 SC32/WG1 - "JURISDICTIONAL DOMAINS" CONTEXT

Chapter 4 below analyses existing uses and meanings of "domain" as well as use of "domain" as part of a compound term.

Standards development work in support of ISO/IEC 18038 "Identification and Mapping of Various Categories of Jurisdictional Domains" focuses on another type of domain.

Here the focus is on one or more jurisdictions forming a "domain" of a govern/control nature which in turn serves as a source for external constraints on business transactions. Jurisdictional domains are a primary source of external constraints on a business transaction and as such serve as a Source Authority(ies) for such sets of external constraints. Further, jurisdictional domains are also often the Source Authority for "coded domains" especially where these are used as part of the specification of an external constraint.

In this "jurisdictional domain" standard, the term " domain" is utilized in a manner very much as that for "coded domain", i.e., that of governing, control, rulebase, etc. Here a "jurisdiction" being the Source Authority, the entity establishing and maintaining the rule-base(s), etc.

The working definition in ISO/IEC 2nd WD 18038 for jurisdictional domain is:

jurisdictional domain:

a distinct legal and/or regulatory framework which is a source of **external constraints** on **Persons**, their behaviour and the making of **commitments** among **Persons** including any aspect of a **business transaction**.

NOTE 1 The pivot jurisdiction is a United Nations (UN) recognized (or candidate) member state. Each UN member state, (a.k.a. country) may have sub-administrative divisions as recognized jurisdictions, (e.g., provinces, territories, cantons, länder, etc.), as decided by that state.

NOTE 2 Several levels and categories of jurisdictional domains may exist within a jurisdictional domain.

NOTE 3 Jurisdictional domains can combine to form new jurisdictional domains, (e.g., through bilateral, multilateral and/or international agreements).

EXAMPLE Included here, for example, are the European Union (EU), NAFTA, WTO, WCO, ICAO, WHO, Red Cross, the ISO, the IEC, the ITU, etc.

NOTE 4 Aspects of business transaction includes the making, selling, transfer of goods, services and/or rights (and resulting liabilities) and associated information. This is independent of whether such interchange of commitments are conducted on a for-profit or not-for-profit basis.

It should be noted that at the recent Plenary Meeting of SC32/WG1 (Ottawa 30 September - 4 October, 2002), it passed the following resolution:

Resolution WG 1 / 23: Integration of ISO/IEC 18038 Project into the ISO/IEC 15944 Multipart Standard

SC 32/WG 1 requests approval of SC 32 for a project split to ISO/IEC 15944 to integrate ISO/IEC 18038 as a part of this multipart standard. The editor of ISO/IEC 18038 will become the editor of the new part, and the project 1.32.20.01.00.00 will be ceased as separate project.

The rationale is that the multipart sections provide greater definition of the BOV requirements set out in ISO/IEC 14662. The multipart standard has already been split to accommodate an accounting ontology and work is now in hand to also incorporate UML/UMM technologies. It is logical to include the work on jurisdictional domains. The co-editors of ISO/IEC 18038 have been consulted and support the SC 32/WG1 proposal.
[Reference: ISO/IEC JTC1 SC32/WG1 N0239, 2002-10-04]

3.0 APPROACH AND SOLUTION TO "CODE" AND "CODED DOMAIN": RULE-BASED

3.1 OVERVIEW

"Coded Domain" is a coined/invented term¹¹. The approach taken is that a (real world) entity¹² can simultaneously be a member of any number of coded domains. **Whether or not an entity is a member of a specific coded domain is determined by the rules governing that coded domain.**

The construct and approach here is that of a rule-based "domain" which has a Source Authority and where the Source Authority determines which entities (real world or abstract), in accordance with its rule-base, are to become members of a coded domain based on the set of rules governing this domain, (e.g., as members of a "club"). Consequently, such "members" are assigned unique identifiers by the Source Authority based on the set of rules governing the "coded domain". These identifiers for entities as members of a coded domain are commonly known as "Codes representing X" in international standards and industry conventions and specifications. In short, only when an entity is assigned identifiers as a "code" according to the rules and processes governing the coded domain does it become a member of that coded domain.

In Chapter 4 following (and associated annexes) are summarized the results of the analysis of the various meanings and uses of "domain", generally, and in the international standards context. These need not be repeated here since the results of these analyses are summarized in Chapter 4.2. In the few paragraphs which follow we present a few key definitions pertaining to "code".

¹¹See further Chapter 0.4 "Benefits of Use of ISO/IEC 18022" as found in JTC1/SC32/SC32 N0695 ISO/IEC WD 18022:200x - IT-enablement for Widely Used Coded Domains (Working Draft Text).

¹²The concept/term "entity" is defined as:

entity: any concrete or abstract thing that exists, did exist, or might exist, including associations among these things.

EXAMPLE A person, object, event, idea, process, etc.

NOTE An entity exists whether data about it are available or not.entité (suite)

entité: tout objet ou association d'objets, concret ou abstrait, existant, ayant existé ou pouvant exister.

EXEMPLE Personne, événement, idée, processus, etc.

NOTE Une entité existe que l'on dispose de données à son sujet ou non.

[ISO/IEC 2382-17:1999 (17.02.05)]

This term/definition for "entity" is utilized in both ISO/IEC 15944-1 and ISO/IEC FDIS 11179-3 and many other standards.

3.2 WHAT IS A "CODE"?

In ISO 639-2:1998 (E/F) *Codes for the representation of names of languages - Part 2: Alpha-3 cods/Codes pour la représentation des noms de langue - Partie 2: Code alpha-2* "code" is defined as:

code: data representation in different forms according to a pre-established set of rules.

code: représentation de données sous différentes formes, selon un jeu de règles préétablies.

In ISO 5127 *Information and documentation - Vocabulary/Information et documentation - Vocabulaire* are found two definitions; namely:

code:

set of rules for the transformation of a language into another language.

[ISO 5127:2001 (1.1.4-05)]

and,

code:

data transformation or data representation in different forms according to a pre-established set of rules.

[ISO 5127:2001 1.1.4-06)]

One notes that ISO 639 views code as a "state" resulting from the application of a set of pre-established rules and that ISO 5217 views code as a "process", an action, for transformation.¹³

The ISO/IEC 7826 two-part standard titled "*Information technology -- General structure for the interchange of code values*" does not define "code" but does define "code value" as:

code value: result of applying a coding scheme to an element in a coded set.

[ISO/IEC 7826-1:1994 (3.5)]

Here code value is a "state". The ISO/IEC 7826 standard has been withdrawn. The new ISO/IEC 18022 standard replaces it in part.

¹³This is similar to "identification" which is also defined as either a "process" or a "state". See further Clause C.5 "Identification" in Annex C (Informative) "Unambiguous Identification of Entities in (electronic) Business Transactions" in ISO/IEC DIS 15944-1:2002.

The ISO/IEC 2382 *Information technology - Vocabulary* standard has several definitions for "code". The ones most relevant to "coded domain" include:

*code, coding scheme: a collection of **rules** that maps the elements of one set on to the elements of a second set.*

NOTE 1 The elements may be characters or character strings.

NOTE 2 The first set is the coded set and the second is the code element set.

NOTE 3 An element of the code element set may be related to more than one element of the coded set but the reverse is not true.

*code: ensemble des **règles** établissant une correspondance entre les éléments d'un premier ensemble et ceux d'un second ensemble.*

NOTE 1 Les éléments peuvent être des caractères ou des chaîne de caractères.

NOTE 2 Le premier ensemble est le jeu codé et le second est le jeu de codets.

NOTE 3 Un codet peut correspondre à plusieurs éléments du jeu codé, mais l'inverse n'est pas vrai.

[ISO/IEC 2382-4:1999 (04.02.01)]

This ISO/IEC 2382 definition for "code, coding scheme" also includes the aspect of "rules" which has been represented in **bold** to indicate that it will be utilized as a defined term in Open-edi.

Other terms/definitions pertaining to "code" focus on mapping between/among codes, sets of codes, etc. But ISO/IEC 2382 itself does not contain term/definition pairs for:

- code;
- code set.

i.e., what is a "code" in the sense of where and how does it originate?

Therefore, the definition for "code" found in ISO 639-2, already noted above, is the most relevant and is the one used here in ISO/IEC 18022. This has been done through the addition of a "note" and referencing "rules" as a defined term.

The resulting definition for a "code" as used in ISO/IEC 18022 is:

*code: data representation in different forms according to a pre-established set of **rules**.*

NOTE In this ISO/IEC 18022 standard the "pre-established set of rules" are determined and enacted by a Source Authority and must be explicitly stated.

*code: représentation de données sous différentes formes, selon un jeu de **règles** préétablies.*

NOTE [French equivalent to be supplied at CD stage]

[Adapted from ISO 639-2:1998 (3.1)]

Applying the above noted definition for "code" in the context of commitment exchange and business transactions, results in the following definition:

code (in a coded domain):

an **identifier** assigned to an **entity** as member of a **coded domain** according to the pre-established set of **rules** governing that **coded domain**.

NOTE 1 [to be added, if required]

NOTE 2 [to be added, if required]

Here the definition for identifier is that as stated in ISO/IEC 15944-1:2002 which is:

identifier (in business transaction): an unambiguous, unique and a linguistically neutral value, resulting from the application of a rule-based identification process. Identifiers must be unique within the **identification** scheme of the issuing authority.

identificateur (dans une transaction d'affaires): valeur non ambiguë, unique et linguistiquement neutre, résultant de l'application d'un processus d'identification à base de règles. Les identificateurs doivent être uniques dans le système **d'identification** de l'autorité émettrice. [ISO/IEC 15944-1:2002 (3.27)]

Identification in turn is defined:

identification: a rule-based process, explicitly stated, involving the use of one or more attributes, i.e., data elements, whose value (or combination of values) are used to identify uniquely the occurrence or existence of a specified entity.

identification: processus basé sur des règles, énoncées explicitement, impliquant l'utilisation d'un ou plusieurs attributs, c-à-d. des éléments de données, dont la valeur (ou une combinaison de valeurs) sert à identifier de façon unique l'occurrence ou l'existence d'une entité spécifiée. [ISO/IEC 15944-1:2002 (3.26)]

In the general context of business agreement semantic descriptive techniques, a "code" in the context of its coded domain is considered a special category or sub-type of "identifier".

Note: The JTC1 term/definition for "entity" utilized in both SC32/WG1 and SC32/WG2 standards is taken from ISO/IEC 2382-17:1996 (17.02.05) is:

entity: any concrete or abstract thing that exists, did exist, or might exist, including associations among these things.

EXAMPLE A person, object, event, idea, process, etc.

NOTE An entity exists whether data about it are available or not.

entité: tout objet ou association d'objets, concret ou abstrait, existant, ayant existé ou pouvant exister.

EXEMPLE Personne, événement, idée, processus, etc.

NOTE Une entité existe que l'on dispose de données à son sujet ou non. [ISO/IEC 2382-17:1999 (17.02.05)]

3.3 WHAT IS A "CODED DOMAIN"?

As stated above, a common attribute of "code", "coding scheme" and "code value" in many ISO and ISO/IEC standards is that sets of codes exist as the result of the application of rules which are pre-established. In the context of this "coded domain" standard, the pre-established rules are used to specify a code as the identifier for a member of a coded domain.

In Chapter 4 below (and associated Annexes) are presented various analyses of the different definitions associated with "domain" in the primary English and French language dictionaries as well as in the *ISO/IEC 2382 Information technology - Vocabulary* multipart standard. In addition, Chapter 4 includes two use case studies namely that of the Canadian federal government and that of the Quebec (provincial) government. The results of these different sets of analyses are summarized in Chapter 4.2 below.

In Chapter 4.3 the result of these analyses identified key elements which serve as the basis for the definition of "coded domain". These key elements include the following:

A "coded domain" is a "domain":

- which is under the control of a Source Authority where there are limits on membership in the domain;
- where a Source Authority governs membership and application of its pre-established set of rules, i.e., rulebase, determines membership, membership management, etc.;
- members of a coded domain are assigned a membership ID, i.e, unique ID code, by the Source Authority in accordance with its rulebase;
- the set of rules of the Source Authority governing membership of entities in a coded domain also determine the properties and/or behaviours any entity must have in order to become and remain a member of a coded domain.

Since a coded domain is by definition "rule-based", a definition for "rulebase" is provided. The term/definition "rulebase" in turn utilizes the existing/accepted definition of "rule". {See further

the document which forms part of the standards development work for ISO/IEC 18038 on "jurisdictional domains", SC32/WG1 N0211 "What is a "Principle"? What is a "Rule"?: Need for Definitions"}

Because every rule-based coded domain must have a source for the rulebase governing the coded domain, a definition of "Source Authority" is also provided. Finally, since a "coded domain" must have members identified according to the rules governing a coded domain, the concept/term/definition of "ID Code" is included.

In addition, two associated relevant terms and definitions are also provided here as part of this contribution. They are:

- IT-enablement/habilitation TI; and,
- multilingualism/multilinguisme.

A "coded domain" is thus rule-based. The set of rules governing membership of entities in "coded domain" must be explicitly stated. This also means that some Person must set and maintain the "membership" rules for a "coded domain". Two basic possibilities exist; namely:

- (1) a single Person sets the rules governing membership, (e.g., a regulator¹⁴); or,
- (2) multiple Persons together determining and agreeing on the rules governing a coded domain and establishing a new Person as Source Authority.

Common dictionary definitions as well as international standards were reviewed and analyzed to derive the definition for coded domain.

Combining the requirements stated in Chapter 2 above and the results of the analysis here in Chapter 3 and Chapter 4 below (and associated annexes) yields the following sets of terms/definitions.

***coded domain:** a domain for which (1) the boundaries are defined and explicitly stated as a **rulebase** of a **Source Authority**; and, (2) each **entity** which qualifies as a member of that domain is identified through the assignment of a unique code.*

¹⁴ **regulator:** a Person who has authority to prescribe external constraints which serve as principles, policies or rules governing or prescribing the behaviour of Persons involved in a business transaction as well as the provisioning of goods, services, and/or rights interchanged.

autorité de réglementation: Personne autorisée à prescrire des contraintes externes qui servent de principes, de politiques ou de règles régissant ou prescrivant le comportement des Personnes concernées par une transaction d'affaire, ainsi que la fourniture des biens, services et/ou droits échangés.

[ISO/IEC 15944-1:2002 (3.59)]

NOTE 1 The rules governing the assignment of an ID code resides with the Source Authority and forms part of the Coded Domain Registration Schema of the Source Authority.

NOTE 2 Associated with the ID code can be:

- *one or more equivalent codes;*
- *one or more equivalent representations especially those in the form of human equivalent (linguistic) expressions.*

NOTE 3 Where an entity as member of a coded domain is allowed to have more than code, i.e., as equivalent codes (possibly including names), one on these must be specified as the pivot code.

NOTE 4 A coded domain in turn can consist of two or more coded domains, i.e., through the application of the inheritance principle of object classes.

NOTE 5 In object methodology, entities which are members of a coded domain are referred to as instances of a class.

NOTE 6 In UML modelling notation a code is viewed as an instance of an object class.

pivot code: *the most stable code assigned to a member of a coded domain where an entity as a member of a coded domain may be assigned and/or associated with more than one code as identifier as member of coded domain.*

EXAMPLE *ISO 3166-1:1997 (E/F) "Codes for the representation of names of countries and their subdivisions - Part 1: Country codes/Codes pour la représentation des noms de pays et de leur subdivisions - Partie 1: Codes pays" contains three code sets:*

- *a three digit numeric code;*
- *a two alpha code*
- *a three alpha code.*

Here, the three digit numeric code serves as the pivot code. It is the most stable, remains the same even though the two alpha and/or three alpha codes may and do change.

code set: *the complete set of codes identifying entities as members of a coded domain according to the rulebase of the Source Authority for that coded domain.*

Terms/definition which are embedded in the definition for coded domain are:

- rulebase
- Source Authority

- entity*¹⁵
- code*.

"Rulebase", "Source Authority", and "ID Code" are defined as follows

rulebase: *a pre-established set of **rules** which interwork and which together form an autonomous whole.*

NOTE One considers a rulebase to be to rules as database is to data.

[ISO/IEC 15944-2 (new draft) 02.08.30

"Rulebase" as a defined term, in turn utilizes the following definition for rule:

rule: *a statement governing conduct, procedure, conditions and relations.*

NOTE 1 Rules specify conditions that must be complied with. These may include relations among objects and their attributes.

NOTE 2 Rules are of a mandatory or conditional nature.

NOTE 3 In Open-edi, rules formally specify the commitment(s) and role(s) of the parties involved, and the expected behaviour(s) of the parties involved as seen by other parties involved in (electronic) business transactions. Such rules are applied to:

- *content of the information flows in the form of precise and computer-processable meaning, i.e. the semantics of data; and,*
- *the order and behaviour of the information flows themselves.*

NOTE 4 Rules must be clear and explicit enough to be understood by all parties to a business transaction. Rules also must be capable of being able to be specified using a using a Formal Description Technique(s) (FDTs).

EXAMPLE A current and widely used FDT is "Unified Modelling Language (UML)".

règle: *énoncé régissant une conduite, une procédure, des conditions ou des rapports.*

NOTE 1 Les règles spécifient les rapports entre les objets et leurs attributs.

NOTE 2 Les règles sont de nature obligatoire ou conditionnelle.

¹⁵ * These are already defined in ISO and ISO/IEC standards.

NOTE 3 Les règles spécifient formellement les engagements et le(s) rôle(s) des parties concernées, et le(s) comportement(s) prévu(s) des parties concernées tels que perçus par d'autres parties concernées par des transactions (électroniques) d'affaires. Ces règles s'appliquent aux éléments suivants:

- *contenu des flux d'information sous forme de signification précise et traitable par ordinateur, c-à-d. la sémantique des données; et,*
- *l'ordre et le comportement des flux d'information eux-mêmes.*

NOTE 4 Les règles doivent être suffisamment claires et explicites pour être comprises par toutes les parties d'une transaction d'affaires. En même temps, les règles doivent pouvoir être spécifiées en utilisant une ou des technique(s) de description formelle(s) (FDT).

EXEMPLE L'une des techniques de description formelles actuellement et couramment utilisées est l'UML (Langage de modélisation unifié ou Unified Modelling Language).

[ISO/IEC JTC1/SC32/WG1 N0211. Also part of work on ISO/IEC 18038]

Source Authority (SA): *a Person recognized by other Persons as the authoritative source for a set of constraints.*

NOTE 1 A Person as a Source Authority for internal constraints may be an individual or organization.

NOTE 2 A Person as Source Authority for external constraints may be an organization or public administration.

EXAMPLE In the field of air travel and transportation, IATA as a Source Authority, is an "organization" while ICAO as a Source Authority, is a "public administration".

NOTE 3 A Person as an individual shall not be a Source Authority for external constraints.

Also part of work on ISO/IEC 18038]

ID Code: *an identifier assigned by the Source Authority to an entity as a member of a coded domain.*

NOTE 1 The rules governing the assignment of an ID code resides with the Source Authority and forms part of the SA's Coded Domain Registration Schema.

NOTE 2 In UML modelling notation an ID code is viewed as an instance of an object class.

NOTE 3 Associated with the ID code can be:

- *one or more equivalent codes;*
- *one or more equivalent representations especially those in the form of human equivalent (linguistic) expressions.*

The following terms/definitions are also relevant to this contribution:

IT-enablement: *the transformation of a current standard utilized in **business transactions**, (e.g., code tables), from a manual to computational perspective so as to be able to support **commitment exchange** and **computational integrity**.*

habilitation TI: *transformation des normes actuelles utilisées dans les **transactions d'affaires** (par exemple, les tables de codes) de mode manuel en mode informatique, afin de pouvoir assurer une **intégrité informatique** et les **engagement échangés**.*

[also ISO/IEC 15944-2; 18038]

multilingualism: *the ability to support not only character sets specific to a (natural) **language** (or family of languages) and associated **rules** but also **localization** requirements, i.e., use of a language from **jurisdictional**, sectorial and consumer marketplace perspectives.*

multilinguisme: *capacité de supporter non seulement les jeux de caractères particuliers à une **langue** (ou une famille de langues ainsi que les **règles** connexes, mais aussi les exigences en matière de **localisation**, par exemple l'utilisation d'une langue dans une perspective **juridique**, sectorielle ou commerciale.*

[Note: Need yet to verify French 02.09.05, also 18038]

4.0. SUMMARY ANALYSIS OF EXISTING USES AND MEANINGS OF "DOMAIN" AS WELL AS "DOMAIN" AS PART OF COMPOUND TERMS

4.1 INTRODUCTION

"Domain" as a word is associated with many different concepts and meanings which are accepted and in general use. In addition, in international standards, there are also different concepts and definitions for use of "domain" as a defined term.

An added problem is the use of "domain" as part of a compound term, both in general use and in international standards. This adds another layer of different concepts and meanings associated into the mix.

In order to obtain an understanding of what is a "coded domain", it is useful to bring forward and examine many different concepts and definitions associated with "domain" and "domain" as part of a compound term, i.e., as found both in general use and in existing international standards. The purpose here is to identify which of these different concepts and meanings are relevant to the scope and purpose of this standardization project. These are the ones incorporated in the definition for "coded domain" in this international standardization context.

This analysis consists of three parts; namely:

- concepts and definitions for "domain" as found in the major recognized English and French language dictionaries;
- the concept and definition of "value domain", as a compound term with a specific use and meaning in the context of "metadata" (already presented in Chapter 2.3 above);
- existing international standard definitions for "domain" as a term as well as in compound terms of relevance to "coded domain"; and,
- existing bilingual definitions for "domain" (as part of compound terms) for official use within the Canadian federal government as well as within the provincial government of Quebec.

In addition, there is an Annex E - ISO/IEC FPDTR 20943-3:200x (E) *Information Technology - Procedures for achieving metadata registry content consistency - Part 3: Value domains*. It provides some comparative analyses between "value domain" and "coded domain".

4.2 SUMMARY RESULTS

Many definitions representing differing concepts and meanings, i.e., semantics, are associated with the use of the word (or character string) "domain".

From the perspective of the scope and purpose of this ISO/IEC 18022 standard and the need for its development to support of (electronic) business transactions, the following dictionary definitions and meanings associated with "domain" are relevant:

- (1) from Oxford:
 - under rule, control;
 - contained within certain limits (sphere of activity)
- (2) from Webster:
 - ultimate ownership and control of use;
 - governed by a single... [Person].
- (3) from Larousse:
 - propriété;
 - champ d'activité.
- (4) from Le Petit Robert:
 - possédée par un propriétaire;
 - portion de territoire présentant des caractères particuliers.

In summary, the dictionary definitions of "domain" from a "coded domain" standardization perspective have the following key properties/behaviours associated with "domain" found in the dictionaries (referenced above) which are relevant to the scope and objective of this standard include:

- that of rule-based and under the control of someone who has ownership (of a domain);
- something that is contained, within limits which, in addition to rules, also includes a set of particular characteristics.

The analysis of international standards also identified multiple different concepts and definitions for "domain" and the use of "domain" as a compound term. It is outside the scope and resources from this contribution to do a comprehensive review. The analysis of the multipart ISO/IEC 2382 *Information technology - Vocabulary* standard serves as a very adequate case study.

The results of this analysis can be summarized as follows:

- (1) the term/definition of "value domain" as a "set of permissible values" maps directly to that of ISO/IEC 2382 Part 17: Databases (1999);
- (2) within the context of distributed data processing, i.e., Part 18 (1998), the concepts/definitions of "under common control" and "domain scheme" are relevant to "coded domain";
- (3) within the context of "artificial intelligence", i.e., Part 28 (1995), "domain pertains to a specific field of knowledge or expertise" and can be considered to be more of an ontological perspective.

However, there are different categories of ontologies. One of these is an "axiomatic" ontology, i.e., one which is "rule-based". It is this category of ontology of a "rule-based" ontology which is relevant to this standards development work. {See further SC32/WG1 N0222 "Draft Definition for "Open-edi Business Transaction Ontology". Also found in WG1 N0?? the WD for 15944-4 Accounting and Economic Ontology"}.

- (4) within the context of "electronic mail", i.e., Part 32 (1998), the concepts/definitions of relevance here include:
 - domain managed by ... [an] authority;
 - a collection... managed by a single authority.

A key aspect here of "domain" is the *a priori* need for the (1) existence of an "authority"; and, (2) one which is recognized by others.

- (5) within the context of "networking", i.e., Part 35, the focus is on names, addressing, etc., from an Internet domain name and IP addressing perspective.

Here of relevance are concepts/meaning of the "domain" pertaining to:

- under the control of a specific authority;
- the possibility of several levels in a domain scheme.

The analysis of the concept of "domain" as actually used in practice included two case studies; namely:

- User view - Canadian federal government {See Annex C}; and,
- User view - Canadian province: Quebec. {See Annex D}

These analyses bring forward the following results:

- the meanings/definitions associated with the term "domain" are very sector and/or application area use specific. They do not provide any definitions of a cross-sectorial nature;
- some new categories of "domains" were identified as being in use including (in addition to use of "descriptive" domains closed related to "metadata"); namely:
 - locative domains;
 - time domains;
 - protection domains.

Three added aspects of a "domain" relevant to this standardization work are:

- (1) membre du réseau (member of a network), i.e., a "club";
- (2) homogeneous on the scale of domain, i.e., all members are the same, are "peers";
- (3) "domain" as a set of values of the same semantic type. This includes a domain as a rule-based predefined relationship of other different domains with or without the latter domains having a one-to-one instance occurrence.

ANNEX A - DICTIONARY DEFINITIONS

In this Annex A, we present some definitions taken from the most widely used and authoritative dictionaries in the English and French language. From each set we identify terms, phrases, words, etc., in the definitions of relevance to the scope and purpose of this standardization work. We have indicated these through the use of *italics*. Our summary notes are also in *italics*.

A.1 OXFORD

In a legal context, "domain" pertains to leadership, ownership, rights, sovereign power, possession:

- a district or region *under rule, control*, or influence, or *contained within certain limits*; realm; *sphere of activity*, influence, or dominion.
- a sphere of thought or action; field, province, scope of a department of knowledge, etc.

In logic, "domain" pertains to/is:

- the breadth, extension, circuit, or sphere of a notion.
- the class of all terms that bear a given relation to any term.

In mathematics, "domain" pertains to/is:

- an algebraic system with two binary operations defined by postulates stronger than those for a ring but weaker than those for a field; esp. (more fully integral domain), a commutative ring in which the cancellation law holds for multiplication of non-zero elements and (with most writers) which has a unit element for multiplication.
- the set of values that an independent variable of a function can take; the graphical representation of this set; the set comprising all the first elements of the ordered pairs constituting some given set.
- an open connected set of at least one point.

In physics, a "domain" pertains to/is:

- in ferromagnetic materials, a region which behaves as an elementary magnet, all the atoms or ions in a region the axes of their permanent magnetic moments aligned in the same direction.

Of relevance here to this standardization work are the following meanings:

- *under rule, control;*
- *contained within certain limits (sphere of activity).*

A.2 WEBSTER

Webster has the following definitions for domain.

domain:

- (law) *ultimate ownership and control over the use* of land;
- the territory *governed by a single ruler or government*, realm
- a field of action, thought, influence, etc. (e.g., "the domain of science")
- a realm or range of personal knowledge, responsibility, etc.
- a region characterized by a specific feature, type of growth or wildlife, etc. (e.g., "we entered the domain of the pine trees")
- (math) the set of values assigned to the independent variables of a function.
- (math) an open set that is connected.
- (physics) one of many regions of magnetic polarity within a ferromagnetic body, each consisting of a number of atoms having a common polarity, and collectively determining the magnetic properties of the body by their arrangement
- (crystall.) a connected region with uniform polarization in a twinned ferroelectric crystal.

domain of integrity (math) {see integral domain}

Of relevance here to this standardization work are the following meanings:

- *ultimate ownership and control over the use;*
- *governed by a single...[Person].*

A.3 LAROUSSE

Larousse provides the following definitions for "domaine".

domaine (nom masculin)

- *propriété* foncière; bien, terre
- *champ d'activité d'une personne*, étendue de sa compétence. (par ex: «cela n'est pas (de) mon domain»))
- ensemble de ce qui constitue l'objet d'un art, d'une science, d'une faculté; univers, monde. (par ex.: «le domaine de la médecine»)
- (math) pour une correspondance de A vers B, ensemble des éléments de A qui ont au moins une image dans B.

From Larousse, the following aspects are relevant:

- *propriété;*
- *champ d'activité.*

A.4 LE PETIT ROBERT

Le Petit Robert provides the following definitions for "domaine".

domaine:

- *terre possédée par un propriétaire*
- ensemble des étendues dévolues à une activité
- ce qu'embrace un art, une science, un sujet, une idée, (par ex: «le domaine de ses connaissances»)
- secteur relevant de la compétence de quelqu'un, d'une institution, d'une science.
- (math) partie ouverte et connexe de cet espace, (par ex: (1) «domaine de définition d'une fonction»; (2) domaine d'un espace de la médecine»)
- (science) *portion de territoire présentant des caractères* (géologiques, climatiques, botaniques) *particuliers.*
- (biochemie) unité structurale d'une protéine, à laquelle une fonction particulière peut être attribuée.

Of relevance here to this standardization work are:

- *possédée par un propriétaire;*
- *portion de territoire présentant des caractères particuliers,*

Conclusion:

From a "coded domain" perspective the key properties/behaviours associated with "domain" found in the dictionaries (referenced above) which are relevant to the scope and objective of this standard include:

- *that of rule-based and under the control of someone who has ownership (of a domain);*
- *something that is contained, within limits which, in addition to rules, also include a set of particular characteristics.*

ANNEX B - INTERNATIONAL STANDARD DEFINITIONS

Multiple different concepts and definitions are currently found in international standards for "domain" and the use of "domain" as part of a compound term. It is outside the scope and resources for this paper to do a comprehensive review. The focus here is on ISO/IEC JTC1 standards and the examples chosen are taken from five parts of the multipart ISO/IEC 2382 *Information technology - Vocabulary* standard. Our observations are made in *italics*. The five parts examined are:

- (1) Part 17: Databases (1999)
- (2) Part 18: Distributed data processing (1998)
- (3) Part 28: Artificial Intelligence - Basic concepts and expert systems (1995)
- (4) Part 32: Electronic Mail (1998)
- (5) Part 35: Networking (2nd CD, 1998)

[Note: At the end of this Annex B are found some terms and definitions using "domain" as part of TC215 "Health Informatics" standards development work].

(1) Part 17: Databases (1999)

17.02.14

(attribute) domain

the set of all possible attribute values

17.02.14

domaine (d'attribut)

ensemble de toutes les valeurs d'attribut possibles.

These definitions are most relevant to "value domain" in metadata.

(2) Part 18: Distributed data processing (1998)

18.02.05

domain (in distributed data processing)

that part of a computer network in which the resources or addressing are under common control.

NOTE The domain scheme may be geographical or organizational.

18.02.05

domaine (en informatique répartie)

parties d'un réseau d'ordinateurs dans laquelle les ressources ou l'adressage dépendent d'une autorité commune.

NOTE Le schéma du domaine peut être fondé sur la géographie ou sur l'organisation.

The concepts of "under common control" and "domain scheme" are relevant to "coded domain".

(3) Part 28: Artificial Intelligence - Basic concepts and expert systems (1995)

28.01.04

domain (in artificial intelligence)

a specific field of knowledge or expertise.

28.01.04

domaine (en intelligence artificielle)

ensemble de connaissances et de compétences relatives à un spécialité.

28.04.04

domain knowledge

knowledge accumulated in a particular domain.

28.04.04

connaissance d'un domaine

connaissance accumulée dans un domaine particulier.

28.04.05

domain model

a model of a specific field of knowledge or expertise.

28.04.05

modèle de domaine

modèle représentant l'ensemble des connaissances et des compétences relatives à une spécialité.

Here a domain as specific field of knowledge or expertise is more of ontological perspective.

(4) Part 32: Electronic Mail (1998)

Part 32 contains eight terms pertaining to "domain". They are:

- 32.02.13 administration management domain/domaine de gestion d'administration
- 32.02.14 private management domain (PRMD)/domaine de gestion privé
- 32.02.12 management domain (in electronic mail)/domaine de gestion (en courrier électronique)
- 32.05.11 top-level domain name/nom de domaine de premier niveau/nom de domaine de tête/nom de domaine principal
- 32.05.12 management domain name/nom de domaine de gestion

- 32.05.13 administration domain name/nom de domaine d'administration
- 32.05.14 private domain name/nom de domaine privé
- 32.09.08 directory management domain (DMD)/domaine de gestion d'annuaire

There is little value added in also providing the English/French definitions for these "domain" related terms. However, the following definitions are relevant from a "coded domain perspective namely:

32.02.13

administration management domain

a management domain managed by a telecommunications operator recognized by the telecommunications authority of a given country.

32.02.13

domaine de gestion d'administration

domaine de gestion géré par un exploitant de télécommunication reconnu par l'autorité responsable des télécommunications dans un pays donné.

32.09.08

directory management domain (DMD)

a collection of one or more directory system agents and possibly several directory user agents, which is managed by a single authority.

32.09.08

domaine de gestion d'annuaire

collection d'un ou plusieurs agents de système d'annuaire, et éventuellement de plusieurs agents d'utilisateur d'annuaire, qui est géré par une seule autorité.

Of relevance here are concepts/meaning such as:

- domain managed by ...[an] authority;
- a collection... managed by a single authority.

A key aspect of "domain" here is the a priori need for the (1) existence of an "authority"; and, (2) one which is recognized by others.

(5) Part 35: Networking (2nd CD, 1998)

35.01.20

domain

that part of a computer network in which resources or addressing are under control of a specific authority.

NOTE The domain scheme may be geographical or organizational.

35.01.20

domaine

parties d'un réseau d'ordinateurs dans laquelle ressources ou l'adressage dépendent d'une autorité particulière.

NOTE Le schéma du domaine peut refléter la géographie de l'organisation de l'entreprise.

35.01.21

domain name

the identifier for a domain.

NOTE 1 There are various levels of domain names.

NOTE 2 A domain name may be composed of one or several parts. The domain name (if composed of one part only) or the rightmost part (if there are several parts) is a top-level domain name.

NOTE 3 The overall domain scheme may be geographically or organizationally based.

35.01.21

nom de domaine

identificateur d'un domaine.

NOTE 1 Il y a plusieurs niveaux de noms de domaine.

NOTE 2 Un nom de domaine peut comprendre une ou plusieurs parts. Un nom de domaine (s'il est composé) d'une seule partie), une partie la plus à droite (s'il y a plusieurs parties) est un nom de domaine de premier niveau.

NOTE 3 Le schéma général du domaine peut être basé sur la géographie ou l'organisation de l'entreprise.

Other terms/definitions with "domain" as part of the term in this Part 35 are:

- 35.07.10 domain name system (DNS)/système de nom de domaine
- 35.07.11 domain name server (DNS)/serveur de nom de domaine serveur
- 35.07.12 domain name service (DNS)/service de nom de domaine service

In these "name" really means an address, i.e., a unique identifier, which provides correspondence between an IP address and the fully qualified domain name with "domain name" being a kind of naming tree.

Of relevance here are concepts/meaning such as:

- *under the control of a specific authority;*
- *the possibility of several levels in a domain scheme, i.e., levels of "granularity".*

ISO DIS 17113:2002 Health informatics - Exchange of information between healthcare information systems - Development of messages

ISO 17113:2002 also has some terms/definitions of interest here. They are:

domain:

area of knowledge or activity characterized by a set of concepts and terminology understood by practitioners in that area.

[ISO DIS 17113:2002 (3.11)]

value set:

vocabulary domain that is constrained to a single concept and code system.

[ISO DIS 17113:2002 (3.43)]

vocabulary domain:

set of concepts that are acceptable for a coded message element in a specific message element type.

[ISO DIS 17113:2002 (3.44)]

ISO 17113:2002 also appears to utilize "domain" from a conceptual perspective.

ANNEX C - USER VIEW - CANADIAN FEDERAL GOVERNMENT

One result of the Official Languages Act in Canada is that in the operations of the federal government the English and the French language have equal status. As there are many variants in the use of the English and of French languages world-wide, the federal government wishes to ensure consistency in use of both English and French in an equivalent basis. To support this objective it maintains an extensive terminology database (a.k.a., Termium) which provides equivalent English/French terms and definitions for use by federal institutions.

As such the use case perspective on different semantics associated with the term "domain/domaine" is useful to note. Termium contains seven different pairs of definitions depending on the field or discipline of use. Some are definitions while others are only working definitions/descriptions. The English and French definitions and especially the working definitions are at different stages of development. This results in one (working) definition containing more information being more precise than its other language version.

This use case introduces additional concepts/meanings associated with the term "domain". They are presented here for information purposes only. They are (in no particular order):

(1) in polling and survey (statistics)

domain: sub-population which can be characterized on the basis of age and sex, industry and occupation, etc.

domaine: sous-population définie, par exemple, par des caractéristiques telles que l'âge et le sexe, ou la branche d'activité et la profession.

(2) in genetics

domain: sequence that can be equated with a particular function

domaine: séquence d'acide nucléique distincte d'une autre par sa structure ou sa fonction.

(3) in the Internet and telematics

domain: a part of a naming hierarchy.

domaine: partie d'une hiérarchie de désignation.

(4) in biochemistry

domain: some proteins - like myoglobin, the oxygen-carrying protein of muscle - are composed of a single polypeptide chain that is folded into a single compact unit. Other proteins have obvious separate domains, polypeptide regions that fold into globular units that often have independent functions. Antibodies typically have several discrete domains.

domaine: dans les protéines composées de plusieurs domaines structuraux ou de plusieurs sous-unités, les mouvements relatifs des domaines ou sous-unités peuvent affecter le rayon de giration de façon sensible.

(5) in information security

domain: in computer security, all of the objects that a subject can access.

domaine: [no equivalent provided]

(6) in statistics/mathematics

domain: set of elements by which a function is limited or defined.

CONT: "variable" is a symbol (...) which can assume any of a prescribed set of values, called the domain of the variable.

domaine: domaine de définition d'une fonction: ensemble des différentes valeurs de la variable réelle pour lesquelles la fonction est définie.

(7) in biological sciences

domain: combinations of (alpha) helices and (beta)-sheets that are particularly stable and occur frequently in many different proteins. These "structural clichés" often form the basis for the next higher level of structure.

domaine: unité de repliement de la chaîne polypeptidique. Son existence dans les protéines résulte vraisemblablement de la fusion ou de l'insertion des gènes au cours de l'évolution.

(8) in the management of the Internet and telecommunications

domain: a set of messaging systems - at least one of which contains, or realizes a message transfer agent - that is managed by a single organization.

domaine: ensemble de systèmes informatiques de messagerie, dont au moins un comporte ou réalise les fonctions d'un agent de transfert de messages, et qui est géré par un même organisation.

Conclusion:

The nature of this terminology database is that it reflects the uses/context of federal government documents being translated.

It is interesting to note that here the meanings/definitions associated with the term "domain" are very sector and/or application area use specific. They do not provide any definitions of a cross-sectoral nature.

ANNEX D - USER VIEW - CANADIAN PROVINCE: QUEBEC

One result of language legislation in the province of Quebec, Canada, is the development and maintenance of a terminological database titled «Le Banque de terminologie du Québec (BTQ)» by the «l'Office de la langue française (OLF)». The OLF also maintains a document base «La banque documentaire» (basically documents used to verify and confirm terminology), and a publication titled «Le français au bureau», i.e., a guide for use of the French language in the office including proper style and usage in correspondence.

Collectively these tools are known and distributed as "Le DOC" (online and CD-ROM).

A quick search identified well over 20+ occurrences of "domain" and domain as part of a compound term, (e.g., time domain) with different definitions (as well as working definitions). There is little added value in presenting all of these. In the remaining part of this section, are presented some additional meaning and uses associated with domain in addition to those already presented in Annexes A, B, and C. They include the use of the following terms, phrases, words:

- "descriptive" domains;
- "locative" domains;
- membre du réseau [member of a network];
- domaine tempore (or domaine du temps) [time domain]
- homogeneous on the scale of the domain
- "domain" as a set of values of a same semantic type. Context: Figure 9.2 shows a relation called DOCTOR formed by the domains DOC (doctor identification number), DOC-NAME (doctor name), SPECIALTY and CLINIC (in which the doctor practices).

[Here a domain is a predefined relationship of four other (different domains with two of these having a one-to-one instance concurrence)].

- protection domain as "an environment or context that defines the set of access rights that a subject has to objects of the system".

ANNEX E - ISO/IEC FPDTR 20943-3:200X (E) INFORMATION TECHNOLOGY - PROCEDURES FOR ACHIEVING METADATA REGISTRY CONTENT CONSISTENCY - PART 3: VALUE DOMAINS

In this Annex E, we utilize the ISO/IEC FPDTR 20943-3:200x ballot document [Ref: 32N0870] to highlight some similarities and differences between "value domain" and "coded domain".

Value Domain		Coded Domain Perspective
FPDTR 20943-3 Clause #	Text	
Introduction	The ISO/IEC 11179-3:2002, models a value domain and an associated conceptual domain.	ISO/IEC 18022 models a coded domain and associated rulebase (of a Source Authority). Any coded domain can be viewed as a "value domain" from a metadata perspective. The reverse is not true.
4.1	An Enumerated Domain is a value domain where all the permissible values are listed explicitly. Examples of types of enumerated domains include code sets, standard classifications, and categorizations.	The set of permissible values explicitly listed may (and often do) represent entities whose properties and behaviours are not the same, are not "peers". An enumerated domain can consist of one or more coded domains.
4.1	Every value domain represents two kinds of concepts: data element concept (indirectly) and conceptual domain (directly).	A coded domain is the application of a rulebase (by a Source Authority).
4.1.1	The choice of codes used in the value domain above is arbitrary.	The choice of codes in a coded domain is never <u>arbitrary</u> but governed by and predefined by the rulebase of the Source Authority.
4.1.2	Each time new permissible values are added or subtracted, a new value domain, or value domain version, is created. Determining whether a change to a value domain merits the creation of a new value domain or just a new version of an existing value domain is up to the individual registration authority.	For coded domains a formal process, explicitly stated, must be followed. Members of a coded domain may choose multiple representations of human interface equivalents of various value domains associated with its ID code. For example, a (real) country can change its name(s) and alpha codes representation(s) independent of its valid 3-digit ID Code number used to identify it as a member of the United Nations.
4.1.3	All the value domains for human sex codes can be viewed as being associated with a common conceptual domain.	Within the ISO 5218 standard, the set of codes representing human sexes is predefined and form a coded domain. This is independent of the multiple possible different conceptual domains for various needs and perspectives of "human sexes" in different contexts and resulting value domains or code sets.
4.1.11	Semantic restriction of value domains	The rules governing a coded domain generate the complete semantics including restrictions.
4.1.12	Unbounded enumerated domains (UPC example)	All coded domains are bounded. UPC is a "bounded", i.e., rule-based, domain. At any temporal state, the full set of IDs of Codes members, i.e., manufacturers, is

Value Domain		Coded Domain Perspective
FPDTR 20943-3 Clause #	Text	
		known and enumerated as are the valid IDs of each item, i.e., part, of a manufacturer's UPC. UPC. Other coded domains such as telephone address, IP addresses, identification cards, (e.g., credit/debit), machine-readable travel documents, (e.g., passports), etc., are all bounded, enumerated coded domains. Their key characteristic is that they are coded domains of a dynamic nature operating in real time on the application of the rule set(s) covering the "boundaries" of the domain, i.e., "what's in" and "what's out". {See further Annexes C and D in ISO/IEC 15944-1:2002}
4.3	Code sets are lists of permissible values, therefore they are examples of value domains.	Many code sets cannot be used "as is" in commitment exchange (and on a cross-sectorial basis). They need to be transformed into IT-enabled coded domains. For example, near 25% of the entities enumerated in ISO 3166-1 Country Codes are <u>not</u> "countries".
4.4	Classification schemes as value domains. Some code sets have structure built into them. Every code set with structure (as described above in 4.2) is both a classification scheme and value domain.	All coded domains are structured code sets. The nature of the structure is governed by the rulebase. The rulebase may or may not include a classification scheme.