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Terminology work — Principles and methods

Travail terminologique — Principes et méthodes

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 37, *Language and terminology*, Subcommittee SC 1, *Principles and methods*.

This fourth edition cancels and replaces the third edition (ISO 704:2009), which has been technically revised.

The main changes are as follows:

— the structure and content have been adapted based on ISO 1087;

— concept models in accordance with ISO 24156-1 have been introduced;

— clauses on associative concept relations have been extended;

— appellations and proper names are treated more comprehensively and more systematically;

— where necessary, existing examples have been adapted or replaced, and new examples have been introduced.

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

Introduction

0.1 Overview

This document specifies state-of-the-art principles and methods of terminology work. According to ISO 1087:2019, 3.5.1, terminology work is "work concerned with the systematic collection, description, processing and presentation of concepts and their designations" in various domains and subjects. It is multidisciplinary and draws support from several disciplines (e.g. logic, epistemology, philosophy of science, linguistics, translation studies, information science, cognitive science). It combines elements from many theoretical approaches that deal with the description, ordering and transfer of knowledge.

Terminology work according to this document is concerned with terminology used for unambiguous communication in natural language, in particular special languages. The goal of terminology work as described in this document is, thus, a clarification and standardization of terminology for communication between humans. Terminology work can also support knowledge modelling, information modelling, data modelling and classification, but this document does not cover these fields.

This document is intended to standardize the essential elements for terminology work. The general purposes of this document are to provide a common theoretical framework and to explain how this framework should be implemented by organizations or individuals involved in terminology work. This document also provides the fundamentals for terminology science teaching and training, in particular for the training of terminologists or terminology workers.

Thus, this document is intended to provide assistance to those carrying out various terminology work activities. The principles and methods should be observed not only for the manipulation of terminological information but also in the planning and decision-making involved in managing terminology. The main activities include, but are not limited to, the following:

— identifying concepts and concept relations;

— analysing and structuring concept fields on the basis of identified concepts and concept relations;

— analysing and developing concept systems on the basis of concept fields;

— visualizing concept systems, for example by means of traditional concept diagrams or Unified Modeling Language-based concept models;

— defining concepts;

— assigning linguistic or non-linguistic designations to concepts;

— creating and maintaining terminology resources, principally in print and electronic media (terminography).

Objects, concepts, definitions and designations are fundamental to terminology work and therefore form the basis of this document. Objects are perceived or conceived and abstracted into concepts. Concepts are represented by designations and/or definitions. The set of designations and concepts belonging to one special language constitutes the terminology of a specific domain or subject.

For referencing objects, concepts, definitions and designations in accordance with the current state of the art, the following wording conventions are used in this document:

— Objects:

  — are **perceived** or **conceived**;

  — are **abstracted into** or **conceptualized as** concepts.

— Concepts:

  — **depict** or **correspond to** objects or groups of objects;

  - are **represented** or **expressed by** linguistic or non-linguistic designations or by definitions;
  - are **connected by** concept relations and **organized into** concept systems that are **structured** according to concept relations.
- Definitions:
  - **define**, **represent** or **describe** concepts.
- Designations:
  - **designate** or **represent** concepts;
  - are **assigned to** concepts;
  - **refer to** objects.

Figure 1 illustrates these wording conventions in graphical form.

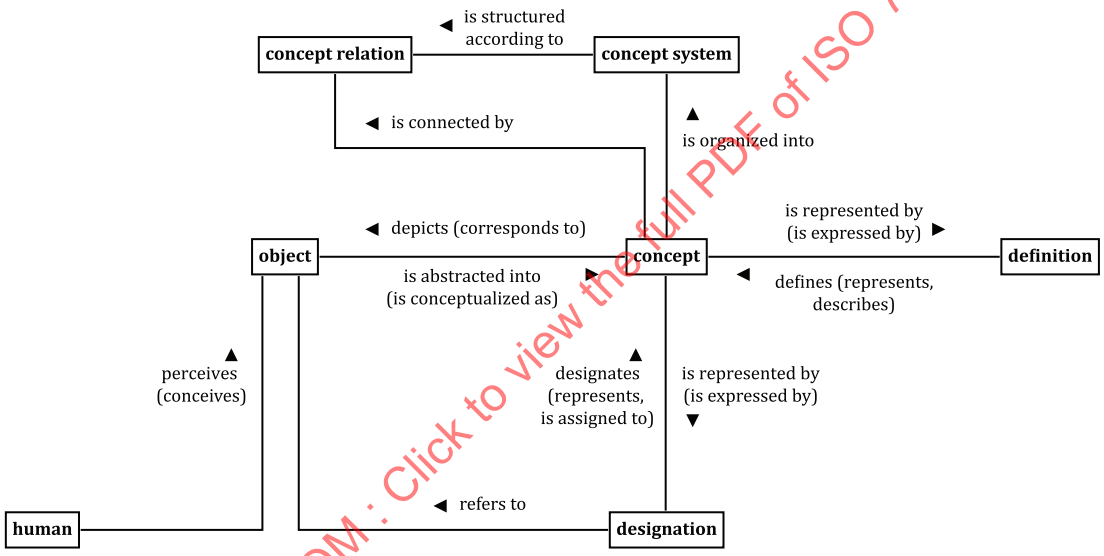


Figure 1 — Graphical illustration of wording conventions

0.2 Notations

In running text of this document, the following notations are used starting with Clause 4:

- terms designating concepts defined in ISO 1087 and in this document are in italics;
- other terms and proper names are indicated by double quotation marks;
- objects, concepts, properties, characteristics, types of characteristics and criteria of subdivision are indicated by single quotation marks;
- examples are boxed;
- symbols do not have any specific markup.

These notations are intended to facilitate the distinction between different types of references and other text throughout this document.

The examples in this document have been chosen for illustrative purposes and are specific to the language(s) in question. Translation into other languages can necessitate the selection of other examples to illustrate the points.

Terminology work — Principles and methods

1 Scope

This document establishes the basic principles and methods for preparing and compiling terminologies both inside and outside the framework of standardization. It describes the links between objects, concepts, definitions and designations. It also establishes general principles for the formation of terms and proper names and the writing of definitions.

This document is applicable to terminology work in scientific, technological, industrial, legal, administrative and other fields of knowledge.

This document does not stipulate rules for the presentation of terminological entries in International Standards, which are treated in ISO 10241-1 and ISO 10241-2.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1087, *Terminology work and terminology science — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1087 and the following apply.

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

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

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

3.1
domain
subject field
field of special knowledge

Note 1 to entry: The borderlines and the granularity of a domain are determined from a purpose-related point of view. If a domain is subdivided, the result is again a domain.

EXAMPLE 1 The domain of chemistry can be subdivided into pure chemistry and applied chemistry.

EXAMPLE 2 Amongst others, the domains of agriculture and food production relate to the subject of cereals.

[SOURCE: ISO 1087:2019, 3.1.4, modified — Examples added.]

3.2
subject
area of interest or expertise

Note 1 to entry: A subject may touch upon two or more *domains* (3.1).

EXAMPLE The subject of cereals relates to various domains such as agriculture and food production.

[SOURCE: ISO 1087:2019, 3.1.5, modified — Note 1 to entry added (from ISO 10241-1:2011, 3.3.2) and example added.]

3.3
intensional definition
definition that conveys the intension of a concept by stating the immediate superordinate concept and the delimiting characteristic(s)

EXAMPLE 1 optical mouse: computer mouse in which movement is detected by light sensors.

EXAMPLE 2 mechanical mouse: computer mouse in which movement is detected by rollers and a ball.

Note 1 to entry: Intensional definitions are preferable to other types of definitions because they clearly reveal the delimiting characteristics of a concept within a concept system: they should be used whenever possible.

[SOURCE: ISO 1087:2019, 3.3.2, modified — "generic concept" replaced by "superordinate concept" in the definition, "movements are" replaced by "movement is" in the Examples, and "delimiting" added before "characteristics" in Note 1 to entry.]

3.4
terminological entry
concept entry
collection of terminological data related to only one concept

Note 1 to entry: A terminological entry prepared in accordance with the principles and methods given in this document follows the same structural principles whether it is monolingual or multilingual.

[SOURCE: ISO 1087:2019, 3.6.2, modified — "concept entry" added as an admitted term, and "ISO 704" replaced by "this document" in Note 1 to entry.]

3.5
full form
designation that is complete

EXAMPLE "solid-state drive" is the full form of "SSD".

[SOURCE: ISO 10241-1:2011, 3.4.1.2.3, modified — "complete representation of a" removed before "designation" and "that is complete" added after "designation" in the definition, example replaced.]

3.6
terminologist
expert who performs terminology work as a main function of a professional activity

[SOURCE: ISO 12616-1:2021, 3.30]

3.7
terminology worker
person whose role is to perform terminology work as an ancillary function of other professional activities

[SOURCE: ISO 12616-1:2021, 3.29]

4 Reality and language

In *terminology work*, an *object* is anything perceivable or conceivable. Some *objects*, such as a given 'engine', 'sheet of paper' or 'diamond', are material. Other *objects*, such as a given 'conversion ratio' or 'project planning', are immaterial. Still other *objects*, for example a given 'unicorn' or 'scientific hypothesis', are imagined. Discussions on whether an *object* actually exists in reality are unproductive and should thus be avoided. Attention should be focused on how one deals with *objects* for the purposes of communication.

Objects are made up of and identified by their *properties* (see 5.4.1, Example), but neither information on *properties* of specific *objects* nor information on the *objects* themselves is commonly recorded in *terminology resources*. However, in some cases, such as *terminology work* in support of technical documentation, *objects* or their *properties* can be represented.

5 Concepts

5.1 Overview

In communication, not every individual *object* in the world is differentiated and named. Instead, through observation and a process called conceptualization, *objects* are grouped into categories. These categories correspond to units of knowledge called *concepts*. *Concepts* are made up of *characteristics* (see 5.4.2, Example 2). They are represented in various forms of communication (*object* → *concept* → communication). This document does not deal with all *concepts* represented in *natural language*, but only with those belonging to *domains* or *subjects*.

In *terminology work*, *concepts* shall be considered units of knowledge that correspond to *objects* or groups of *objects*. *Concepts* are not to be confused with immaterial or imagined *objects*; *objects* in a given situation are observed and conceptualized mentally and then a *designation* is assigned to the *concept* rather than to the *objects* themselves. The link between an *object* and its corresponding *designation* or *definition* is made through the *concept*, a higher level of abstraction.

Terminology work requires an understanding of the conceptualization that underpins human knowledge in a *domain* or *subject*. Because *terminology work* always deals with *special language*, the *concept* is viewed in the first place as a unit of knowledge. The *concepts* contextualized in the *special language* of a given *domain* or *subject* can be represented in various forms of human communication. In *natural language*, *concepts* can be represented by linguistic designations, i.e. *terms* and *proper names*, or by non-linguistic designations, i.e. *symbols*. They can also be represented by *definitions*. In *formal language*, *concepts* can be represented by codes or formulae, while they can also be represented by icons, pictures, diagrams, graphic illustrations, sound clips, video or other multimedia representations. *Concepts* can also be represented with the human body as they are in signed language.

Different *domains* or *subjects* view the same *objects* differently. When necessary, the same *objects* can be abstracted in different ways, and the resulting *concept(s)* can be represented by different *definitions* for different target audiences.

EXAMPLE

Concept	***Domain***	***Definition***
'water'	chemistry	molecule-composed compound of two atoms of hydrogen and one atom of oxygen
	physics	chemical compound that is colourless, odourless and tasteless, and that is naturally found in solid state at temperatures at and below 0 °C, in liquid state at temperatures between 0 °C and 100 °C, and as vapour at temperatures above 100 °C under standard atmospheric pressure
	biology	liquid chemical substance that is essential to all known forms of life

5.2 General concepts

When a *concept* depicts a potentially unlimited number of *objects* that form a group by reason of shared *properties*, the *concept* is called a *general concept*. *Designations* of *general concepts* take the form of *terms* (including *appellations*) or *symbols*.

EXAMPLE

Terms	"hard disk", "liquidity"
Appellations	"Adobe® Acrobat® X Pro" [1], "Nokia 7 Plus®"[1], "HNO_3"
Symbols	©, W

[1] Adobe® Acrobat® X Pro is a trademark of Adobe Systems and Nokia 7 Plus® is a trademark of Nokia Corporation. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of the product named.

5.3 Individual concepts

When a *concept* corresponds to a unique *object* or to a composition of entities considered to form a unique *object*, the *concept* is called an *individual concept*. The *designation* of an *individual concept* takes the form of a *proper name* or a *symbol.*

EXAMPLE 1

Proper names	"United Nations", "IBM®"[2)]
Symbols	 (used to designate 'Africa'),  (used to designate 'Statue of Liberty')

[2)] IBM® is a trademark of International Business Machines Corporation. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of the product named.

Proper names represent *individual concepts* and shall thus be distinguished from *terms* that represent *general concepts*. When an *individual concept* is expressed by a *proper name* that includes a linking element such as "and", it is still considered one *individual concept*.

EXAMPLE 2

The *proper name* "North, Central and South America" refers to a single *object* that is a whole with three parts (a single region made up of the three parts). Thus, it represents one *individual concept*. Conversely, the three *proper names* "North America", "Central America" and "South America" represent three separate *individual concepts*.

EXAMPLE 3

The *proper name* "Canadian Radio-television and Telecommunications Commission" refers to a single *object*, not two, i.e. not to the 'Canadian Radio-television Commission' and the 'Canadian Telecommunications Commission'.

5.4 Characteristics

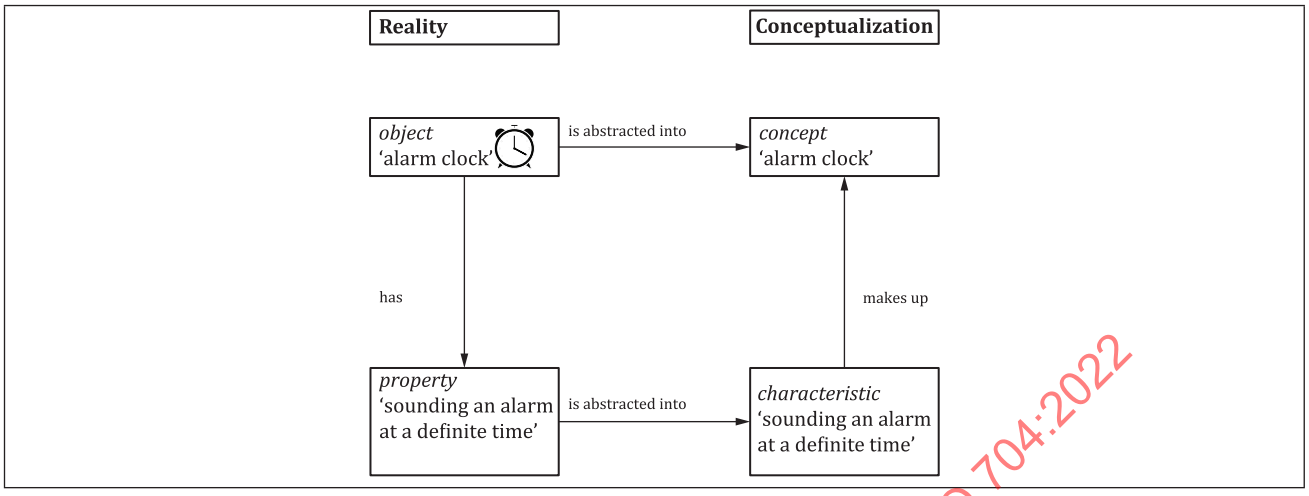
5.4.1 General

Conceptualization plays a pivotal role in organizing human knowledge because it provides the means for recognizing *objects* and for grouping them into meaningful categories in a particular *domain* or *subject*. To categorize an *object* for the purposes of conceptualization, it is necessary to identify its *properties*. *Objects* considered as sharing the same *properties* are grouped into categories. Once similar *objects,* or occasionally a single *object*, are viewed as meaningful categories, the relevant *properties* are abstracted into *characteristics*. The *characteristics* are then combined as a set in the formation of a *concept.*

Thus, *objects* in the real world are identified by their *properties* (see the Example below). The *properties* are then abstracted into *characteristics* and the *objects* are abstracted into *concepts* made up of the *characteristics*. *Characteristics* are qualifiers and narrow the *intension* of a *superordinate concept* (see 5.5.4.2.1).

NOTE The *concept* 'property' in the *domain* of information technology is different from the *concept 'characteristic'* as used in this document.

EXAMPLE



The relations between *object*, *property*, *characteristic* and *concept* can be further elucidated by the following statements:

— each *object* has at least one *property*;

— each relevant *property* is abstracted into a *characteristic*;

— each *concept* is comprised of at least one *characteristic*;

— each *object* is abstracted into at least one *concept*.

5.4.2 Terminological analysis

Based on the process of conceptualization according to 5.4.1, terminological analysis requires:

— identifying the *domain* or *subject*;

— identifying the *properties* possessed by *objects* in the *domain* or *subject*;

— determining those *properties* that are abstracted into *characteristics*;

— determining how the *characteristics* combine to form a *concept*;

— identifying relations with other *concepts* in the *domain* or *subject*;

— writing or identifying and analysing *definitions*;

— assigning a *designation* to the *concept*.

The *properties* that belong to *objects* can themselves be *objects*. Similarly, the *characteristics* that make up a *concept* can themselves be *concepts*, sometimes within the same *domain* or *subject*, sometimes not. Depending on the *domain* or *subject* concerned, terminological analysis should start with those *concepts* corresponding to material *objects*. The relevant *characteristics* are more easily abstracted given that the *properties* of those *objects* can be physically observed or examined.

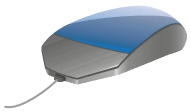
A *terminologist* or *terminology worker* can begin by analysing content that describes *objects* by means of *designations*. By analysing relevant content, the *terminologist* or *terminology worker* can get an understanding of the *properties* of the various *objects*, so as to determine which *properties* need to be abstracted into *characteristics*.

If the *objects* in Example 1 below are contextualized in the field of information technology, these particular *objects* are recognized as belonging to the set of *objects* that has been conceptualized as

'optical mouse'. In the process of conceptualization, the relevant *properties* of all the *objects* in the category are abstracted into *characteristics*.

EXAMPLE 1

The *objects* represented by the visual representations below have the following *properties*:

		
— 'being a device'; — 'being ivory-coloured'; — 'being hand-manoeuvred along a firm, flat surface'; — 'having three buttons'; — 'having an ivory-coloured wire for connecting to a computer'; — 'having a visible laser emitter'; — 'having light sensors that detect movement'.	— 'being a device'; — 'being blue and grey'; — 'being hand-manoeuvred along a firm, flat surface'; — 'having one button'; — 'having a grey wire for connecting to a computer'; — 'having a visible laser emitter'; — 'having light sensors that detect movement'.	— 'being a device'; — 'being black and grey'; — 'being hand-manoeuvred along a firm, flat surface'; — 'having two buttons'; — 'having a black wire for connecting to a computer'; — 'having an infrared emitter'; — 'having light sensors that detect movement'.

To facilitate terminological analysis, the *properties* of *objects* can be grouped into categories such as part, function, composition, colour, shape, operation or location. Categories appropriate to the *domain* or *subject* can be found from reference works and encyclopaedias, but any list should be used flexibly. Also, it should be assumed that additional categories are likely to be needed to adequately represent all the *properties*. For practical purposes, beginning with one of the more typical *objects* is recommended. *Characteristics* shall be identified based on content about the *domain* or *subject* and this often requires research. Experienced *terminologists* or *terminology workers* for whom the *concept* in question is clear and straightforward may move directly to identifying the *characteristics*.

As illustrated in Example 2 below, those *characteristics* are applied to the entire set of *objects* as opposed to the individual *objects*. Example 2 is the preliminary result of a terminological analysis with regard to the *concept* 'optical mouse'. *Concepts* corresponding to immaterial *objects* (e.g. 'bankruptcy') shall be analysed along the same lines.

EXAMPLE 2

Concept: unit of knowledge based on the set of all optical mice

***Designation* (*term*)**: "optical mouse"

***Properties* of *object* 1**	***Properties* of *object* 2**	***Properties* of *object* 3**	***Characteristics***
'being ivory-coloured'	'being blue and grey'	'being black and grey'	'having colour'
'being hand-manoeuvred along a firm, flat surface'	'being hand-manoeuvred along a firm, flat surface'	'being hand-manoeuvred along a firm, flat surface'	'being hand-manoeuvred along a firm, flat surface'
'having three buttons'	'having one button'	'having two buttons'	'having at least one button'
'having an ivory-coloured wire for connecting to a computer'	'having a grey wire for connecting to a computer'	'having a black wire for connecting to a computer'	'having a wire for connecting to a computer'
'having a visible laser emitter'	'having a visible laser emitter'	'having an infrared emitter'	'having a light emitter'
'having light sensors that detect movement'	'having light sensors that detect movement'	'having light sensors that detect movement'	'having light sensors that detect movement'

Characteristics shall be used in the analysis of *concepts*, the development of *concept systems* and the writing of *definitions.* Where appropriate, they should have a bearing on the selection and formation of *designations*. In selecting *properties* and *characteristics,* these purposes need to be borne in mind, since the number of *properties* that distinguish one *object* from another is effectively infinite. For example, in the case of 'computer mice', the property 'place of manufacture' need not be considered. An experienced *terminologist* or *terminology worker* can anticipate what is likely to be required.

5.4.3 Intension and extension

The set of *characteristics* that make up the *concept* is the *intension* of the *concept*. The set of *objects* conceptualized as a *concept* is the *extension* of the *concept*. The *intension* determines the *extension*.

EXAMPLE 1

As shown in 5.4.2, Example 2, the *characteristics* making up the *intension* of 'optical mouse' determine the *extension*, i.e. the *objects* that qualify as 'optical mice'.

EXAMPLE 2

The following *characteristics* make up the *intension* of 'planet in the solar system': 'being in orbit around the Sun', 'having sufficient mass to assume a hydrostatic equilibrium (nearly round) shape' and 'having cleared the neighbourhood around its orbit'. These *characteristics* determine the *extension*, so the *objects* that qualify as 'planets in the solar system' are the following celestial bodies: 'Mercury', 'Venus', 'Earth', 'Mars', 'Jupiter', 'Saturn', 'Uranus' and 'Neptune' (in ascending order by their distance from the sun). SOURCE: Reference [65].

5.4.4 Essential characteristics and non-essential characteristics

Not all *characteristics* are equally important. For practical purposes, the *essential characteristics* of the *intension* shall be the focus of terminological analysis and can differ between various *domains* or *subjects*.

The *essential characteristics* of a *concept,* such as 'wireless mouse', shall be identified. The absence of an *essential characteristic* in the course of terminological analysis leads to poor or even erroneous understanding of the *concept*. In the example of the *concept* 'wireless mouse', if the *characteristic* 'using a wireless light or sound connection' is removed, the *concept* represents a different *concept* corresponding to a different set of *objects*. Therefore, this is an *essential characteristic*.

On the other hand, if the *characteristic* 'having colour' is removed, the *concept* is not altered. Although any material *object* 'wireless mouse' necessarily has a colour, it still qualifies as a 'wireless mouse' independent of the specific colour in question. Therefore, this *characteristic* is not indispensable to understand the *concept* 'wireless mouse' and thus it is a *non-essential characteristic*. When the *concept* in question is highly complex, it can be necessary to categorize *characteristics* explicitly as *essential characteristics* and *non-essential characteristics*.

5.4.5 Shared characteristics and delimiting characteristics

After identifying the *characteristics* that make up the *intension* of a *concept* and the *essential characteristics*, the terminological analysis shall be taken a step further. Each *characteristic* of the *concept* under study shall be analysed with regard to other relevant *concepts*. Similarities between *concepts* are indicated by shared *characteristics*; differences that set a *concept* apart are signalled by *delimiting characteristics* (see 5.5.4.2.1, Example 2).

The same *characteristic* of a *concept* can be delimiting with regard to one other *concept* but shared with another *concept*. Analysing the similarities and differences between *concepts* results in identifying the unique set of *characteristics* that make up a given *concept*.

Specification of this unique combination of *characteristics* situates the *concept* within a network of *concepts* with similar or different *characteristics*. A *concept system* shall be structured according to

the relations between the *concepts* (see 5.6). The task of defining a *concept* requires knowledge of the *characteristics* used to develop the *concept system*.

5.5 Concept relations

5.5.1 General

Concepts do not exist as isolated units of knowledge but always in relation to each other. Human mental processes constantly create and refine relations between *concepts*, whether these relations are formally acknowledged or not. When organizing *concepts* into a *concept system*, it is necessary to bear in mind the *domain* or *subject* that gave rise to the *concept* and to consider the expectations and objectives of the target audience. The *domain* or *subject* shall be used as the framework within which the *concept system* is established.

EXAMPLE

The task is to compile the *terminology* of pointing devices in the *domain* of information technology. Thus, the example of 'optical mouse' forms part of the *concept field* dealing with 'mice' as conceptualized in that *domain*. This *concept field* can be the basis for developing a *concept system*.

NOTE 'Mice' outside the *domain* of information technology, such as 'field mice' or 'laboratory mice', are excluded.

5.5.2 Types

To develop a *concept system*, the *concepts* of the *concept field* and their relations shall be examined and compared. One and the same *concept* can be connected to other *concepts* by different types of *concept relations*. At least the following relations shall be used to develop a *concept system*:

— *hierarchical relations* (see 5.5.4);

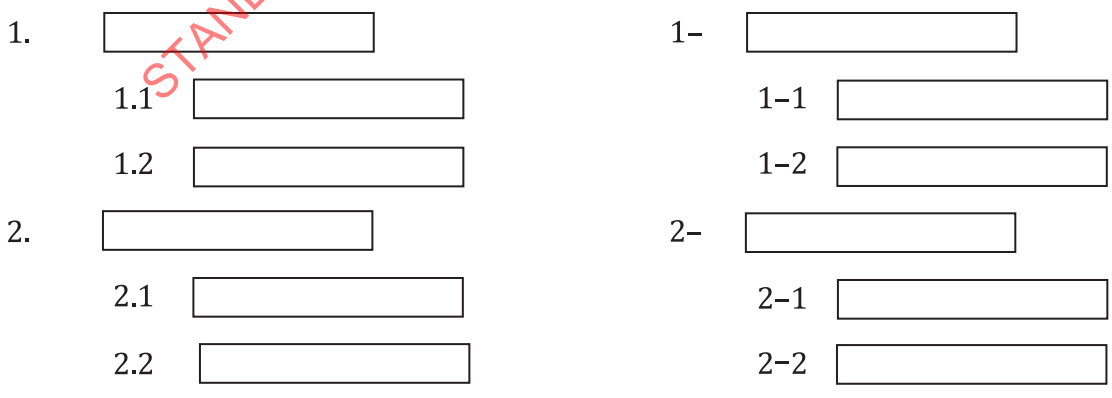
  — *generic relations*;

  — *partitive relations*;

— *associative relations* (see 5.5.5).

5.5.3 Notations

Concept relations can be represented formally in a list or graphically. In this document, formal representations in lists are indented and numbered with a full stop (.) for *generic relations*, and numbered with an en dash (–) for *partitive relations* (see Figure 2).



a) Generic relations **b) Partitive relations**

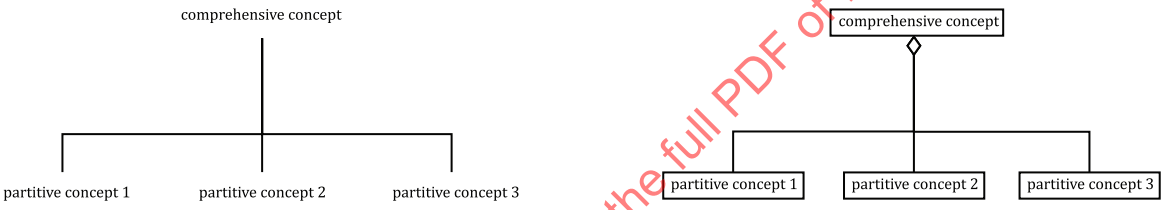
Figure 2 — Concept relations — Formal representations in lists

In this document, two graphic representations of *concept systems* are used. Traditional *concept diagrams* follow the requirements laid down in this document. UML-based *concept models* have been drawn in accordance with ISO 24156-1 (see Figures 3, 4 and 5).

a) Traditional concept diagram (tree diagram) to represent generic relations

b) UML-based concept model to represent generic relations

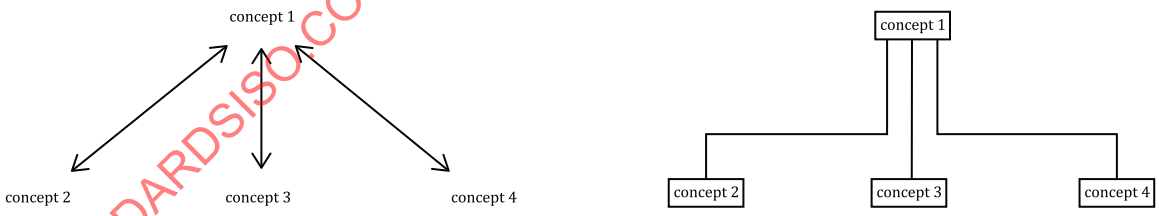
Figure 3 — Graphic representations of generic relations



a) Traditional concept diagram (rake diagram) to represent partitive relations

b) UML-based concept model to represent partitive relations

Figure 4 — Graphic representations of partitive relations



a) Traditional concept diagram to represent associative relations

b) UML-based concept model to represent associative relations

Figure 5 — Graphic representations of associative relations

5.5.4 Hierarchical relations

5.5.4.1 Types

Concepts connected by *hierarchical relations* are organized into levels of *superordinate concepts, subordinate concepts* and *coordinate concepts*. A hierarchy requires at least one *subordinate concept* below a *superordinate concept*. *Concepts* are superordinate, subordinate or coordinate, not on their own, but always in relation to each other in a hierarchy. *Criteria of subdivision* that are not obvious should be described. The same *criterion of subdivision* may be used for subdividing different *concepts* of a

given *concept system.* It shall not be used simultaneously for a *superordinate concept* and its *subordinate concept*.

In this document, *hierarchical relations* are categorized as:

— *generic relations* (see 5.5.4.2);

— *partitive relations* (see 5.5.4.3).

5.5.4.2 Generic relations

5.5.4.2.1 Generic relations and general concepts

In a *generic relation*, the *intension* of the *subordinate concept* includes the *intension* of the *superordinate concept* plus at least one additional *delimiting characteristic*. For example, the *intension* of 'optical mouse' comprises that of 'computer mouse' plus the *delimiting characteristic* 'detecting movement by means of light sensors'. Conversely, the *extension* of the *superordinate concept* includes that of the *subordinate concept*. For example, the *extension* of 'computer mouse' includes that of 'optical mouse' since some of the *objects* categorized as 'computer mice' can also be categorized as 'optical mice' (see Example 1 below).

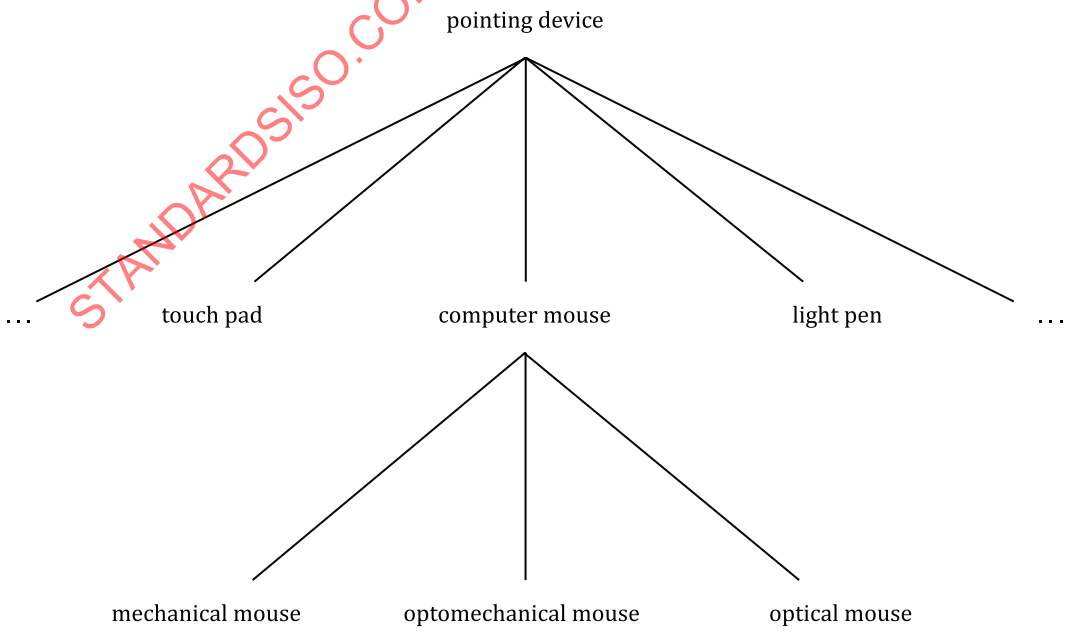
EXAMPLE 1

Verbal description

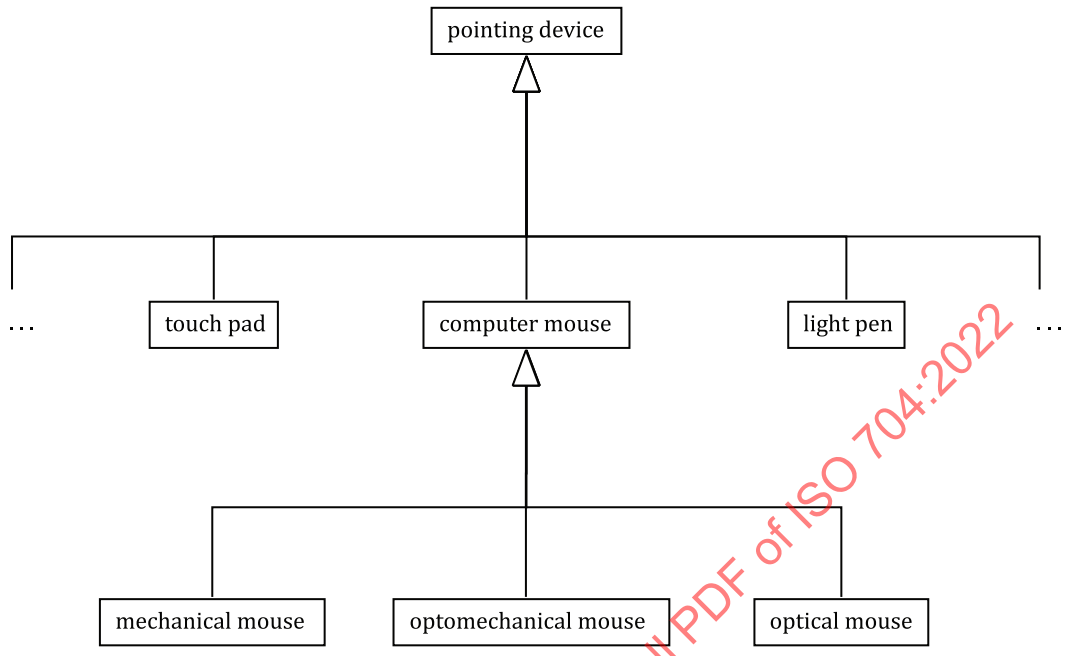
In the *concept diagram* and *concept model* below, 'computer mouse' is a *specific concept* of the *generic concept* 'pointing device'. Similarly, the *concepts* 'mechanical mouse', 'optomechanical mouse' and 'optical mouse' are each a *specific concept* of the *generic concept* 'computer mouse'. Each of the *coordinate concepts* 'mechanical mouse', 'optomechanical mouse' and 'optical mouse' has a *generic relation* with the *generic concept* 'computer mouse'.

An ellipsis (...) indicates further *specific concepts* that are not shown.

Traditional *concept diagram* (tree diagram)



UML-based *concept model*



Comparing the *characteristics* of a *concept* and of other relevant *concepts* (i.e. *generic concepts*, *coordinate concepts* and *specific concepts*) can require an adjustment and refinement of the *intension*. In Example 2 below, the *characteristics* of the *concept* 'optical mouse' are compared with the *characteristics* of other relevant *concepts* in Example 3.

EXAMPLE 2

Type of characteristic	***Characteristic***	**Comparison**
'usage'	'being hand-manoeuvred along a firm, flat surface'	DELIMITING with regard to the *generic concept* 'pointing device', but INHERITED from the *generic concept* 'computer mouse', and SHARED with the *coordinate concepts* 'optomechanical mouse' and 'mechanical mouse'
'composition'	'having a light emitter'	SHARED with the *coordinate concept* 'optomechanical mouse', but DELIMITING in relation to all other *concepts* in question
'composition'	'having at least one button'	DELIMITING with regard to the *generic concept* 'pointing device', but INHERITED from the *generic concept* 'computer mouse', and SHARED with the *coordinate concepts* 'optomechanical mouse' and 'mechanical mouse'
'function'	'detecting movement by means of light sensors'	SHARED (partly) with the *coordinate concept* 'optomechanical mouse', but DELIMITING with regard to all other *concepts* in question
'function'	'controlling the location of a pointer on a computer screen by means of light reflection'	DELIMITING with regard to all other *concepts* in question

NOTE 1 The *characteristics* 'having colour' and 'having a wire for connecting to a computer' have now been dispensed with as they are considered to have no importance in the subsequent steps of terminological analysis.

When documenting *characteristics*, instead of listing inherited *characteristics* redundantly for *specific concepts*, they shall be listed only with the *generic concept*. Under the *specific concept*, it is possible simply to list only the additional *characteristic*(*s*) that delimit(s) the *specific concept* from its *generic concept* and/or from its *coordinate concept(s)*. This important feature of the *generic relation* is called inheritance principle: if *concept* B (e.g. 'optical mouse') is a *specific concept* of the *generic concept* A

(e.g. 'computer mouse'), then *concept* B inherits all the *characteristics* of *concept* A. The inheritance principle is a way of testing and validating the *generic relation* (see Example 3 below). A vertical series of concepts connected by *generic relations* is called a concept ladder. A group of *coordinate concepts* forms a horizontal series of *concepts*.

NOTE 2 In keeping with the metaphor implied by the inheritance principle, a *generic concept* can be called a parent, a *specific concept* can be called a child, and *coordinate concepts* can be called siblings.

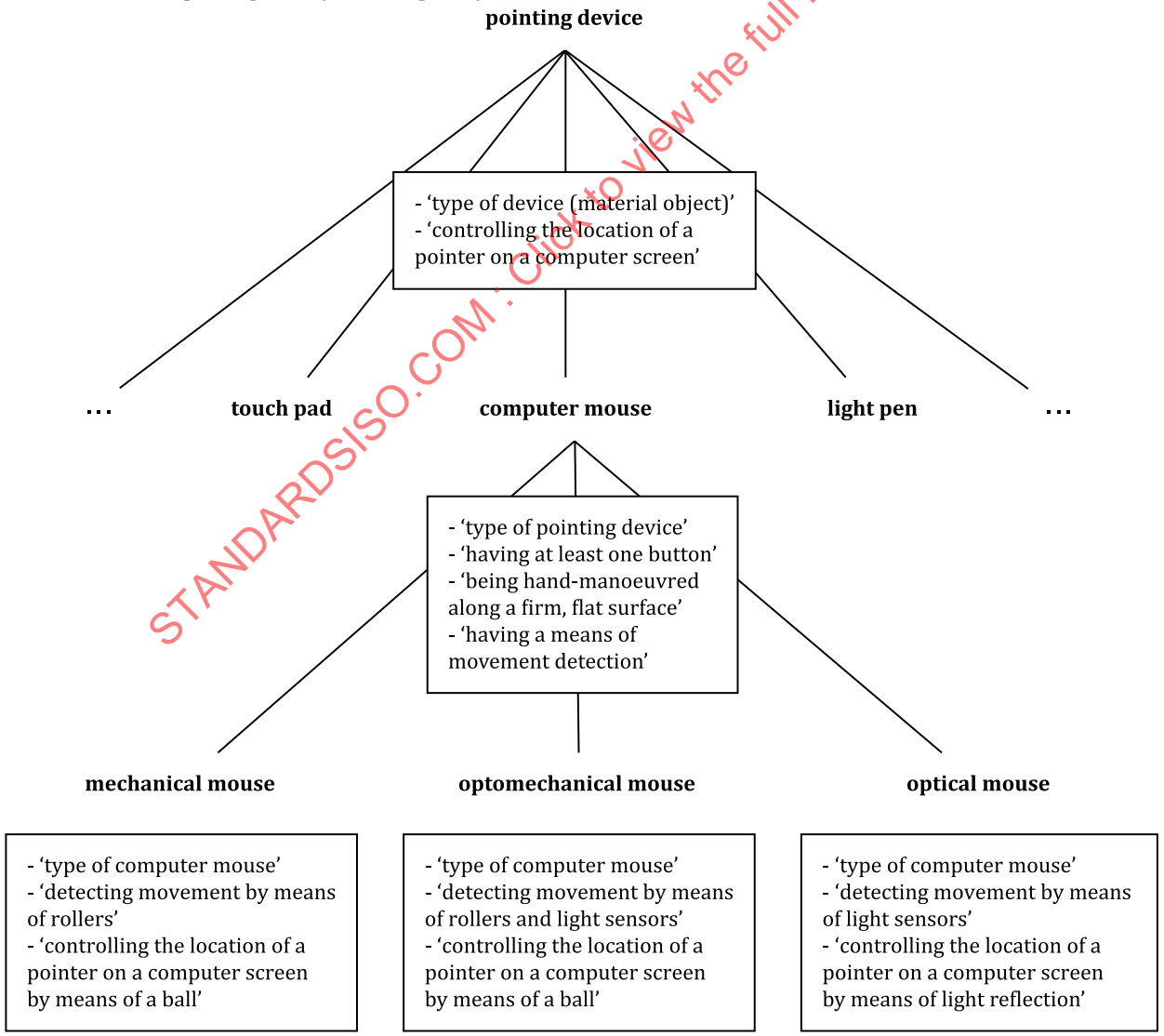
EXAMPLE 3

Verbal description

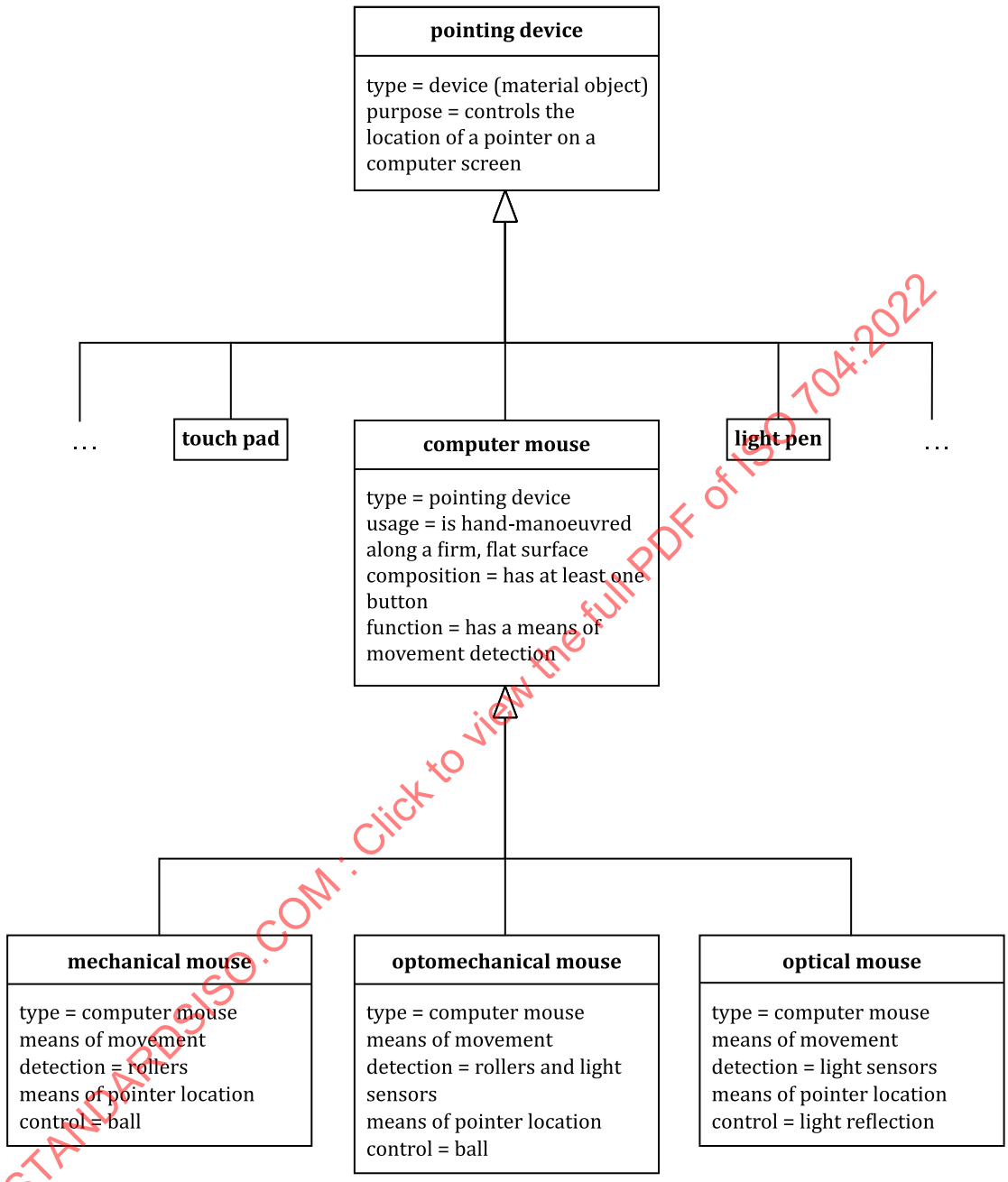
According to the inheritance principle, an 'optical mouse' is a type of 'computer mouse', which is in turn a type of 'pointing device'. The set of all 'optical mice' is a subset of all 'computer mice'. This means that all 'optical mice' are also 'computer mice', and that the *concept* 'optical mouse' inherits the *intension* from 'computer mouse'. When the subset is defined, however, 'optical mice' are distinguished from other 'computer mice' by at least one additional *characteristic* not shared by the other 'computer mice'. This means that 'computer mouse' has a smaller *intension* than 'optical mouse'. The *delimiting characteristic* used to increase the specificity of the *concept* is the nature of the means that convert computer mouse movement into a means of locating the pointer on the computer screen.

An ellipsis (...) indicates further *specific concepts* that are not shown. In the *concept diagram*, *characteristics* are displayed in separate rectangles. In the *concept model*, *characteristics* are displayed in accordance with ISO 24156-1.

Traditional *concept diagram* (tree diagram)



UML-based *concept model*



As already mentioned, in a *generic relation* there may be several ways of subdividing a *concept* into *specific concepts* depending on the *criterion of subdivision* or the *type of characteristic* chosen (see Example 4 below).

EXAMPLE 4

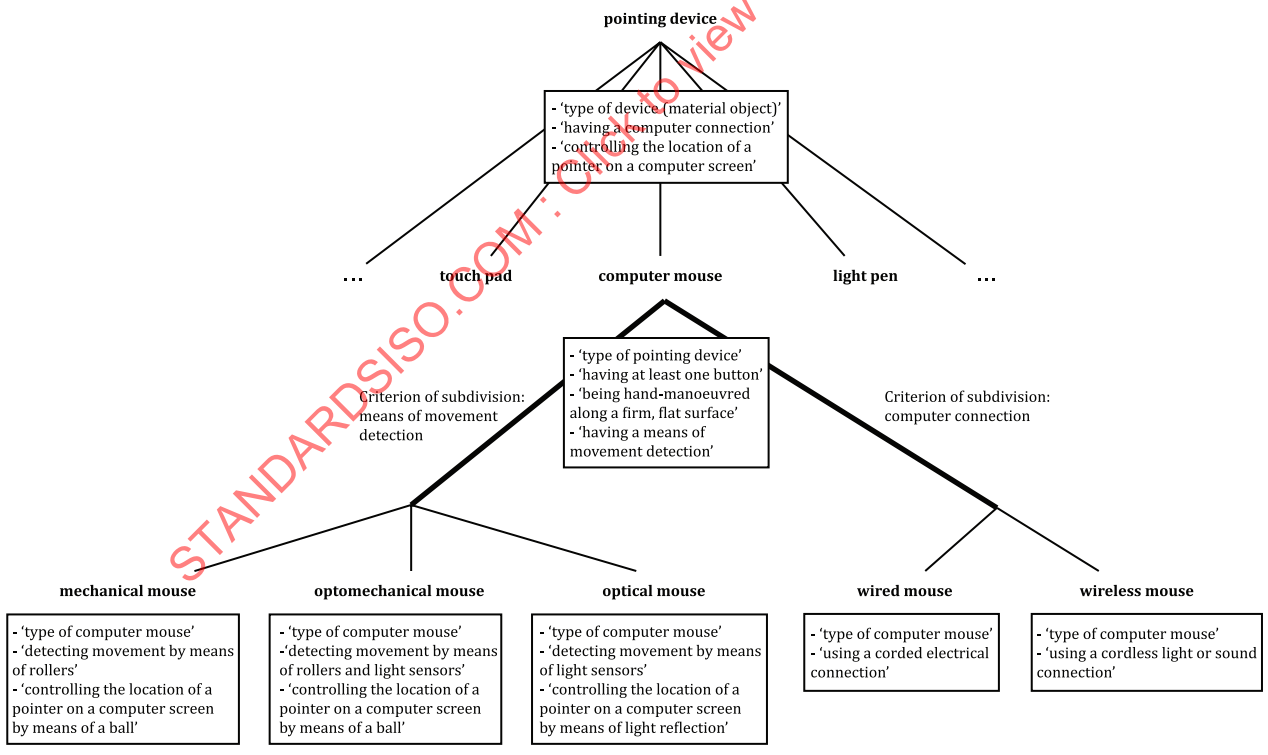
Verbal description

'Mechanical mouse', 'optomechanical mouse' and 'optical mouse' are *coordinate concepts* because they share the same *criterion of subdivision*; 'wired mouse' and 'wireless mouse' constitute another set of *coordinate concepts* (see below).

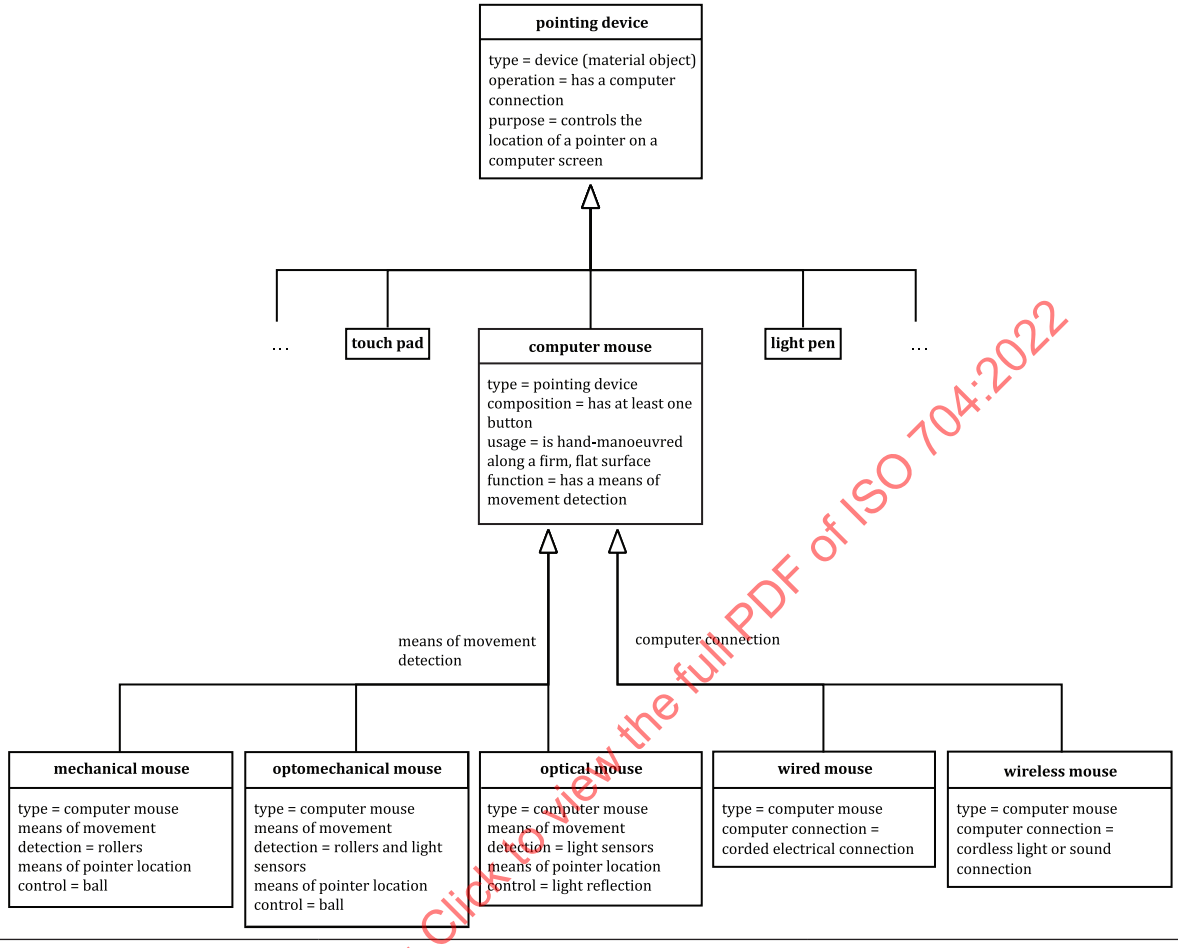
Concept	***Characteristic***	***Type of characteristic***
'mechanical mouse'	'detecting movement by means of rollers'	'means of movement detection'
'optomechanical mouse'	'detecting movement by means of rollers and light sensors'	'means of movement detection'
'optical mouse'	'detecting movement by means of light sensors'	'means of movement detection'
'wired mouse'	'using a corded electrical connection'	'computer connection'
'wireless mouse'	'using a cordless light or sound connection'	'computer connection'

An ellipsis (...) indicates further *specific concepts* that are not shown. In the *concept diagram*, *characteristics* are displayed in separate rectangles, and thicker lines indicate different *criteria of subdivision* (multidimensionality, see 5.6.3). In the *concept model*, *characteristics* and *criteria of subdivision* are displayed in accordance with ISO 24156-1.

Traditional *concept diagram* (tree diagram)



UML-based *concept model*



Apart from traditional *concept diagrams* (tree diagrams) and UML-based *concept models*, *generic relations* can also be visualized by an indented list (see Example 5 below).

EXAMPLE 5

1. pointing device
    - 1.1 touch pad
    - 1.2 computer mouse
        - * (criterion of subdivision: means of movement detection)
        - 1.2.1 mechanical mouse
        - 1.2.2 optomechanical mouse
        - 1.2.3 optical mouse
        - * (criterion of subdivision: computer connection)
        - 1.2.4 wired mouse
        - 1.2.5 wireless mouse
    - 1.3 light pen

NOTE The wordings with an asterisk (*) serve to structure the indented list according to relevant *criteria of subdivision.* They are not part of the concept hierarchy.

5.5.4.2.2 Generic relations and individual concepts

A concept ladder can contain *individual concepts*. If such *individual concepts* are present, they occupy the bottom rung (last item) of the concept ladder. The *extension* with a single *object* cannot be subdivided into a more specific *concept*. Each *object* in an *extension* of a *general concept* can be abstracted into an *individual concept* forming the bottom rung of a concept ladder and therefore be designated by a *proper name* (see Clauses C.3 and C.4). The *individual concept* inherits all the *characteristics* of its *generic concept*.

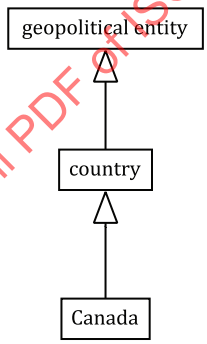
EXAMPLE

Verbal description

This example shows a concept ladder. In the concept ladder, 'Canada' constitutes the bottom rung, which cannot be subdivided into a more specific *concept*.

Traditional *concept diagram* (tree diagram)

UML-based *concept model*



5.5.4.3 Partitive relations

5.5.4.3.1 Partitive relations and general concepts

Unlike *concepts* connected by a *generic relation*, *concepts* connected by a *partitive relation* do not inherit *characteristics*. The parts that make up the whole can be similar in nature (such as 'atoms' in an 'oxygen molecule') or distinctly different from each other. One or more parts can be compulsory (and can thus be abstracted into *characteristics*) or optional. Some parts reflect *delimiting characteristics* in that they allow the whole to be distinguished from other similar *comprehensive concepts*. Some parts can be multiple such as 'page' (as part of a 'book'), or variable within a range, such as an 'ink reservoir', an 'ink cartridge' or an 'ink refill' (as part of a 'pen').

To identify *partitive concepts* and their *characteristics*, it is necessary to determine the position of the *comprehensive concept* in a hierarchy and to be mindful of the inheritance principle with regard to the *comprehensive concept* (see 5.5.4.2.1). The position of the *comprehensive concept* in the hierarchy determines its *partitive concepts* and their *extensions*.

EXAMPLE 1

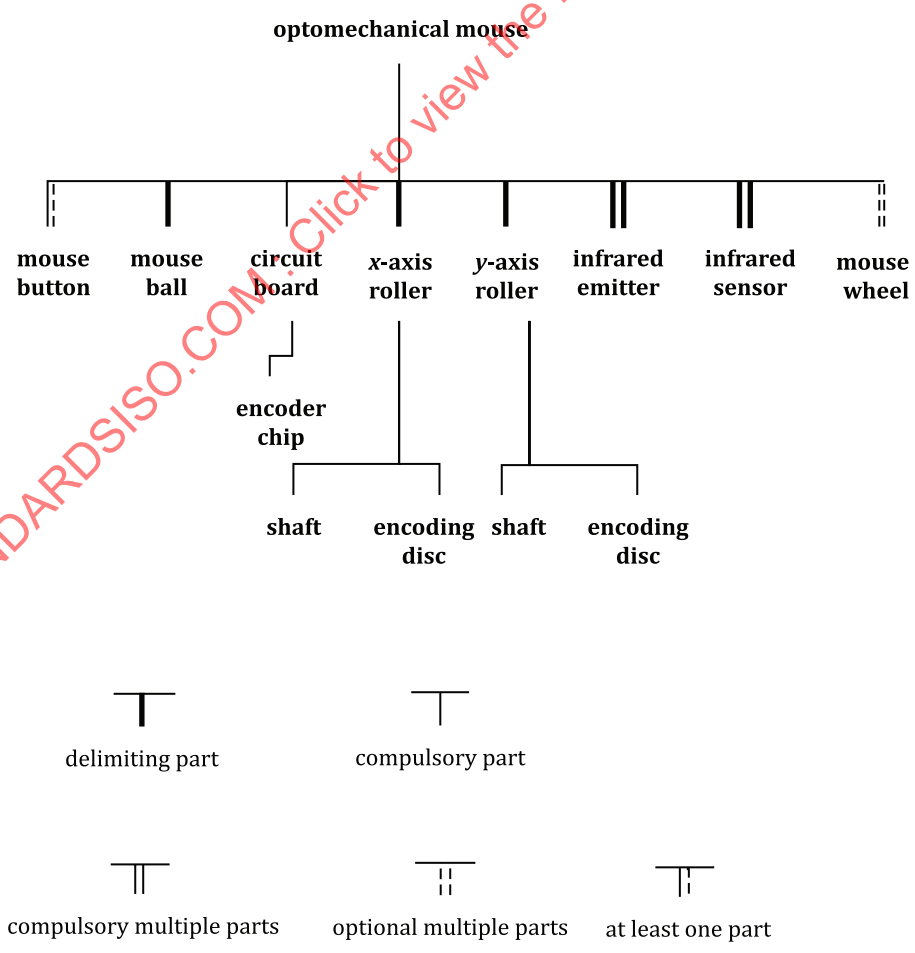
Verbal description

Before analysing *partitive relations*, it is necessary to determine whether the analysis starts with the *comprehensive concept* or one of its *partitive concepts*. In the following *concept diagram* and *concept model*, the analysis is based on 'optomechanical mouse' as the *comprehensive concept* (the whole) and its *partitive concepts* 'mouse button', 'mouse ball', 'circuit board', '*x*-axis roller', '*y*-axis roller', 'infrared emitter', 'infrared sensor' and 'mouse wheel' (the parts that make up the whole). The part 'mouse wheel' is optional since it is not found on all 'optomechanical mice'. This is indicated in the *concept diagram* by dotted lines and in the *concept model* by information about multiplicity. All the other parts are compulsory components of all 'optomechanical mice'. The *partitive concepts* 'mouse ball', '*x*-axis roller', '*y*-axis roller', 'infrared emitter' and 'infrared sensor' are considered delimiting parts because they behave like *delimiting characteristics* in that they allow the *comprehensive concept* 'optomechanical mouse' to be distinguished from *coordinate concepts* such as 'mechanical mouse' and 'optical mouse'.

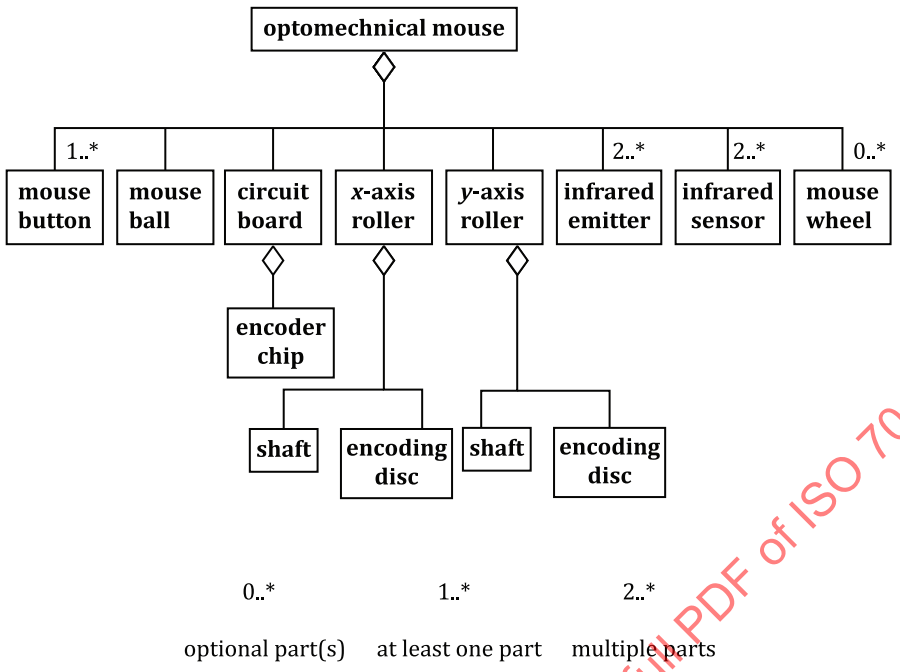
With regard to other 'computer mice' (see 5.5.4.2.1, Example 4), one of the *delimiting characteristics* of the *concept* 'optomechanical mouse' is 'detecting movement by means of rollers and light sensors'. As with *delimiting characteristics*, whether a part is delimiting depends on the *concept system*, the *coordinate concepts*, the inheritance principle and the *criterion of subdivision* used. In the *partitive relation* shown below, the rollers are conceptualized as '*x*-axis roller' and '*y*-axis roller' along with their parts.

NOTE According to ISO 24156-1:2014, 3.7, multiplicity "specifies how many objects depicted by a certain concept can be related to the objects depicted by another concept".

Traditional *concept diagram* (rake diagram)



UML-based *concept model*



Usually a partitive concept system does not provide a complete analysis of the *concepts*. If a *partitive concept* is not particular to the *comprehensive concept*, then the *extension* of the *partitive concept* cannot be accounted for completely and some *characteristics* of its *intension* can be lacking. *Partitive concepts*, i.e. parts, that are common to two or more *coordinate concepts* in a *generic relation* may have been inherited from the *generic concept*. Such inherited *partitive concepts* shall be analysed in relation to the *generic concept* and not to the *comprehensive concept*.

EXAMPLE 2

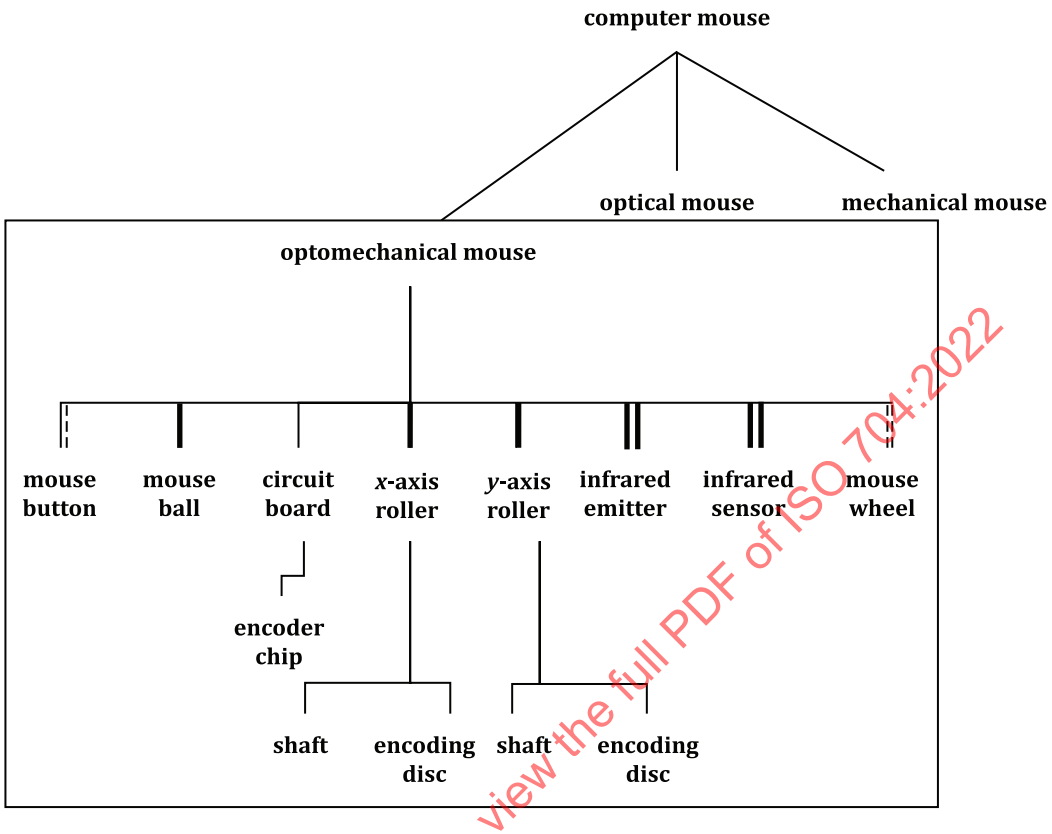
Verbal description

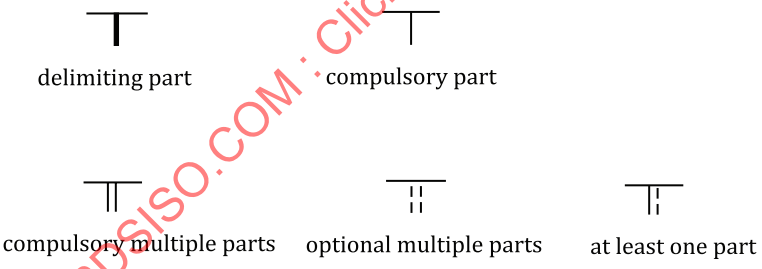
The part 'mouse button' is not conceptually unique to 'optomechanical mice' but is inherited from the *generic concept* 'computer mouse'. The 'mouse button' of an 'optomechanical mouse' does not form a separate *concept* with its own *designation* but rather constitutes only a portion of the set of *objects* that make up the *extension* of the *concept* 'mouse button'. Other types of 'computer mice' also have 'mouse buttons'. The complete *extension* of the *concept* 'mouse button' can only be determined when 'mouse button' is analysed with regard to the *generic concept* 'computer mouse'.

The 'mechanical mouse' and 'optomechanical mouse' have, basically, the same parts. Both use rollers and other moving parts to detect the movement of the mouse ball. However, in addition to its mechanical parts, an 'optomechanical mouse' uses 'infrared emitters' and 'infrared sensors' to detect and transmit the movement of the mouse ball.

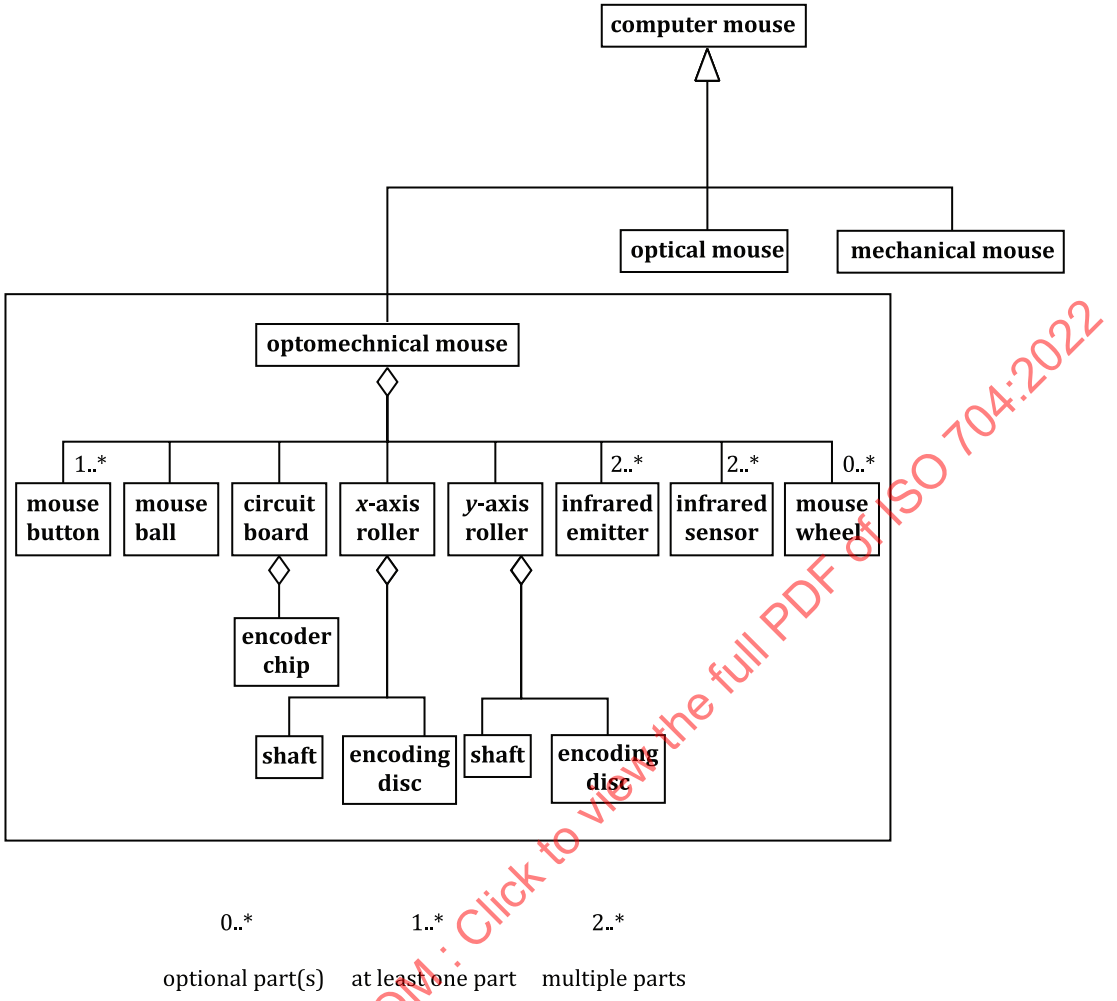
The parts 'mouse ball', '*x*-axis roller', '*y*-axis roller' and their parts, as found in a 'mechanical mouse' or an 'optomechanical mouse', represent *partitive concepts* that are unique with regard to other 'computer mice' and hence can be defined on the basis of *partitive relations.*

Traditional *concept diagram* (rake diagram, supplemented by relevant *generic relations*)





UML-based *concept model* (including relevant *generic relations*)



Multidimensional partitive concept systems are possible, although they are less common.

EXAMPLE 3

Verbal description

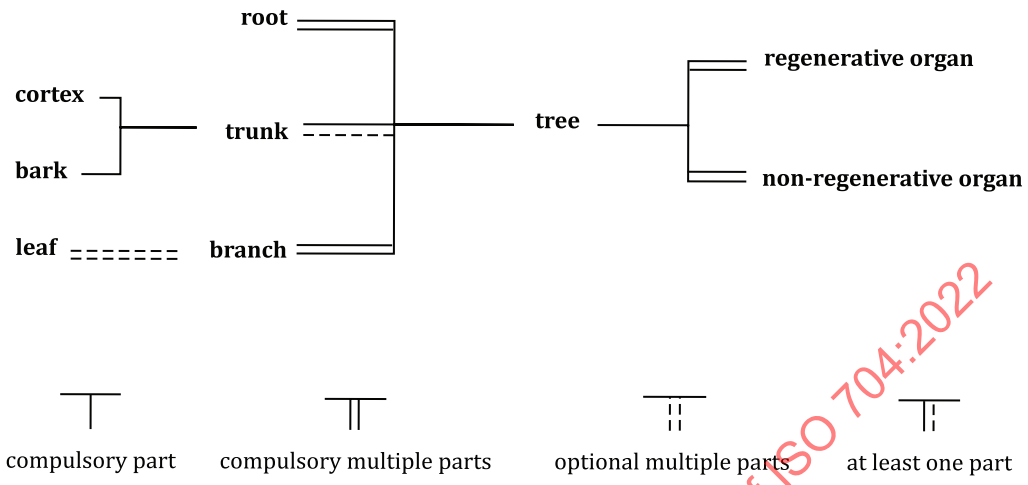
Criterion of subdivision: the *concept* 'tree' viewed according to 'composition as a living plant'

Comprehensive concept:	***Partitive concepts:***
'tree'	'root', 'trunk', 'branch', 'leaf'

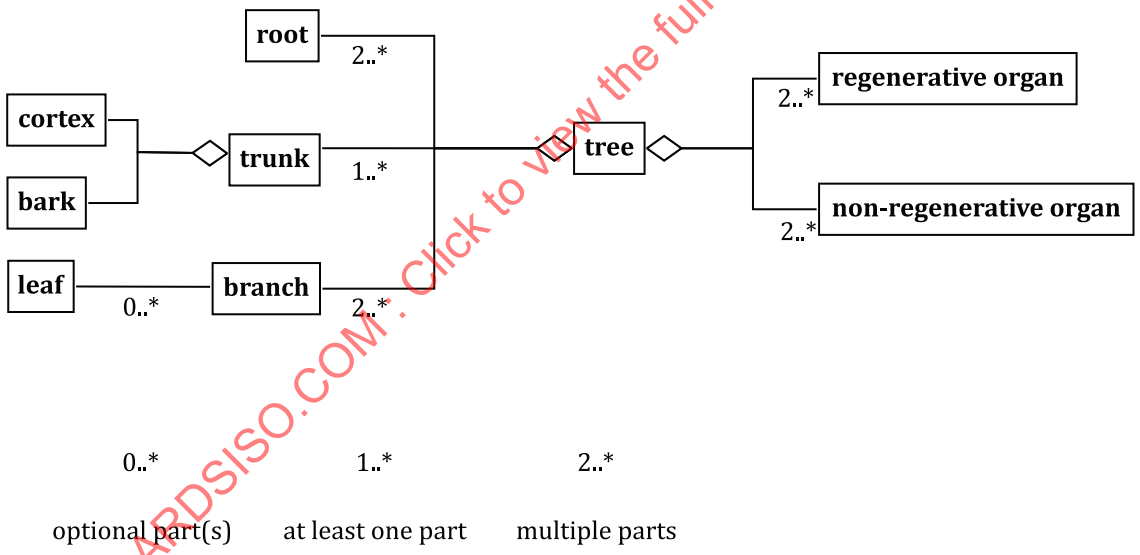
Criterion of subdivision: the *concept* 'tree' viewed according to 'regenerability of organs'

Comprehensive concept:	***Partitive concepts:***
'tree'	'regenerative organ', 'non-regenerative organ'

Traditional *concept diagram* (rake diagram)



UML-based *concept model*



Apart from traditional *concept diagrams* (rake diagrams) and UML-based *concept models*, *partitive relations* can also be visualized by an indented list (see Example 4 below).

EXAMPLE 4

1– tree
* (criterion of subdivision: composition as a living plant)
1–1 branch
1–1–1 leaf
1–2 root
1–3 trunk
1–3–1 bark
1–3–2 cortex
* (criterion of subdivision: regenerability of organs)
1–4 regenerative organ

1–5 non-regenerative organ

NOTE 1 The wordings with an asterisk (*) serve to structure the indented list according to relevant *criteria of subdivision.* They are not part of the concept hierarchy.

NOTE 2 Multiplicity and optionality of parts, as shown in Example 3, are not reflected in this list.

5.5.4.3.2 Partitive relations and individual concepts

In a *generic relation*, an *individual concept* constitutes the most specific *concept* in the hierarchy (bottom rung) and cannot be subdivided further. However, if the same *individual concept* is viewed as a *comprehensive concept* in a *partitive relation*, the *individual concept* can be subdivided into its parts.

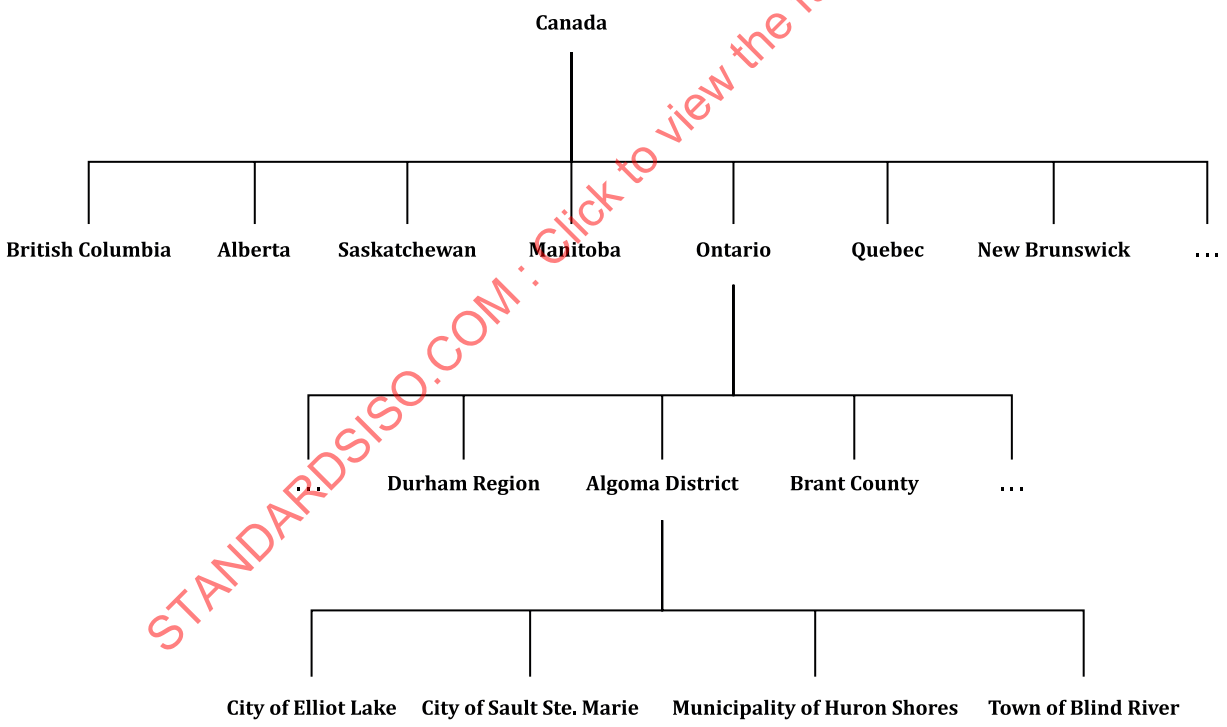
EXAMPLE

Verbal description

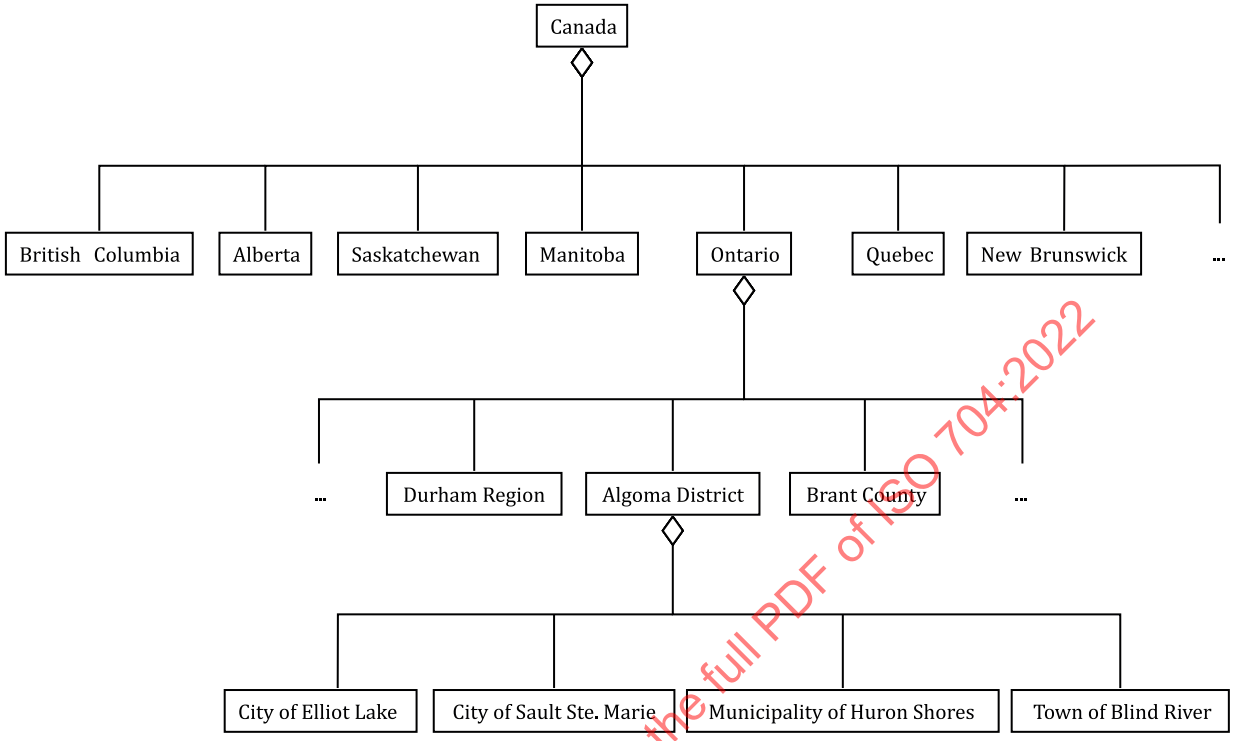
In a *partitive relation*, the *individual concept* 'Canada', which in the Example in 5.5.4.2.2 constitutes the bottom rung in a concept ladder, can be subdivided into the various *partitive concepts* that correspond to parts of the *object* 'Canada'. The *proper name* "Canada" thus represents an *individual concept* whose *partitive concepts* (provinces, counties, municipal units) are also designated by *proper names*.

An ellipsis (...) indicates further *specific concepts* that are not shown.

Traditional *concept diagram* (rake diagram)



UML-based *concept model*



5.5.5 Associative relations

Associative relations are usually derived from underlying relations between *objects*. Depending on the *domain* or *subject*, *associative relations* can be more common than *generic relations* and *partitive relations*. There are various types and subtypes of *associative relations* (see Table 1 below).

Table 1 — Types and subtypes of associative relations

Type (description)	Subtype (relation role)	Example(s)
contiguity relation (based on proximity between *objects*)	enhancement relation (tool – accessory)	'smartphone' – 'selfie stick'
	attachment relation (tool – connection)	'computer screen' – 'HDMI port'
	locative relation (container – contained; contained – contained)	'milk carton' – 'milk'; 'fish' – 'shellfish' (with regard to 'sea')
	material relation (concrete item – material)	'seawater' – 'salt' (one of several materials); 'steel tyre' – 'steel' (one material only)
	property relation (material – state)	'air' – 'humidity'
	ownership relation (*object* – owner)	'public enterprise' – 'state'
	rank relation (level of hierarchy – level of hierarchy)	'chair' – 'vice-chair'

Table 1 *(continued)*

Type (description)	Subtype (relation role)	Example(s)
sequential relation (based on a criterion for ordering *objects*)	*temporal relation* (earlier occurrence – later occurrence)	'production' – 'consumption'
	spatial relation (*object* in space – *object* in space)	'floor' – 'ceiling'
	causal relation (cause – effect)	'humidity' – 'corrosion'
	developmental relation (step of a process – step of a process)	'tadpole' – 'frog'
activity relation (based on an action object)	agent relation (action – actor)	'teach' – 'teacher'
	object relation (action – *object*)	'energy conversion' – 'energy'; 'publication' – 'book'
	tool relation (action – instrument)	'click' – 'computer mouse'
	manner relation (action – method)	'teach' – 'e-learning'
	locational relation (action – place)	'learn' – 'school'
	purpose relation (action – objective)	'medical examination' – 'diagnosis'
	result relation (action – beneficiary)	'hospital discharge' – 'patient'
	patient relation (action – patient)	'psychotherapy' – 'client'
origination relation (based on the origin of an *object*)	originator relation (producer – product)	'baker' – 'bread'
	ingredient relation (raw material – product)	'wood' – 'desk'
	instrument-product relation (tool – product)	'oven' – 'bread'
instrumental relation (based on a tool used for specific purposes)	agent-instrument relation (professional – tool employed)	'painter' – 'brush'
	object-instrument relation (*object* – tool used for handling)	'time' – 'clock'; 'screw' – 'screwdriver'
	instrument-patient relation (tool employed – patient)	'baby sling' – 'baby'
interactional relation (based on a two-way connection between *objects*)	dependency relation (controlled – controller; controller – controlled; agent – patient)	'pointer' – 'computer mouse'; 'employer' – 'employee'; 'interviewer' – 'interviewee'
	representational relation (entity – representative)	'length' – 'metre'; 'country' – 'flag'

Table 1 *(continued)*

Type (description)	Subtype (relation role)	Example(s)
transmission relation (based on the sender-receiver principle)	sender-receiver relation (sender – receiver)	'satellite' – 'parabolic dish antenna'; 'seller' – 'buyer'
	sender relation (sender – *object*)	'mobile phone' – 'text message'; 'seller' – 'merchandise'
	receiver relation (*object* – receiver)	'text message' – 'mobile phone'; 'merchandise' – 'buyer'
opposite relation (based on *objects* that can be viewed as opposites of each other)	contrary relation (*essential characteristics* of two or more *concepts* viewed as opposites)	'positive correlation' – 'zero correlation' – 'negative correlation'
	contradictory relation (negation between two *concepts*)	'hairy-headedness' – 'baldness'; 'conformity' – 'nonconformity'

5.6 Concept systems

5.6.1 General

Terminology work serves to develop and visualize a coherent *concept system*. The unique position of each *concept* within a *concept system* is determined by the *intension* and the *extension*. In the case of *concept systems* based on *generic relations*, the *concept system* also reflects the inheritance principle, because *specific concepts* inherit *characteristics* from their *generic concepts*.

Concept systems are cognitive tools that serve to:

— model *concepts* and relations between them within a *concept field* in a *domain* or *subject*;

— clarify *concept relations*;

— form the basis for a uniform and standardized *terminology*;

— facilitate the comparative analysis of *concepts* and *designations* across *natural languages* and across *domains* or *subjects*;

— facilitate the writing of *definitions*;

— facilitate the inclusion of all relevant *concepts* while developing a *terminology resource*.

5.6.2 Development and visualization

Once a *concept system* has been developed on the basis of a relevant *concept field*, different techniques can be used to produce *concept diagrams* or *concept models*. Developing *concept systems* involves a series of iterative operations leading, for example, to the compilation of a *terminology resource* in a specific *domain* or *subject*. These operations generally include:

— selecting the *concept field*, the preliminary *designations* and *concepts* to be treated by taking into account the *domain* or *subject* as well as the target audience and its needs;

— analysing the *intension* and *extension* of each *concept*;

— determining the relations and positions of these *concepts* within the *concept system*;

— visualizing the resulting *concept system* by means of a *concept diagram* or a *concept model*;

— writing or identifying and analysing *definitions* for the *concepts* based on the *concept relations*;

— assigning *designations* to each *concept*.

The steps involved in developing *concept systems* and defining *concepts* are closely related. *Definitions* shall reflect the *concept system*. If appropriate *definitions* already exist, the *concept relations* within the *concept system* shall be established primarily by analysing the *characteristics* of each *concept* included in its *definition*. Consequently, developing and visualizing a *concept system* as well as writing *definitions* for the relevant *concepts* are iterative processes that often require review and repetition of some operations.

Concept systems can be represented in different ways, for example by traditional *concept diagrams* following the requirements laid down in this document, or UML-based *concept models* drawn in accordance with ISO 24156-1. *Concept diagrams* and *concept models* shall fulfil the following criteria:

— clarity: enable terminology users to get a quick and thorough overview of the *domain* or *subject* in question;

— intelligibility: present the *concept system* in a user-friendly way and avoid complexity by limiting the number of *concepts* and *concept relations* shown;

— transparency: clearly display the various types of *concept relations* and *criteria of subdivision*;

— extensibility: be easy to expand and modify.

5.6.3 Types

Concept systems can be categorized according to various criteria. Based on the types of *concept relation* involved, the types of *concept systems* include the following:

— Generic concept system: a *concept system* in which all the *concepts* relate to each other as *generic concepts* and *specific concepts* (see 5.5.4.2.1, Example 1).

— Partitive concept system: a *concept system* in which all the *concepts* relate to each other as *comprehensive concepts* and *partitive concepts* (see 5.5.4.3.1, Example 1).

— Associative concept system: a *concept system* in which all the *concepts* relate to each other by means of *associative relations*. The type or subtype of *associative relation* between any two *concepts* may vary within a system (see Example 1 below). In special cases, the type of *associative relation* can be made explicit by a label adjacent to the line representing the *associative relation*, and directionality can be expressed by appropriate graphical means.

— Mixed concept system: a *concept system* using a combination of *concept relations* (see Examples 2, 3 and 4 below).

Based on the number of *criteria of subdivision*, the types of *concept systems* include:

— monodimensional concept system: a *concept system* in which *superordinate concepts* are subdivided according to one *criterion of subdivision* (see 5.5.4.2.1, Example 1);

— multidimensional concept system: a *concept system* in which *superordinate concepts* are subdivided according to more than one *criterion of subdivision* (see 5.5.4.2.1, Example 4, 5.5.4.3.1, Example 3, and Example 2 below).

Based on the number of immediate *superordinate concepts*, the types of *concept systems* include:

— monohierarchical concept system: a *concept system* in which the *concepts* have only one immediate *superordinate concept* (see 5.5.4.2.1, Example 1);

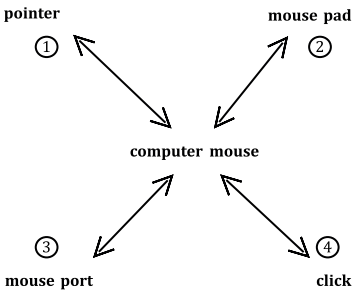
— polyhierarchical concept system: a *concept system* in which one or more concepts have more than one immediate *superordinate concept* (see Example 5 below).

EXAMPLE 1

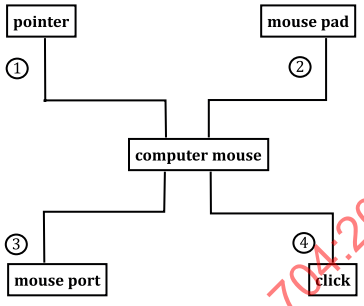
Verbal description

This example shows an associative concept system including *associative relations* only.

Traditional *concept diagram*



UML-based *concept model*



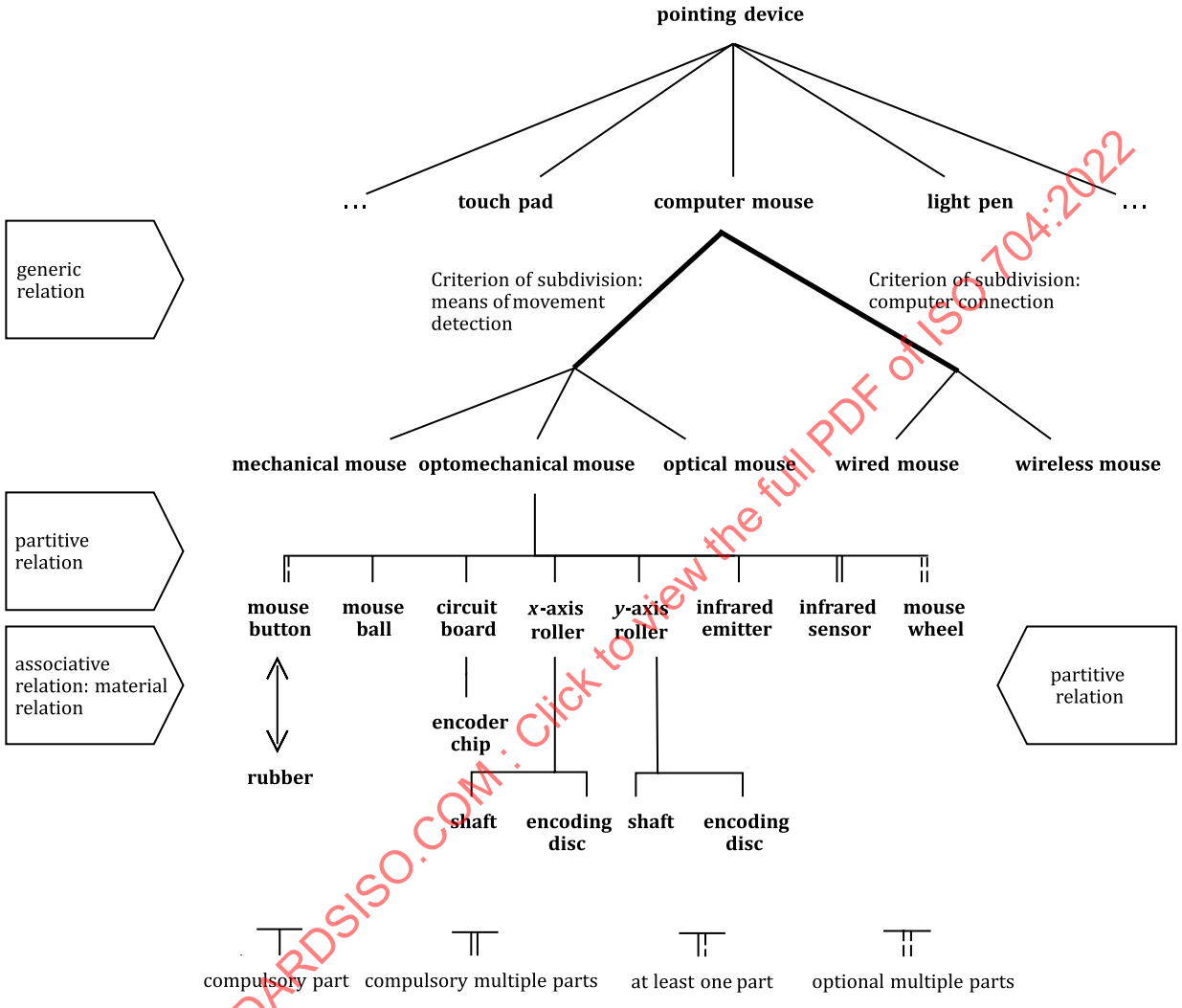
1 dependency relation 2 enhancement relation 3 attachment relation 4 tool relation

EXAMPLE 2

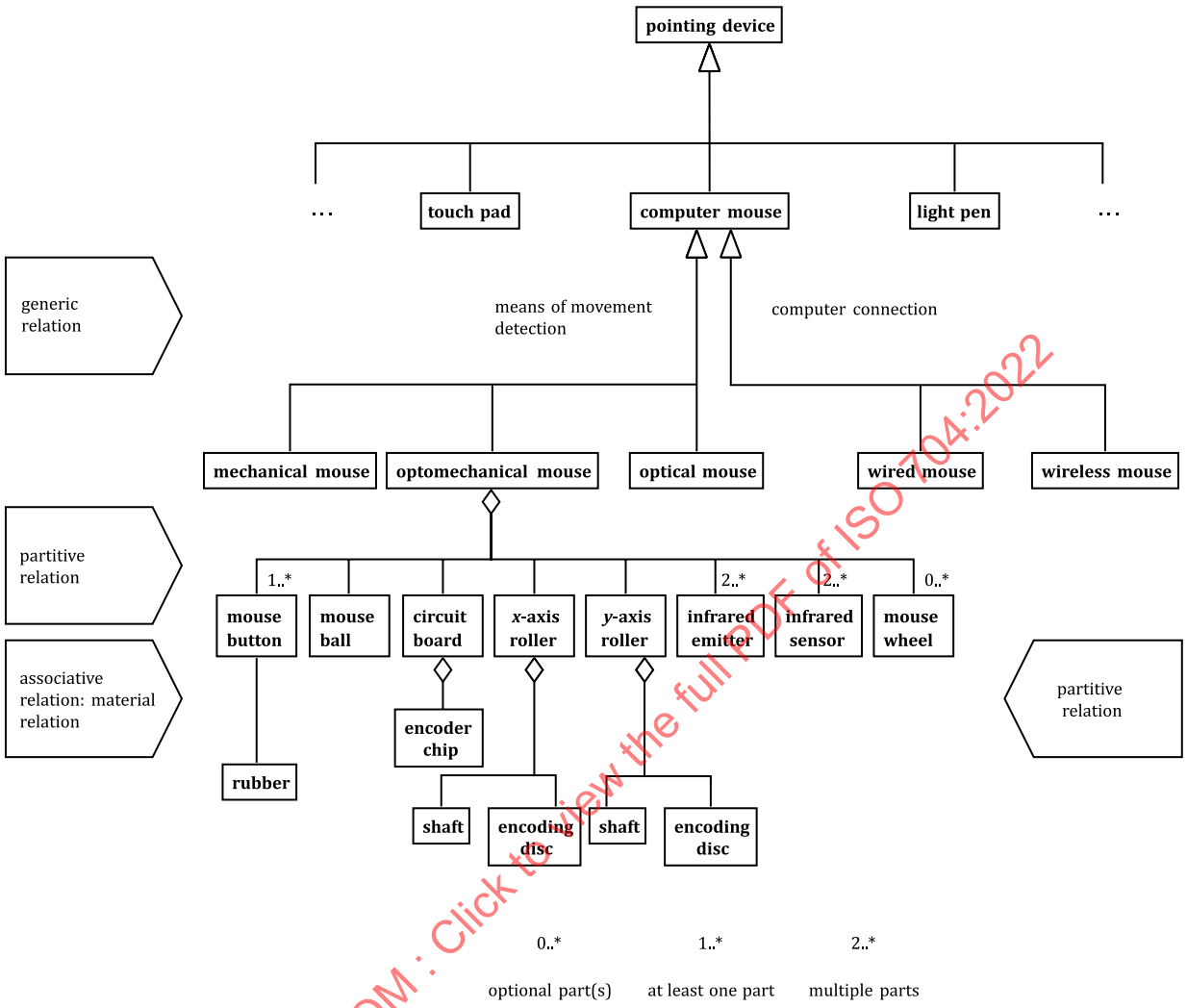
Verbal description

This example shows a multidimensional mixed concept system with *generic relations, partitive relations* and an *associative relation*. An ellipsis (...) indicates further *specific concepts* that are not shown.

Traditional *concept diagram*



UML-based *concept model*

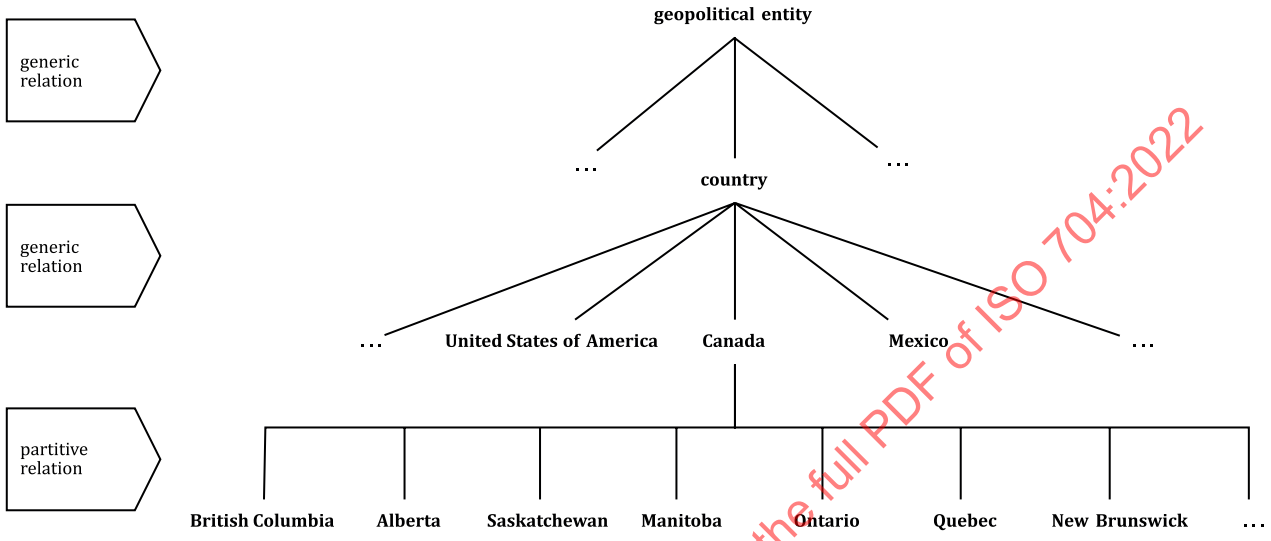


EXAMPLE 3

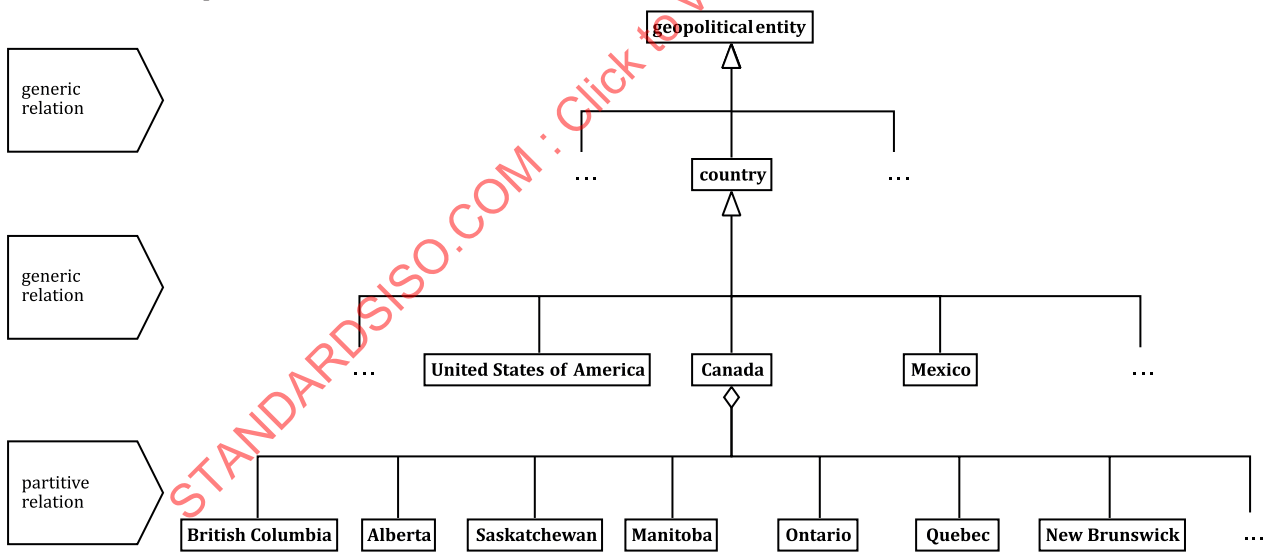
Verbal description

This example shows a mixed concept system with both *generic relations* and *partitive relations* between *general concepts* and *individual concepts*. An ellipsis (...) indicates further *specific concepts* and *partitive concepts* that are not shown.

Traditional *concept diagram*



UML-based *concept model*



Different *domains* or *subjects* view the same *objects* in different ways. Hypothetical-deductive approaches such as mathematics can create *concept systems* based on statistics or abstract formulae. The natural sciences can view the same *objects*, but draw up *concept systems* resulting from the classification of observed phenomena. Engineering and technology can structure a factory according to production processes, whereas experts in law or sociology can view the same phenomena in terms of legal liability or social interaction.

EXAMPLE 4

Verbal description

This example describes the *concept* 'climate change', as defined in an International Standard. It also shows two mixed concept systems. An ellipsis (...) indicates further *specific concepts* that are not shown.

climate change
change in climate that persists for an extended period, typically decades or longer

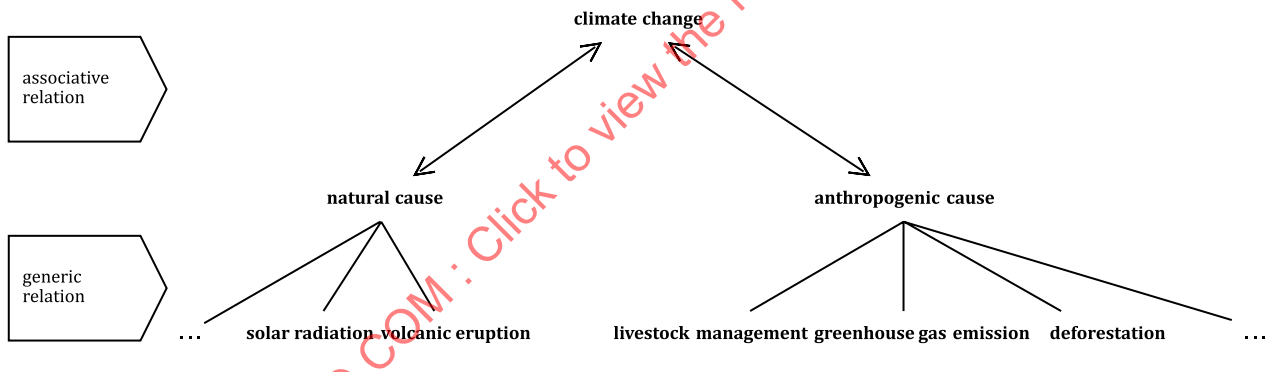
Note 1 to entry: Climate change can be identified by such means as statistical tests (e.g. on changes in the mean, variability).

Note 2 to entry: Climate change might be due to natural processes, internal to the climate system, or external forcings such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use.

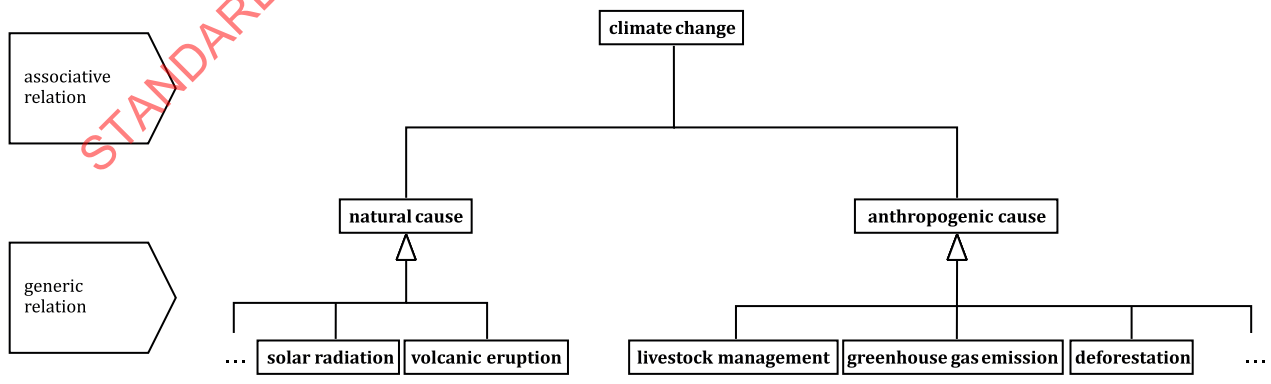
[SOURCE: ISO 14090:2019, 3.5]

Based on Note 2 to entry above and from the point of view of climatology, 'climate change' can be viewed as an *object* caused by various natural and anthropogenic factors. One part of a corresponding mixed concept system 'climate change' can be represented in the following ways.

Traditional *concept diagram*

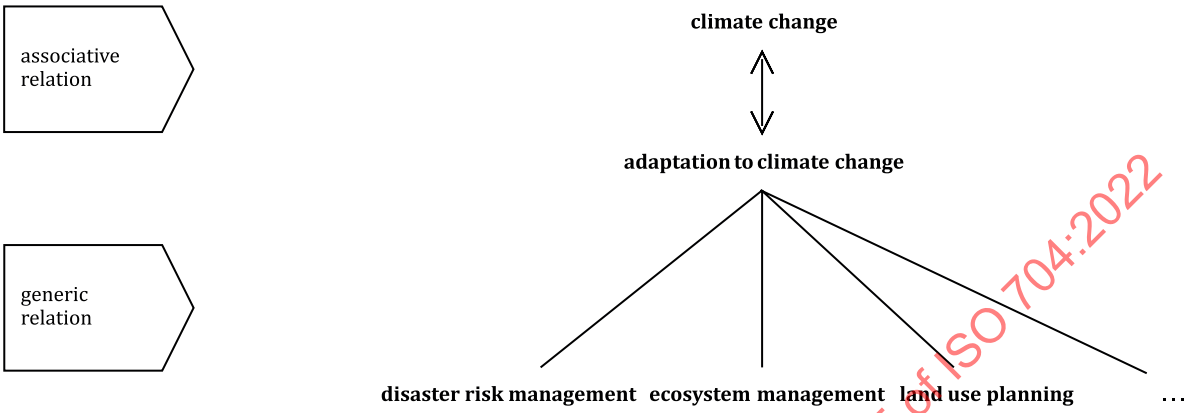


UML-based *concept model*

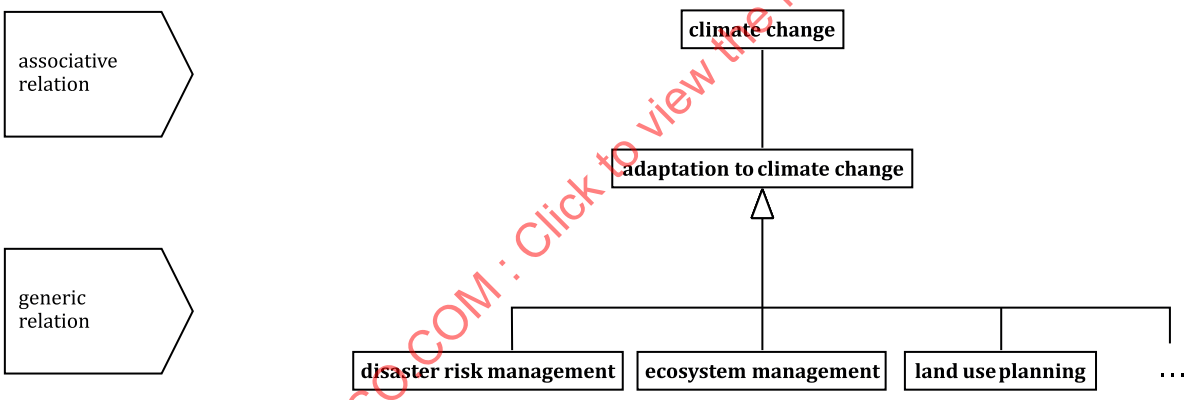


From the point of view of social sciences, 'climate change' can be viewed as an *object* for which there are various possibilities of adaptation for humans. One part of a corresponding mixed concept system 'climate change' can be represented in the following ways.

Traditional *concept diagram*



UML-based *concept model*

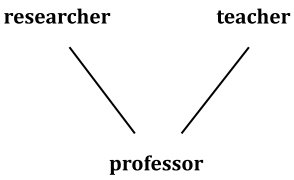


EXAMPLE 5

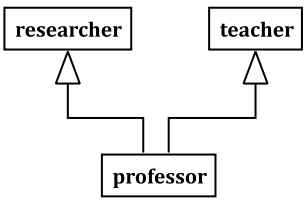
Verbal description

This example shows a polyhierarchical concept system.

Traditional *concept diagram* (tree diagram)



UML-based *concept model*



6 Definitions

6.1 General

A *definition* shall provide the *essential characteristics* and thus distinguish the *concept* from other *concepts*. Unlike an encyclopaedic description (see 6.6.3), a *definition*'s main purpose is not to provide all details about a given *concept*.

EXAMPLE

In most encyclopaedic sources, an explanation of 'penguin' includes the information that they live in the south temperate and Antarctic regions.

This information is not necessary to differentiate penguins from other birds and should not be included in a *definition*.

In the case of *terminology work* carried out in standardization, *terms* and other *designations* are standardized (with one specified as preferred, when there is more than one *designation*) as well as the *definition*. In scientific, mathematical, and technical documentation, the *definition* can be complemented with a graphic illustration (see also Clause A.2). The *definition* can also be expressed by or complemented by a formula (see 6.4.3.10, Example, and 6.4.5.5, Example).

Some *designations* are so long and complex that they can serve as *definitions* because the elements making up the *designation* represent the *concept's characteristics*. Some *definitions* are so short they can be thought of as *designations*. Despite this, the *definition* should not be confused with the *designation* in a *terminology resource*. Furthermore, synonyms should never be indicated in place of a *definition* in the way they often are in dictionaries describing *general language*. Although some *terminology resources* list *abbreviations* as *designations* and provide *full forms* in the place of *definitions*, this is not appropriate terminological practice. Both the *full form* and the *abbreviation* are *designations* and should be treated as *designations* in a *terminological entry*. The same consideration applies to equivalents in other *natural languages*.

When providing *definitions*, the needs of the target audience shall be taken into consideration:

— experts in the *domain* or *subject* in question, already familiar with the relevant conceptualization patterns and who can be familiar with the *designations*;

— experts in another *domain* or *subject* who can be familiar with the *designations* and the *concepts*; or

— non-experts who are unfamiliar with both the *designations* and the *concepts* of the *domain* or *subject*.

A *definition* alone can be insufficient. Developing *terminology resources* for non-experts often requires amplification, for example by adding other types of information (*contexts,* encyclopaedic information, explanations, notes or examples, see 6.6) or by the inclusion of a representation in other media (e.g. graphic illustration, sound clip). The format in which *definitions* are written varies from *natural language* to *natural language*. Every *natural language* has its own conventions and *definitions* should respect them.

6.2 Intensional definitions

The role of an *intensional definition* is to provide the minimum amount of information that forms the basis for conceptualization and that allows one to recognize a *concept* and differentiate it from other *concepts*, especially *coordinate concepts*. An *intensional definition* shall define the *concept* as a unit with an unambiguous *intension* reflecting a corresponding *extension*.

Intensional definitions shall begin by stating the immediate, i.e. closest, *superordinate concept*, followed by the *delimiting characteristic(s).* The *superordinate concept* situates the *concept* in its proper place in the *concept system* (i.e. 'computer mouse' as a type of 'pointing device', 'tree' as a type of 'plant'). In practice, *intensional definitions* are preferable to other types of *definitions* and should be used whenever possible as they most clearly reveal *characteristics* of a *concept* within a *concept system*. Other types of

definitions in current usage are treated in 6.3 (*extensional definitions*) and in Annex A (ostensive, lexical, précising and stipulative definitions).

The requirement of stating the immediate *superordinate concept* does not apply to the top *superordinate concept* in a *concept system*, which is usually not defined in that particular *concept system*.

NOTE For more details on *intensional definitions*, see Reference [70].

6.3 Extensional definitions

In some situations, a *definition* may be a list of *designations* that represent the *concept's* immediate *subordinate concepts*, under just one *criterion of subdivision*. This is called an *extensional definition*. The *subordinate concepts* correspond to *objects* making up the *extension* of the *concept*. (See 5.5.4.2.1, Example 4, and 5.6.3, Example 2, for examples of *criteria of subdivision*.) The *subordinate concepts* represented may either be *individual concepts* or *general concepts*. They can be ordered in various ways.

A *concept's extension* is not the same as an *extensional definition* describing that *concept*. The list of *designations* represents *concepts* that correspond to the *objects* making up the *extension*. It only suggests a *concept's intension* but does not determine it as in an *intensional definition*.

Extensional definitions are useful only in very limited circumstances. They shall be used when a given *concept* can be described more efficiently by an *extensional definition* than by an *intensional definition*. *Extensional definitions* shall be used only if

— the number of *subordinate concepts* to be enumerated is finite,

— the list of *subordinate concepts* is complete under one *criterion of subdivision*, and

— the *subordinate concepts* can be clarified by *intensional definitions* or are well known.

NOTE For more details on *extensional definitions*, see Reference [71].

6.4 Writing definitions

6.4.1 General

Some of the requirements and recommendations in this subclause can depend on the *natural language* in question. Therefore, in translations of this document, they shall be adapted to the norms of the relevant *natural language*.

NOTE Such adaptation does not violate the rules on the degree of correspondence as an identical version in another language in accordance with ISO/IEC Guide 21-1:2005, 4.2.

6.4.2 Nature of intensional definitions

An *intensional definition* shall reflect the *concept system* by describing the *concept* and its relations to other *concepts* in the *concept system*. *Intensional definitions* shall enable terminology users to reconstruct the *concept system*. The *characteristics* selected and presented in an *intensional definition* shall indicate the difference between one *concept* and another *concept* or the relation between the *concepts*.

An *intensional definition* is a statement in the form of an incomplete sentence without a full stop. The *definition* begins with a noun or other part of speech stating the immediate *superordinate concept* associated with the *concept* being defined (generally in lower case). This noun is followed by *delimiting characteristics* that distinguish the *concept* from its *coordinate concept(s)*. An article (generally indefinite) is implied but not written at the beginning of a *definition*. The *domain*, *subject* or a special usage can be indicated in angle brackets (<>) at the beginning of the *definition* (see 6.4.6 and Examples 1, 2, 3 and 4 below).

Intensional definitions of *concepts* that are represented by nominal *designations* shall begin with a noun or noun phrase, those represented by verbal *designations* shall begin with a verb. *Intensional definitions*

of *concepts* represented by adjectival *designations* may begin with an adjective or adjectival phrase. In most cases, they begin with a word or phrase that indicates the state or function of an *object*. Depending on the *natural language* in question, this can be a gerund or present participle, such as:

— being or occurring … ;

— of or relating to … ;

— having … .

A *terminological entry* can start with the *designation* to be read as a sentence: when the *concept* being defined is designated by a noun, the subject is the *designation*, the copula (which links the predicate and the subject) is the verb "be" and the *definition* completes the predicate (wording about the subject). Generally, the *designation* is followed by a separator, such as a punctuation mark (see 3.3, Example 1 and Example 2) or line break (see Examples 1, 2, 3 and 4 below).

EXAMPLE 1

optical mouse
<information technology> computer mouse in which movement is detected by light sensors
This *terminological entry* is to be read as: "[An] optical mouse in information technology [is a] computer mouse in which movement is detected by light sensors".

EXAMPLE 2

localize
<information technology> adapt the translation of a software product to the cultural norms of the target language
This *terminological entry* is to be read as: "[To] localize in information technology [is to] adapt the translation of a software product to the cultural norms of the target language".

EXAMPLE 3

acaulescent <botany> having no apparent stem above ground
This *terminological entry* is to be read as: "[being] acaulescent in botany [is] having no apparent stem above ground".

EXAMPLE 4

pyroclastic <geology> composed chiefly of rock fragments of volcanic origin
This *terminological entry* is to be read as: "[being] pyroclastic in geology [is being] composed chiefly of rock fragments of volcanic origin".

If a nominal *term* or *proper name* can also represent a similar or different *concept* as a verb, adjective or adverb, the part of speech shall be specified in appropriate form.

EXAMPLE 5

output, verb **output**, noun	**constant**, adjective **constant**, noun	**Xerox**®[3], noun **xerox**, verb
[3] Xerox® is a trademark of Xerox Corporation. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of the product named.		

6.4.3 Writing intensional definitions

6.4.3.1 *Intensional definitions* are statements of *essential characteristics* that make up the relevant *concepts*. They shall be as concise as possible and as complex as necessary. *Intensional definitions* shall

be written in accordance with the formal conventions specific to the *natural language* in question. In the case of writing *definitions* for standards, see ISO 10241-1 for the necessary details.

Before drafting an *intensional definition*, it is necessary to determine the *concept relations* and to model a *concept system* within which the *concept* is situated. If an *intensional definition* already exists, in an International Standard for example, it should be adopted as it stands only if it is consistent with other *concepts* in the *concept system*. This allows the *concept* in question to be incorporated into the *concept system*. Otherwise, it should be adjusted and/or commented.

When modelling a *concept system* and drafting the corresponding *intensional definitions*, it is essential to determine which *concepts* belong to the *general language* and thus need not be defined. *Designations* of such *concepts* are usually recorded in dictionaries describing *general language*.

Generic concepts, except the top *generic concept* in the *concept system*, should be defined before defining their *specific* concepts. When drafting a new *intensional definition*, the *designations* used in it should represent *concepts* with *definitions* either in the same *terminology resource* or in other resources, including dictionaries describing *general language*.

6.4.3.2 An *intensional definition* shall describe only one *concept*. It shall not include hidden *definitions* of other *concepts*. Any *characteristic* that requires a clarification shall be defined as a separate *concept* in a separate *terminological entry*.

EXAMPLE

optical mouse computer mouse with light sensors, phototransistors that receive light, convert it into electrical signals and are used to detect movement, which in turn controls the location of a pointer on a computer screen This draft *definition* includes the *characteristics* 'phototransistors that receive light, convert it into electrical signals and are used to detect movement'. These *characteristics* constitute a hidden *definition* of the *concept* 'light sensor'. Thus, they should not be included in the *intensional definition* of 'optical mouse' but be used in a separate *definition* of the *concept* 'light sensor'.

6.4.3.3 An *intensional definition* shall describe a *concept*, not the words or elements that make up a *designation*.

EXAMPLE 1

draft *definition* (lexical definition, see Clause A.3)	**coniferous tree** tree bearing cones The wording "bearing cones" is an explanation of the word "coniferous" rather than a *delimiting characteristic* of 'coniferous tree'.
corrected *definition*	**coniferous tree** needle-leaved or scale-leaved gymnospermous tree

EXAMPLE 2

draft *definition* (lexical definition, see Clause A.3)	**population** collective term used to describe items being analysed The wording "collective term …" introduces an explanation about the *term* rather than an *intensional definition*.
corrected *definition*	**population** totality of items under consideration [SOURCE: ISO 3534-1:2006, 1.1]

6.4.3.4 An *intensional definition* shall not contain *characteristics* that belong logically to its *generic concepts* or *specific concepts*.

EXAMPLE

In the *intensional definition* of 'optical mouse', it is not appropriate to indicate the *characteristic* 'being hand-manoeuvred along a firm, flat surface' since this *characteristic* is part of the *intension* of the *generic concept* 'computer mouse'.

6.4.3.5 An *intensional definition* using *characteristics* based on a *generic relation* shall represent the *concept* by stating the immediate *generic concept*, followed by the *delimiting characteristics* that differentiate the *concept* from *coordinate concepts* in a generic concept system. By stating the immediate *generic concept*, the *characteristics* that make up its *intension* are implicitly assumed in the *intensional definition* based on the inheritance principle (see 5.5.4.2.1 and 5.5.4.3.1). An *intensional definition* shall be based on the *concept relations* determined during terminological analysis. It can be supplemented by further information (see 6.6) or a representation in other media (e.g. graphic illustration, sound clip).

EXAMPLE

mechanical mouse computer mouse in which movement is detected by rollers and a ball **optomechanical mouse** computer mouse in which movement is detected by rollers and light sensors **optical mouse** computer mouse in which movement is detected by light sensors NOTE Optical mice are available in wired and wireless options. These *intensional definitions* are based on the *concept system* in 5.5.4.2.1, Example 4: *Generic concept*: 'computer mouse'. *Specific concepts*: 'mechanical mouse', 'optomechanical mouse', 'optical mouse', 'wired mouse', 'wireless mouse'. *Delimiting characteristics*: 'detecting movement by means of rollers', 'detecting movement by means of rollers and light sensors' and 'detecting movement by means of light sensors'.

6.4.3.6 An *intensional definition* using *characteristics* based on a *partitive relation* shall describe the *concept* by stating the immediate *comprehensive concept* and the *delimiting characteristics*. It is therefore necessary to analyse the *comprehensive concept* first to determine its position in a *concept system* and to indicate its relation to the *partitive concepts*. Such an *intensional definition* typically begins with a wording such as "part of", "component of", "section of", "period of" or "element in", followed by the *comprehensive concept* and the *delimiting characteristics*. A *concept* shall be defined as a *partitive concept* only if it constitutes a distinct part of the *comprehensive concept*. In the Example below, to have a complete *extension* of the *concept* 'mouse ball', the partitive concept system for both 'mechanical mouse' and 'optomechanical mouse' shall be analysed (see 5.5.4.3.1, Example 1 and Example 2 about 'optomechanical mouse').

EXAMPLE

mouse ball spherical part on the underside of a mechanical or an optomechanical mouse that rolls on a firm surface and whose movement is used to control the location of a pointer on a computer screen This *intensional definition* of 'mouse ball' is based on the partitive concept system: *Comprehensive concept*: 'mechanical mouse' or 'optomechanical mouse'. *Partitive concept*: 'mouse ball'. *Characteristics:* — 'being round like a sphere'; — 'being located on the underside'; — 'rolling on a firm surface'; — 'controlling the location of a pointer on a computer screen by its movement'.

6.4.3.7 An *intensional definition* can contain *characteristics* based on an *associative relation* established between two *concepts*. The *intensional definition* shall state the immediate *generic concept* followed by *characteristics* that indicate the relation between the *concepts* in question. In many cases, the *generic concept* is not specific to the relevant *domain* or *subject*. Therefore, ensure that the complete *intension* and *extension* of the *concept* have been analysed thoroughly before defining the *concept* based on an *associative relation*. The associative concept system in 5.6.3, Example 1, shows an enhancement relation between 'mouse pad' and 'computer mouse'.

EXAMPLE

mouse pad
small pad with a special surface designed for sensing the movement of a computer mouse

This *intensional definition* is based on the associative concept system in 5.6.2, Example 1, and on the *associative relation* of the type enhancement relation.

Generic concept: 'pad'.

Characteristics:

— 'being small' (about 20 cm by 25 cm and about 5 mm thick);

— 'being designed with a surface for sensing the movement of a computer mouse'.

6.4.3.8 A *comprehensive concept* can be defined based on a mixed concept system. The *intensional definition* shall begin by stating the immediate *generic concept* of the *comprehensive concept* being defined, followed by a listing of the delimiting parts corresponding to the *characteristics* that make up the *comprehensive concept*. Optional parts shall not be included. Optional parts frequently associated with a *concept* can be mentioned in a note. This type of *definition* is practical only if the number of parts to be enumerated is limited.

EXAMPLE

In the *intensional definition* of 'optomechanical mouse' in 6.4.3.5, Example, the immediate *generic concept* is 'computer mouse'; 'rollers' and 'light sensors' are delimiting parts as shown in the *concept system* in 5.5.4.3.1, Example 2 ('*x*-axis roller', '*y*-axis roller', 'infrared sensor').

6.4.3.9 Complex *intensional definitions* shall contain only information that makes the *concept* unique. Any additional descriptive information deemed necessary is to be included in a note (see 6.6.5). *Intensional definitions* should be drafted in a consistent manner bearing in mind the target audience's language register and knowledge level.

EXAMPLE

The three synonyms below clearly reflect differing language registers and are therefore likely to be familiar to different target audiences. Accordingly, the first of the two *intensional definitions* is more appropriate for general users while the second is directed at experts. A given *terminology resource* can contain different *intensional definitions* of one *concept* directed at different target audiences.

heart attack
acute episode of heart disease marked by the death or damage of heart muscle due to insufficient blood supply to the heart and characterized especially by chest pain

myocardial infarction
MI
infarction of the myocardium resulting typically from coronary occlusion, which may be marked by sudden chest pain, shortness of breath, nausea and loss of consciousness, and sometimes resulting in death

6.4.3.10 Some formulae describing scientific or mathematical quantities can be considered *intensional definitions* based on the *concept relations* represented by mathematical expressions. These mathematical expressions connect the quantity being described with each of the other quantities involved. This connection is mostly an *associative relation*. It is a *partitive relation* only if the mathematical expression is a summation (either algebraic or vectorial).

EXAMPLE

force
<motion of a material point>

$\vec{F} = m\vec{a}$

where

$\vec{F}$ is the force acting on a material point;

m is the mass of the material point;

$\vec{a}$ is the acceleration of the material point.

This *intensional definition* is based on a mixed concept system (*generic relation* and *associative relations*):

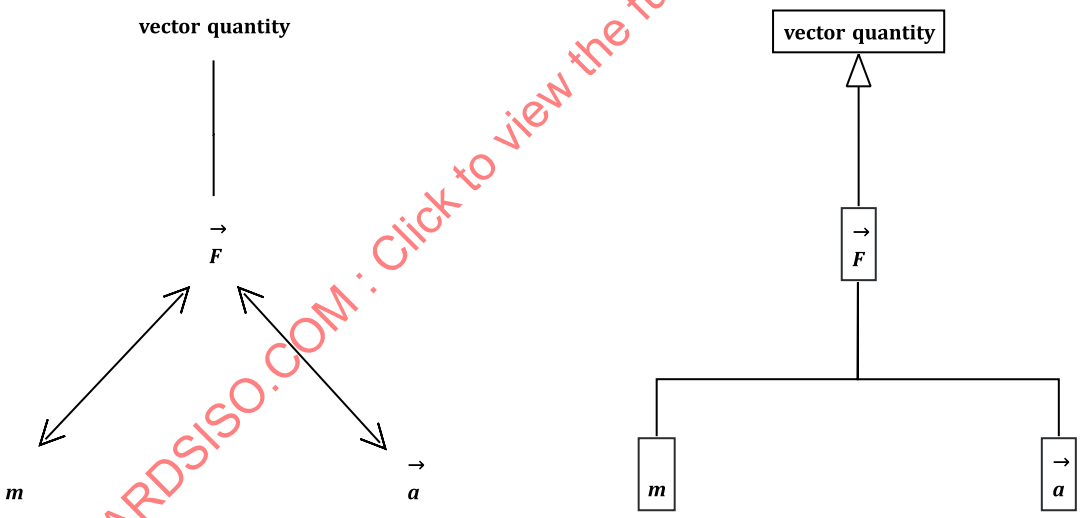
Generic concept: 'vector quantity'.

Characteristics:

— 'being related to m by the product $m\vec{a}$';

— 'being related to $\vec{a}$ by the product $m\vec{a}$'.

The resulting traditional *concept diagram* and UML-based *concept model* look as follows:



6.4.4 Applying the substitution principle

The substitution principle shall be used to test the validity of a *definition*. In the case of an *intensional definition*, it is valid if it can replace a *designation* without loss of or change in *essential characteristics* of the *concept* (see 6.5.2, Example 4).

6.4.5 Writing extensional definitions

6.4.5.1 An *extensional definition* shall enumerate all the *subordinate concepts* corresponding to *objects* in the *extension* and shall not include open-ended wordings (e.g. "and similar items", "etc."). Incomplete lists can be recorded in an example attached to an *intensional definition*. All the *subordinate concepts* enumerated shall be defined elsewhere in the *terminology resource* (except if they are well known). They shall not be defined in an *intensional definition* using the immediate *superordinate concept*, as this creates circularity (see 6.5.2).

EXAMPLE

incomplete *definition* **(open-ended wording)**	**coniferous tree** conifer such as cedars, cypresses, firs, larches, pines, etc.
incomplete *definition* **(not all *concepts* listed)**	**coniferous tree** juniper, larch, fir, cedar, cypress, redwood or pine
extensional definition	**coniferous tree** needle-leaved gymnospermous tree or scale-leaved gymnospermous tree EXAMPLE Familiar representatives of coniferous trees are cedars, yews, firs, junipers, larches, redwoods and pines.

6.4.5.2 *Extensional definitions* shall be written with reference to the position of the defined *concept* within its *concept system*. When the defined *concept* and the listed *subordinate concepts* are connected by a *generic relation*, the operator "or" shall be used for enumerating the *subordinate concepts*. The result is a *generic extensional definition*.

EXAMPLE 1

threatened species critically endangered species, endangered species or vulnerable species

EXAMPLE 2

noble gas helium, neon, argon, krypton, xenon, radon or oganesson

6.4.5.3 When the defined *concept* and the enumerated *subordinate concepts* are connected by a *partitive relation*, the operator "and" shall be used for enumerating the *subordinate concepts*. The result is a *partitive extensional definition*.

EXAMPLE

Family 18 in the Periodic Table helium, neon, argon, krypton, xenon, radon and oganesson

6.4.5.4 *Partitive concepts* whose *extension* extends beyond the *partitive relation* under analysis should not be defined too narrowly with regard to the *comprehensive concept*. In the Example below, the *definition* of the *concept* 'optical mouse' should not include the *characteristics* 'having a cord' and 'having a mouse wheel' as the corresponding *objects* are not necessarily parts of every *object* in the *extension*.

EXAMPLE

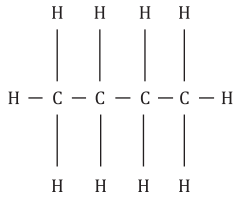
	optical mouse
***definition* too narrow**	computer mouse having a cord and mouse wheel in which movement is detected by light sensors on its underside
	optical mouse
corrected *definition*	computer mouse in which movement is detected by light sensors

6.4.5.5 Some formulae, e.g. structural formulae used in the *domain* of chemistry, can be considered *partitive extensional definitions*. A formula shall not be used as a *definition* and a *designation* at the same time, as this results in a tautology.

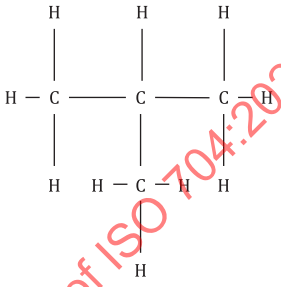
EXAMPLE

The molecular formula "C_4H_{10}" is an *appellation* and represents the *concept* 'butane'. Also, it reflects the basic chemical structure of various *objects* 'butane'. However, a molecular formula giving the number of atoms in a given molecule can still identify a substance ambiguously since the modelling of complex molecules can result in different atomic structures. Compounds with the same molecular formula that have different structures are called isomers. Isomeric variations have similar, but not necessarily identical, qualities. The *object* 'butane' is a relatively simple example with two variations only ('butane' versus 'isobutane'). More complex chemicals can have many isomeric variations for the same molecular formula. As shown below, structural formulae help to clarify the *concept* and act as *partitive extensional definitions*.

isobutane



butane



6.4.6 Indicating a domain or subject

The *extension* and the *intension* reflected in a *definition* shall be appropriate to the *concept system* in a given *domain* or *subject*. If the *domain* or *subject* is not clearly indicated in the *designation*, in the document title or is not generally understood, it shall be placed before the *definition* on the same line (see Example 1 and Example 2 below). In a *terminology database*, there is usually a separate field for indicating the *domain* or *subject*. It can be indicated in angle brackets (<>).

EXAMPLE 1

pointer
<programming> variable that contains the memory location of some data rather than the data itself

pointer
<user interface> onscreen symbol that indicates locations or choices on a computer screen

EXAMPLE An arrowhead.

When adapting a *definition* to a specific *domain* or *subject* (see Clause A.4), the *extension* thereby is limited to the *domain* or *subject* indicated at the beginning of the *definition*.

EXAMPLE 2

mouse
<information technology> hand-held pointing device that controls the location of an onscreen pointer and the selection of functions

The *concept* 'mouse' originally belongs to the *domain* of zoology, but its *designation* has been adopted as a metaphor in the *domain* of information technology. By clearly indicating the *domain*, a separate *concept* is signalled and ambiguity is avoided.

6.5 Deficient definitions

6.5.1 General

Deficient *definitions* shall be avoided. Common types of deficient *definitions* are:

— circular definitions;

— inaccurate definitions;

— negative definitions.

6.5.2 Circular definitions

If one *concept* is defined using a second *concept*, and if that second *concept* is defined using the *designation* or elements of the *designation* representing the first *concept*, the resulting *definitions* are said to be circular. Circular definitions, sometimes called tautological definitions, make it impossible to understand the *concept* and shall be avoided.

Circularity can occur:

— within a single *definition* (inner circle);

— within a system of *definitions* (outer circle).

An inner circle fails to describe an *essential characteristic*, e.g. when the *designation* is repeated to introduce the *definition* or when an element of the *designation* is used as a *characteristic*. When writing a *definition*, the *designation* shall not be repeated to introduce the *definition* (see Example 1 below).

EXAMPLE 1

	tree height
circular definition	**tree height** measured from the ground surface to the top of a tree
corrected *definition*	distance between the ground surface and the top of a tree

Upon application of the substitution principle (see 6.4.4), an outer circle results in the terminology user being unable to complete either *definition.* A *definition* is circular within a system of *definitions* when two or more *concepts* are defined by means of each other. In Example 2 below, the substitution principle clearly reveals repetition and circularity. Once the *definition* of 'natural tree stand' has been modified to remove the circularity, the *definition* of 'virgin forest' can remain as it is.

EXAMPLE 2

circular definitions	**virgin forest** forest constituted of a **natural tree stand**
	natural tree stand stand of trees grown in a **virgin forest**
Replacing the *term* "virgin forest" with the *concept's definition* in the *definition* of 'natural tree stand' results in:	
circular definition	stand of trees grown in a ***forest constituted of a natural tree stand***
corrected *definition*	stand of trees grown without interference by humans

The use of an element of the *designation* as a *characteristic* in the *definition* should be avoided as far as possible. However, if deemed necessary, an element that forms part of the *designation* may be used in the *definition*, provided its *concept* is clearly defined elsewhere. In Example 3 below, if the concept 'evergreen' is defined, the circularity is eliminated. In Example 4 below, 'haploid' in the first *definition* can be replaced by its *definition* without loss of or change in *concept* (see also 6.4.4).

EXAMPLE 3

circular definition	**evergreen tree** tree with **evergreen** foliage
corrected *definition*	tree that has green leaves throughout the entire year
separate *definition* of 'evergreen'	**evergreen** having green leaves throughout the entire year

EXAMPLE 4

definition	**haploid life cycle** period in an organism's life involving one generation when only the multicellular stage is **haploid**
separate *definition* of 'haploid'	**haploid** having a single set of chromosomes in the nucleus of each cell

When defining *concepts* on the basis of *partitive relations*, the same *partitive relation* shall be restricted to one level. It shall thus cover either the subordinate level ('a' has part 'b') or the superordinate level ('b' is part of 'a'), not both ('a' has part 'b' and 'b' is part of 'a'). In Example 5 below, if 'encoding disc' is defined as a *partitive concept* of '*x*-axis roller' or '*y*-axis roller', then '*x*-axis roller' or '*y*-axis roller' shall not be defined as a *comprehensive concept* of 'encoding disk'. This avoids circularity.

EXAMPLE 5

encoding disc
wheel-like part of an *x*-axis roller or a *y*-axis roller in a mechanical or optomechanical mouse whose slot rotation creates pulses used to control the location of a pointer on a computer screen

The *definition* of 'encoding disc' is based on the partitive concept system in 5.5.4.3.1, Example 2:

Comprehensive concepts: '*x*-axis roller' or '*y*-axis roller' and 'optomechanical mouse' (or 'mechanical mouse').

Characteristics:

— 'being wheel-like with slots';

— 'having slots in the disc that break the beam of light into pulses';

— 'pulsing being translated into signals that control the location of a pointer on a computer screen'.

6.5.3 Inaccurate definitions

A *definition* shall describe the *concept* precisely. It should be neither too narrow nor too broad. Otherwise, the *definition* is considered inaccurate. Non-delimiting or irrelevant *characteristics* in the *definition* can result in an *extension* where *objects* are unintentionally included or excluded. A *definition* is considered too broad if the *characteristics* selected to describe the *concept* include *objects* that should not be part of the *extension*. A *definition* is considered too narrow if the *characteristics* selected exclude *objects* that should be part of the *extension*. The *domain* or *subject* and source indicated in the *terminological entry* should also be considered when assessing whether a *definition* is too broad or too narrow.

EXAMPLE

***definition* too broad**	**optomechanical mouse** computer mouse that uses a ball to control the location of a pointer on a computer screen
By not specifying precisely the light sensors, this *definition* expands the *extension* to include mechanical mice.	
***definition* too narrow**	**optomechanical mouse** computer mouse composed of a mouse button, rubber ball, circuit board, *x*-axis roller, *y*-axis roller, LED infrared emitter and infrared sensor
By specifying a rubber ball and an LED infrared emitter, this *definition* limits the *extension* by excluding older mice that used metal balls and those that use non-LED infrared emitters.	
corrected *definition*	**optomechanical mouse** computer mouse composed of a mouse button, ball, circuit board, *x*-axis roller, *y*-axis roller, infrared emitter and infrared sensor

In adapting an existing *definition* to a specific *domain*, *subject* or situation, do not change the *extension* of the *concept*. A change to the *extension* leads to a new *concept*. Similarly, changes to any of the *characteristics* in a *definition* result in a new *concept*.

6.5.4 Negative definitions

A *definition* shall describe what a *concept* is, not what it is not. This requirement applies even if one of its *essential characteristics* can be viewed as the opposite of an *essential characteristic* of another *concept* or other *concepts*.

EXAMPLE 1

negative definition	**deciduous tree** tree other than an evergreen tree
corrected *definition*	**deciduous tree** tree that loses its leaves seasonally
delimiting characteristics	'having green leaves throughout the entire year' (*concept* 'evergreen tree') versus 'losing its leaves seasonally' (*concept* 'deciduous tree')

Concepts with opposite *essential characteristics* are called contrary concepts. With regard to a given *concept*, there can be more than one contrary concept.

EXAMPLE 2

negative definition	**translation service provider** language service provider that does not provide interpreting services or terminology services
corrected *definition*	**translation service provider** language service provider that provides professional translation services [SOURCE: ISO 17100:2015, 2.4.2]
delimiting characteristics	'providing translation services' (*concept* 'translation service provider') versus 'providing interpreting services' (*concept* 'interpreting service provider') versus 'providing terminology services (*concept* 'terminology service provider')

However, when a *concept* is the inverse of another *concept* that has already been defined, then the second *concept* may be described using a proper negation of the *designation* for the first *concept* and/or by negating its *definition*.

Concepts connected by such a relation are called contradictory concepts. With regard to a given *concept*, there can be only one contradictory concept. Contradictory concepts are often signalled by a negation in the *designation* or in the determining component of the *designation* of one *concept* to form the *designation* of the other *concept*.

EXAMPLE 3

conformity
fulfilment of a requirement

[SOURCE: ISO 9000:2015, 3.6.11]

nonconformity
non-fulfilment of a requirement

[SOURCE: ISO 9000:2015, 3.6.9]

vertebrate
animal having a backbone

invertebrate
animal having no backbone

aerobic respiration
process of oxygen assimilation that requires free oxygen

anaerobic respiration
process of oxygen assimilation that does not require free oxygen

In the pairs of *concepts* above, each *concept* is a contradictory concept with regard to the second *concept*. The *definition* of the second *concept* in each pair contains a necessary negation of one or more *essential characteristics* of the *definition* of the first *concept*. Also, the *designations* are negated:

"conformity" – "**non**conformity"	and	"fulfilment" – "**non**-fulfilment"
"vertebrate" – "**in**vertebrate"	and	"having" – "having **no**"
"aerobic" – "**an**aerobic"	and	"requires" – "does **not** require"

6.6 Information supplementing or replacing definitions

6.6.1 General

If information beyond a *definition* is needed, if no *definition* is available or if no *definition* can be drafted, other types of information can supplement or replace the *definition*. Such information can serve to develop, enrich or complement a *definition*. Information supplementing or replacing *definitions* is particularly important in ad hoc terminology work for translation, education and scientific or technical writing purposes. There, the emphasis is on how *terminology* is used in practice. Such information can also help to carry out *terminology work* for information and knowledge management where the emphasis is on *concept relations* and *concept systems*. For more details on ad hoc and systematic terminology work for multilingual communication, see ISO 12616-1:2021, 4.4.2.

Information supplementing or replacing *definitions* can be categorized as follows:

— *contexts* (see 6.6.2);

— encyclopaedic descriptions (see 6.6.3);

— explanations (see 6.6.4);

— notes (see 6.6.5);

— examples (see 6.6.6);

— other descriptions (see 6.6.7).

6.6.2 Contexts

A *context* allows terminology users to deduce the relevant *concept* by implication. It contains the relevant *designation* and is cited or adapted from a source. Typically, it consists of one or more complete sentences. A *context* can serve as the basis for writing a *definition*. *Contexts* can be collected at the beginning of *terminology work*, when *concept systems* and coherent *definitions* have not yet been written.

Furthermore, a *context* shall be free from linguistic errors (e.g. grammar and spelling). The following Examples include *contexts* and the sources from which the citations have been taken.

EXAMPLE 1

portfolio
A portfolio is a purposeful collection of student work that exhibits the student's efforts, progress, and achievements in one or more areas.

SOURCE: Reference [76], p. 60.

EXAMPLE 2

impression
An impression, in [...] online advertising, is a single view of an ad by one individual. Online publishers offer their ad inventory as available impressions and advertisers buy from them in the same terms.

SOURCE: Reference [77].

Sometimes, a *context* contains both the *full form* and its *abbreviation* (e.g. "computer mouse" versus "mouse" in Example 3 below).

EXAMPLE 3

computer mouse
Every day of your computing life, you reach out for your mouse whenever you want to move your cursor or activate something. Your mouse senses your motion and your clicks and sends them to the computer so it can respond appropriately.

SOURCE: Reference [58].

6.6.3 Encyclopaedic descriptions

An encyclopaedic description extends beyond a *definition* both in content and length. Typically, it consists of at least one complete paragraph. It not only conveys *characteristics* but can also provide a wide range of information about the *concept*, the *object* and/or even the relevant *designation(s)*. If it includes all the *characteristics* needed, an encyclopaedic description can serve as the basis for writing a *definition*.

EXAMPLE

Encyclopaedic description of 'computer mouse'

A device that controls the movement of the cursor or pointer on a display screen. A mouse is a small object you can roll along a hard, flat surface. Its name is derived from its shape, which looks [...] like a mouse, its connecting wire that one can imagine to be the mouse's tail, and the fact that one must make it scurry along a surface. As you move the mouse, the pointer on the display screen moves in the same direction. Mice contain at least one button and sometimes as many as three, which have different functions depending on what program is running. Some newer mice also include a scroll wheel for scrolling through long documents.

SOURCE: Reference [69].

Intensional definition based on encyclopaedic description

computer mouse
pointing device designed to be manipulated by hand, having at least one button for selecting items and moving on a firm, flat surface

6.6.4 Explanations

An explanation provides an account of some or even all *essential characteristics* of a *concept* without adhering to the formal structure of a *definition*. It can convey the *concept's* position in a *concept system* and elaborate on selected *characteristics*, e.g. on how the *concept* operates or is applied. Typically, an

explanation consists of one or two complete sentences. If no *definition* of the *concept* is available or exists, an explanation can be used as a starting point for writing a *definition*.

EXAMPLE

Explanation
computer mouse The computer mouse, named from its shape and size, is a piece of hardware that is commonly used as a pointing device for onscreen data and for executing functions by manually clicking on its surface.
Intensional definition based on explanation
computer mouse pointing device used for executing functions on a computer screen by moving it and clicking one of its buttons

6.6.5 Notes

A note is a short statement that describes *non-essential characteristics* or optional parts often associated with a *concept*. It can also list typical elements of the *extension* that complement the *definition*. Typically, it consists of at least one complete sentence. Notes can be part of *terminological entries* in International Standards. For the relevant rules, see ISO 10241-1.

EXAMPLE (Reproduced from 6.4.3.5, Example.)

optical mouse computer mouse in which movement is detected by light sensors
NOTE Optical mice are available in wired and wireless options.

6.6.6 Examples

An example demonstrates how a *concept* can be instantiated by a specific *object*. Thus, it provides information on possible forms of realization of a *concept* at the object level. An example can take the form of running text or a graphic illustration. Examples can be part of *terminological entries* in International Standards. For the relevant rules, see ISO 10241-1.

EXAMPLE

Concept 'single safety sign' instantiated by an example

[Symbol ISO 7010 – P004]

6.6.7 Other descriptions

There are various other forms of description that can be useful in *terminology work*. They can provide historical or culture-specific information about *objects* (e.g. their applications, inventors and locations), *properties*, *concepts* and *characteristics*. They can also contain statements about the *special language* used in the relevant *domain* or *subject*. For example, such a description can consist of a discussion about the use of synonyms in various sources. Such descriptions do not have a conventional format and can take the form of running text. Often, they are cited from existing sources. Depending on the *domain* or *subject*, a non-linguistic representation showing *characteristics* of a *concept* can replace the *definition* (see Clause A.2, Example 5).

EXAMPLE

Description of 'Internet of Things' (IoT) IoT has a broad use in industry and society today and it will continue to develop for many years to come. Various IoT applications and services have adopted IoT techniques to provide capabilities that were not possible a few years ago. IoT is one of the most dynamic and exciting areas of ICT. It involves the connecting of [p]hysical [e]ntities ("things") with IT systems through networks. Foundational to IoT are the electronic devices that interact with the physical world. Sensors collect the information about the physical world, while actuators can act upon [p]hysical [e]ntities. Both sensors and actuators can be in many forms such as thermometers, accelerometers, video cameras, microphones, relays, heaters or industrial equipment for manufacturing or process controlling. Mobile technology, cloud computing, big data and deep analytics (predictive, cognitive, real-time and contextual) play important roles by gathering and processing data to achieve the final result of controlling [p]hysical [e]ntities by providing contextual, real-time and predictive information which has an impact on physical and virtual entities. SOURCE: ISO/IEC 30141:2018, Introduction.

6.7 Indicating sources

Definitions and other types of terminological information shall be accompanied by identifiers of authoritative sources. Indicating sources helps to trace the origin of terminological information and facilitates cooperation in *terminology work*. Furthermore, it helps to respect copyright and to obtain proper authorization, if the source's usage conditions are not clear.

In general, the given source should be authoritative to lend credibility to the terminological information in question. Avoid errors in citations. Examples of citations are given in the examples of 6.6.2, 6.6.3 and 6.6.7.

For more details on using and indicating sources in *terminology work*, see ISO 690, ISO 12615 and ISO 23185.

7 Designations

7.1 General

While words or lexical units are usually recorded in dictionaries describing *general language*, a *terminology resource* shall include *designations*. When providing *designations*, the needs of the target audience shall be taken into consideration:

— experts in the *domain* or *subject* in question, already familiar with the relevant conceptualization patterns and who can be familiar with the *designations*;

— experts in another *domain* or *subject* who can be familiar with the *designations* and the *concepts*; or

— non-experts who are unfamiliar with both the *designations* and the *concepts* of the *domain* or *subject*.

Designations are subject to time considerations and can be readily replaced. For *terminology work*, it is important to record the former *designations* and their sequence. If a *designation* refers to an *object* that no longer exists, the *terminology resource* shall contain information (e.g. time period, date or status change) that specifies when one *designation* became outdated and another *designation* was introduced. If temporal information and/or changes in status are not recorded, *designations* are difficult to confirm.

7.2 Types

According to this document, *designations* are categorized as:

— *terms* (see 7.3);

— *proper names* (see 7.4);

— *symbols* (see 7.5).

Table 2 below shows how these three types of *designations* are linked to types of *concepts* and *objects*.

Table 2 — Relation between designation, concept, and object levels

Type of *designation*	*term*	*proper name*	*symbol*
Type(s) of *concept(s)*	*general concept*	*individual concept*	*individual concept* or *general concept*
Type(s) and number(s) of *object(s)*	several *objects* with shared or identical *properties*	unique *object*	unique *object* or several *objects*

7.3 Terms

7.3.1 General

Terms (including *appellations*) represent *general concepts* that correspond to various types of *objects*, e.g. things, activities, situations or relations. Thus, *terms* (including *appellations*) can take the form of different parts of speech. Frequent parts of speech are noun, verb and adjective.

EXAMPLE

Term	**Part of speech**
"hard disk" (information technology)	noun
"output" (economics)	verb or noun
"constant" (mathematics)	adjective or noun
"Adobe® Acrobat® X Pro"[4] (information technology)	noun
[4] Adobe® Acrobat® X Pro is a trademark of Adobe Systems. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of the product named.	

Terms (including *appellations*) shall be formed in accordance with the principles in 7.6.2. For examples of term formation methods, see Annex B.

7.3.2 Types of terms

Terms are categorized according to various criteria:

— *preferred term*, *admitted term*, *deprecated term* (according to *acceptability rating*);

— *complex term*, *simple term* (according to structure);

— *borrowed term* (according to term formation method).

For more details, see the *concept diagrams* and *concept models* in ISO 1087:2019, Figures A.7 to A.10.

7.3.3 Types of appellations

Appellations are categorized according to the type of identical *objects* to which they refer:

— products and services;

— scientific and technological phenomena;

— honorary distinctions;

— living organisms and other entities covered by *nomenclatures* (see also 7.3.4);

— documents;

— professional positions.

For more details on the various categories of *appellations* in English, see Clause C.2.

7.3.4 Nomenclatures

A *nomenclature* forms a system of *designations* used by an individual or a community, especially those used in a particular science, art or discipline. *Nomenclatures* are widely used by standardization bodies to facilitate rigorous and efficient communication. International bodies of expert communities are responsible for laying down the rules for *designations* in their *domain* or *subject*.

EXAMPLE

The International Committee on Systematics of Prokaryotes is responsible for the International Code of Nomenclature of Prokaryotes. The International Union of Pure and Applied Chemistry is responsible for rules about *nomenclatures* in the *domain* of chemistry. The International Commission on Zoological Nomenclature is responsible for the International Code of Zoological Nomenclature.

7.4 Proper names

7.4.1 General

Proper names represent *individual concepts*. In *natural languages* with grammatical number, a *proper name* shall designate an *individual concept* even if the *proper name* is morphologically in the plural. When recording the *proper name* in a *terminology resource*, the form of the *proper name* shall respect usage, i.e. it should be recorded whether the words that make up the *proper name* are in the singular or the plural (see Example 1 below).

EXAMPLE 1

In English, the singularity of the *object* is reflected in the grammar. Even though the *proper name* for the country 'United States of America' is plural in form, it designates an *individual concept*, thereby taking a singular verb in a sentence: "The United States of America stretches over thousands of miles of territory". There was a time in the early 1800s when the plural verb was used but, as the states were viewed increasingly as a single *object*, the singular verb was then adopted. NOTE Not all *natural languages* indicate singularity in the same way, and some *natural languages* do not indicate it at all.

A *proper name* shall be a unique identifier. Where there is a possibility of confusion, jurisdictional markers, place names, dates, years or numbers shall be added (see Example 2 below).

EXAMPLE 2

Jurisdictional marker: "General Assembly of the United Nations" versus "General Assembly of the Organization of American States". Place name: "Paris, France" versus "Paris, Michigan (USA)". Date, year or number: "2019 Nobel Peace Prize" versus "2018 Nobel Peace Prize".

Some *proper names* are subject to time considerations. For example, a *proper name* can refer to an *object* that no longer exists or that has evolved over time (see Example 3 below).

EXAMPLE 3

The *proper name* "Ministry of Consumer and Commercial Relations" of Ontario, Canada, changed to "Ministry of Consumer and Business Services" in March 2001.

When it is clear, for example from the grammar or the *context*, that a *proper name* is used as a modifier in a longer expression, the expression shall no longer be considered a *proper name*. The expression shall be considered to designate a *general concept* and can become a *term* (see Example 4 below).

EXAMPLE 4

"United Nations" is a *proper name* but "United Nations agency" is not. In English, the use of the lower case noun in the expression (as "agency" above) signals a *general concept* and not an *individual concept*. However, not all *natural languages* indicate the difference graphically.

Proper names are often associated with a certain level of official status by an authorizing body or organization. Each organization decides the form of *proper names* best suited to meet its individual requirements and confers an official status to its *proper names*. In this way, *proper names* are somewhat arbitrary in comparison to *terms*, which are generally accepted by the relevant expert community.

The nature of *proper names* can present a challenge in the writing of *definitions* in that it can be difficult to identify *delimiting characteristics*. For this reason, a *definition* may include references to the relevant *object*.

7.4.2 Types

Proper names can refer to different types of *objects*:

— persons;

— institutions;

— commercial enterprises;

— places;

— human settlements;

— streets and public spaces;

— countries;

— bodies of water;

— weather phenomena;

— buildings;

— points in time or time periods;

— events;

— means of transport;

— works of art;

— astronomical objects.

NOTE Personal names such as "Susan Jones" or "John Smith" are *proper names* as well but can be of terminological interest only in very specific work environments.

For more details on the various categories of *proper names* in English, see Clause C.3.

7.5 Symbols

Symbols are an important aid to intralingual and interlingual communication. They are often part of symbol systems. Some of these symbol systems facilitate international communication, as their visual representation of *concepts* functions independently of any given *natural language*. They can

communicate information directly under difficult circumstances (e.g. traffic signs, airport signs). Whenever the technology allows for their integration into *terminology resources*, they can be added as synonyms for a *term* or *proper name*. Only non-linguistic representations that represent *concepts* are considered *symbols*.

Symbols should be:

— simple and easy to recognize and, if possible, self-explanatory;

— monosemic in a specific *domain* or *subject* (see 7.7.1);

— unambiguous;

— easy and economical to reproduce;

— consistent and appropriate, i.e. designed to permit coordination with and differentiation from other *symbols*.

If possible, *symbols* should bear some visual resemblance to the *concept* that they represent. In some cases, however, the visual resemblance of the *symbol* to the *concept* is less pronounced or completely lost. The *concept* represented can be no longer directly recognizable and can be supported only by general agreement (see Example 1 below).

EXAMPLE 1

Symbols used in the *domain* of tourism to designate 'hiking trail' and 'bird sanctuary', respectively

[Symbols ISO 7001 – PI TC 009 and ISO 7001 – PI TC 011]

Symbol used in the *domain* of environmental protection to designate 'recyclable'

[Symbol ISO 7000 – 1135]

Designations using a letter of the alphabet to communicate the shape of the letter itself rather than its sound shall not be considered *symbols*, but *terms* (see Example 2 below).

EXAMPLE 2

"U-turn" – a turn in the shape of a U

"T-beam" – a beam, the cross-section of which is in the shape of a T

Characters that replace words or parts of words, such as *symbols* that designate mathematical operations or currencies, shall be considered *symbols* (see Example 3 below).

EXAMPLE 3

§, $, €, £, &, @, %, #, =, <, –

The linguistic designations of SI units (International System of Units) can be considered *appellations*, while the non-linguistic ones can be considered *symbols* rather than *abbreviations*: they do not vary from *natural language* to *natural language*, have no plural and are never written with full stops, except for normal sentence punctuation (see Example 4 below). For further details, see ISO 80000 (all parts) and IEC 80000 (all parts).

EXAMPLE 4

Appellation	*Symbol*
“metre”	m
“second”	s
“metre per second”	m/s
“metre per second squared”	m/s^2

Alphanumeric codes made up of combinations of letters, numbers or both shall be considered *symbols*, if they do not represent words in a *natural language* or *abbreviations* (see Example 5 below and B.2.4).

EXAMPLE 5

A4 (paper format in accordance with ISO 216, 210 mm × 297 mm).

7.6 Formation of terms (including appellations) and proper names

7.6.1 General

Patterns for the formation of *terms* (including *appellations*) and *proper names* depend on the lexical, morphosyntactic and phonological structures of individual *natural languages*. Therefore, specific principles of the formation of *terms* (including *appellations*) and *proper names* should only be described in national and regional standards dealing with a particular *natural language* rather than in International Standards. (For examples of term formation methods for English, see Annex B.)

For a standardized *terminology*, it is desirable that a *designation* be assigned to a single *concept*. Before creating a *new term*, a new *appellation* or a new *proper name,* it is necessary to ascertain whether a *designation* already exists for the *concept* in question. Well-established usage shall be respected. Established and widely used *designations*, even if they are poorly formed or opaque, should not be changed unless there are compelling reasons. For examples based on the principle of appropriateness, see 7.6.2.3.

The following principles should be followed in the formation of *terms* (including *appellations*) and *proper names*, as appropriate as possible to the *natural language* in question. (For examples of term formation methods for English, see Annex B.)

— *transparency* (see 7.6.2.1);

— consistency (see 7.6.2.2);

— appropriateness (see 7.6.2.3);

— conciseness (see 7.6.2.4);

— derivability and compoundability (see 7.6.2.5);

— linguistic correctness (see 7.6.2.6);

— preference for a given *natural language* (see 7.6.2.7);

— *transliteration* and *transcription* (see 7.6.2.8).

These principles are not all applicable simultaneously for any one *term*, *appellation* or *proper name*. However, they can provide assistance when creating *new terms*, new *appellations* or new *proper names* or when systematizing existing *terminologies*. If several *designations* exist for a single *concept*, the one that satisfies the largest number of principles described in 7.6.2 shall be selected as the preferred *designation*.

7.6.2 Principles

7.6.2.1 Transparency

A *term* or *proper name* is transparent when the *concept* that it designates can be inferred, at least partially, without a *definition* or other type of information supplementing or replacing a *definition* (see 6.6). In other words, the *concept* expressed by a *term* or *proper name* can be deduced from their linguistic elements. For a *term* or *proper name* to be transparent, a key *characteristic* – usually a *delimiting characteristic* – is expressed in the *term* or *proper name* itself. Only *characteristics* unlikely to change quickly as a result of technological evolution should be used. Otherwise, one can be faced with the task of renaming the *concept* as soon as the technology changes.

EXAMPLE

"torque wrench" versus "monkey wrench"
The *term* "torque wrench" (wrench used to measure torque, usually when tightening a nut or bolt component of an assembly) is transparent. However, the *term* "monkey wrench" (based on the personal name of its supposed inventor, "Moncky") is opaque.
"thermal noise" versus "Johnson noise"
Similarly, the *term* "thermal noise" is more transparent than the *term* "Johnson noise".
"National Commission on Terrorist Attacks Upon the United States" versus "Kean-Hamilton Commission"
The *proper name* "National Commission on Terrorist Attacks Upon the United States" is transparent since it clearly indicates the subject matter to be dealt with by the commission. Conversely, "Kean-Hamilton Commission", a *proper name* derived from the chair and vice-chair of the commission, is opaque.

7.6.2.2 Consistency

Existing *terms* and *proper names* as well as *new terms* and new *proper names* should integrate into and be consistent with the relevant *concept system*.

EXAMPLE

synthetic fabrics: "nylon", "orlon", "dacron", "rayon", etc.
Any *designation* for a new synthetic fabric is consistent (ends in "-on") and respects the pattern arising from the *concept system*.
position titles in a company: "VP of Finance", "VP of Marketing", "VP of Production", etc.
Any title for a new position at the same level is consistent ("VP of") and respects the pattern arising from the *concept system*.

7.6.2.3 Appropriateness

Proposed *terms* and *proper names* should adhere to familiar, established linguistic patterns used in a given *natural language*. Formations that cause confusion should be avoided.

EXAMPLE 1

The information technology *term* "install wizard" is confusing because it looks like a command (to install a wizard) rather than a *term* for a type of wizard (for installing software). The appropriate *term* is "installation wizard". It is clear and accurate and, therefore, unlikely to be mistranslated in localization projects.

Terms and *proper names* should be as neutral as possible. They should avoid distracting connotations, especially discriminatory ones.

EXAMPLE 2

In information technology, the *term* "blacklist" designates a list of URLs to be blocked by a web browser. Conversely, the *term* "whitelist" designates a list of URLs to be allowed by a web browser. Thus, the two *terms* have negative and positive connotations related to the colours black and white, respectively. Therefore, they can be considered discriminatory. The newer *terms* "blocklist" and "allowlist" are more neutral synonyms.

7.6.2.4 Conciseness

A *term* or *proper name* should be as concise as possible. Undue length is a serious shortcoming. It violates the principle of linguistic economy and it frequently leads to ellipsis (omission).

EXAMPLE 1

"e-mail" or "email" instead of "electronic mail"

The requirement for conciseness often conflicts with those for *transparency* and appropriateness (see 7.6.2.1 and 7.6.2.3, respectively). The greater the number of *characteristics* included in a *term* or *proper name,* the greater its *transparency* and appropriateness. However, increasing the number of *characteristics* expressed in a *term* or *proper name* often makes it too long and inconvenient to use. Practicality should govern any decision to give preference to one pattern of formation over another. For example, shortened forms should be favoured whenever a long, precise *term* or *proper name* is not suitable (e.g. oral communication in a factory). In contrast, *complex terms*, composed of several words or lexical units, are acceptable in academic publications.

In many cases, both a *full form* and *abbreviations* coexist. *Abbreviations* can produce synonyms or homonyms that do not occur if the *full forms* are used. It is a function of *terminology work* to draw attention to potential difficulties of this kind, and users of *abbreviations* need to be aware of the risk of misunderstanding. In documents, it is common practice to give the *full form* (together with the *abbreviation*) when the *term* or *proper name* first occurs, so that the *abbreviation* can be used throughout the rest of the document.

EXAMPLE 2

"World Health Organization (WHO)", "European Union (EU)"

7.6.2.5 Derivability and compoundability

Productive formation of *terms* or *proper names* that allows derivatives and compounds should be favoured, according to whatever conventions prevail in an individual *natural language*.

EXAMPLE 1

"herb" versus "medicinal plant" The *term* "herb" with its derived *terms* "herbaceous", "herbal", "herbalist" and "herby" is preferred over "medicinal plant", which produces no derivatives.

EXAMPLE 2

The *proper name* (country name) "Saint Vincent and the Grenadines" produces both the adjective "Vincentian" and the synonym "of Saint Vincent and the Grenadines". Based on the principle of conciseness (see 7.6.2.4), "Vincentian" is preferred over "of Saint Vincent and the Grenadines". SOURCE: Reference [62], p. 197.

7.6.2.6 Linguistic correctness

When *new terms*, new *appellations* or new *proper names* are coined, they should adhere to the morphological, morphosyntactic and phonological norms of the *natural language* in question.

7.6.2.7 Preference for a given natural language

Borrowing from other *natural languages* is accepted as a method for the formation of *designations*. However, *designations* that exist in the given *natural language* should be given preference over direct loans when appropriate (see B.4.2).

Sometimes, *proper names* are not translated but remain in their original *natural language*. However, an *individual concept* can have a *proper name* in different *natural languages*. Whether an *individual concept* has a *proper name* in more than one *natural language* depends on the following:

— the language policy of a country;

— how internationally well known the *concept* is;

— the multilingual nature of the *object* in question;

— the need for international cooperation.

EXAMPLE 1

In bilingual countries such as Canada, *proper names* associated with the federal government (agencies, procedures, regulations, etc.) exist in both English and French; in Switzerland, many *proper names* exist in French, German and Italian.

Major geographical entities, such as countries and their capitals, are internationally well known. Therefore, they have *proper names* in the various *natural languages*, e.g. "Italia", "Italy", "Italie", "Itaalia"; "United States", "États-Unis", "Estados Unidos", "Estato Unido", "Ameerika Ühendriigid". For details, see ISO 3166 (all parts).

Because of their international nature, many United Nations agencies have *proper names* in various *natural languages*, e.g. "Food and Agriculture Organization of the United Nations" ("FAO"), "Ernährungs- und Landwirtschaftsorganisation der Vereinten Nationen" ("FAO"), "Organisation des Nations Unies pour l'alimentation et l'agriculture" ("FAO"), "Organizzazione delle Nazioni Unite per l'alimentazione e l'agricoltura" ("FAO"), "De Forenede Nationers Levnedsmiddel- og Landbrugsorganisation" ("FAO"), "Organização das Nações Unidas para a Alimentação e a Agricultura" ("FAO"), "منظمة الأغذية والزراعة للأمم المتحدة" ("FAO").

EXAMPLE 2

In documents directed at an international target audience, *proper names* can be used in the original *natural language* if they are likely to be understood or they can be translated for the purposes of international cooperation and understanding. However, in a document directed at an international target audience, the Irish *proper name* "Áras an Uachtaráin" cannot be understood. Therefore, the English equivalent "The Official Residence of the President of Ireland" is a better alternative.

A *proper name* without an official equivalent in another *natural language* (issued by an authorizing body or organization) should normally be kept in the original *natural language*. In the case of legal entities, the *proper name* shall remain in the form recorded in the original legal document. Many *proper names*, however, have official equivalents in other *natural languages* that are commonly used and listed in standard references and such official equivalents should be used.

In the event of no official equivalent being available, a *proper name* can be either transliterated or transcribed (see 7.6.2.8). Alternatively, it can appear with an explanation or non-official equivalent (*full form* or *abbreviation*) as an aid to comprehension. Do not use a non-official equivalent in another *natural language* that denotes a different *concept* in that *natural language.*

7.6.2.8 Transliteration and transcription

In the dissemination of standardized *terminologies*, it can be necessary to render a *designation* written in one alphabet or non-alphabetic writing system into a different writing system. In such instances, the most authoritative system for *transliteration* or *transcription* shall be used. For *transliteration* or *transcription* into Latin characters, the latest International Standards shall be used (e.g. ISO 9, ISO 233, ISO 259, ISO 843, ISO 3602, ISO 7098, ISO 9984, ISO 9985, ISO 11940, ISO/IEC 10646 and the Unicode Standard[55]).

In the case of phonetic transcription, the latest version of the International Phonetic Alphabet (IPA) of the International Phonetic Association shall be used; see Reference [67].

7.7 Relations between designations and concepts

7.7.1 Mononymy and monosemy

Ideally, when precise and accurate communication is required in a given *special language*, the objective is to achieve both *mononymy* and *monosemy* (depending on the perspective taken) at least within one and the same *domain* or *subject*. This condition reduces ambiguity, while *synonymy* (see 7.7.2), *polysemy* and *homonymy* (see 7.7.5) can lead to ambiguity.

Designations characterized by *mononymy* are called mononyms. *Designations* characterized by *monosemy* are called monosemes.

EXAMPLE

mononyms (and monosemes)	“electron”
	“neutron”
	“proton”

7.7.2 Synonymy

Designations characterized by *synonymy* are called synonyms and are always interchangeable. However, if two or more *designations* are assigned to *concepts* whose *intensions* are almost identical, they are called quasi-synonyms and are interchangeable only in some situations.

EXAMPLE

synonyms	“half-life” = “half value period”
	“term bank” = “terminological data bank”
	[SOURCE: ISO 1087: 2019, 3.7.3]
	“learning management system” = “LMS”
	[SOURCE: ISO/IEC 2382-36:2019, 3.3.1]
	“drinking water” = 
	[SOURCE: ISO 7001:2007, PI PF 007]
quasi-synonyms	“dashboard” ≈ “instrument panel”

7.7.3 Equivalence

Designations characterized by *equivalence* are called equivalents. They play an important role in *terminology work* for multilingual communication.

EXAMPLE

equivalents	“wavelength” (English) = “Wellenlänge” (German)
	“United Nations” (English) = “Организация Объединённых Наций” (Russian)

7.7.4 Antonymy

Designations characterized by *antonymy* are called antonyms. They designate contrary concepts or contradictory concepts (see 6.5.4).

EXAMPLE

antonyms	"text production" ≠ "text reception" (contrary concepts, see 6.5.4)
	"lawful" ≠ "unlawful" (contradictory concepts, see 6.5.4)

7.7.5 Polysemy and homonymy

Designations in a given *natural language* can have identical forms, either phonetic or written, but designate different *concepts*. *Designations* characterized by *polysemy* are called polysemes and designate *concepts* that have something in common.

EXAMPLE 1

polysemes	"bridge" (dental plate), "bridge" (structure to carry traffic over a gap)
	"curve" (line in graphs), "curve" (bend in a road)

Designations characterized by *homonymy* are called homonyms and designate unrelated *concepts*.

EXAMPLE 2

homonyms	"rock" (popular music), "rock" (mass of stone)
	"bank" (financial enterprise), "bank" (area alongside a river)

Homophones are phonetically identical but orthographically different *designations* that represent unrelated *concepts*. Conversely, homographs are orthographically identical but phonetically different *designations* that represent unrelated *concepts*. Homonyms are both written and pronounced the same way. Example 3 below shows homophones, homographs and homonyms (British English pronunciation).

EXAMPLE 3

homophones	"sun" (celestial body) – "son" (male child)	/sʌn/ – /sʌn/
homographs	"tear" ([to] cry) – "tear" ([to] separate)	/tɪə(r)/ – /teə(r)/
homonyms	"bloom" (efflorescence) – "bloom" (type of ingot)	/bluːm/ – /bluːm/

7.7.6 Harmonization

Incidences of *synonymy*, *polysemy* or *homonymy* usually lead to the need for *concept harmonization* or *term harmonization*, which is part of the standardization process. The standardization of *terminologies* frequently implies *concept harmonization* and *term harmonization* within a *domain or subject*, across *domains* or *subjects* and across *natural languages*. To reduce duplication and cost, efforts should be made to harmonize whenever minor differences exist. For methods of *concept harmonization* and *term harmonization*, see ISO 860.

7.7.7 Acceptability rating

The *terminology* treated in an International Standard shall reflect a coherent *concept system* of the *domain or subject* in question. It shall be precise and lead to increased clarity in communication. Thus, in the case of *terminology work* carried out in standardization, an *acceptability rating* should be carried out by indicating *designations* as preferred, admitted or deprecated. On this basis, terminology users can decide which *designation* to use or to avoid.

A *designation* recommended by a technical committee or other authoritative body shall be considered preferred, whereas an admitted *designation* shall represent an acceptable synonym for a preferred

designation. Designations that have been rejected are labelled as deprecated. *Designations* are rejected or deprecated for various reasons. A *designation* can be a synonym for the preferred *designation* but is deprecated in the interests of *mononymy* (see 7.7.1). A *designation* can be flawed or inaccurate.

EXAMPLE 1

The *term* "fireproof" is misleading and inaccurate; the *terms* "fire-resistant" or "fire-retardant" are more precise (see 7.6.2.3). The *term* "prebake resistance" is not necessarily flawed, but it is deprecated in favour of "precure heat tolerance", a more transparent *term* (see 7.6.2.1).

A *designation* considered deprecated for one *concept* can be reserved to designate another *concept*.

EXAMPLE 2

The *term* "terminology" is deprecated as a synonym for "terminology science", but is used to represent the *concept* 'set of *designations* and *concepts* belonging to one *domain* or *subject*'. SOURCE: ISO 1087:2019, 3.1.11 and 3.1.12.

A *designation* can be deprecated due to historical developments of the *object(s)* in question.

EXAMPLE 3

The historical *proper name* "Commission of the European Communities" is deprecated as a synonym for the current *proper name* "European Commission".

A *designation* can become obsolete because it is no longer in common use.

EXAMPLE 4

The *term* "spiraeic acid" is obsolete as a synonym for the current *term* "salicylic acid".

The inclusion of a *designation* in a *terminology resource* can imply the deprecation of other *designations* that are used as synonyms in the relevant *domain* or *subject*. It is wise to consider these *designations*, to identify them explicitly as admitted or deprecated, and to explain any reasons for deprecation.

Annex A
(informative)

Other types of definitions

A.1 General

This document presents *intensional definitions* (see 6.2) and *extensional definitions* (see 6.3) as the main types of *definitions* used in *terminology work*. It acknowledges, however, that other types of *definitions* are in current usage in some situations. Those types of *definitions* that are most relevant in *terminology work* are treated in this annex.

A.2 Ostensive definitions

An ostensive definition, also called demonstrative definition or definition by pointing, represents the relevant *concept* by exhibiting mainly non-linguistic representations (e.g. a drawing, an illustration, a video, a sound clip or a computer animation). It can even point to one or more representative *objects* in the *extension* of the *concept*. With the increased availability of technology, ostensive definitions can use any form of multimedia. However, rather than being used on its own, an ostensive definition is best employed as a complement to a *designation* and an *intensional definition*, since it is not always clear what is being referred to or how far to generalize from the particular *object* exhibited. Furthermore, it can be difficult to deduce the *superordinate concept* from an ostensive definition.

There are various types of graphic representations:

— abstract illustrations;

— network diagrams;

— matrix diagrams;

— schematic diagrams;

— iconic illustrations;

— drawings and etchings;

— photographs;

— statistical diagrams;

— line charts;

— bar charts;

— pie charts;

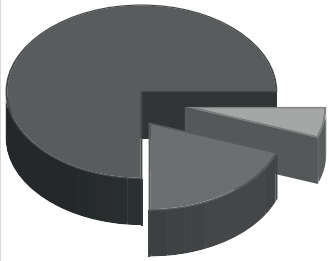
— mixed figures that combine two or more forms.

An ostensive definition may be recognized as a *definition* on its own only in the rare cases where the non-linguistic representation can represent the *concept* in an analogous way to an *intensional definition*. Otherwise, it shall not be used as a *definition* but as supplementary information for inclusion in a note (see 6.6.5).

EXAMPLE 1

This statistical diagram is an ostensive definition of the *concept* 'exploded pie chart'.

exploded pie chart



An ostensive definition shall provide the same information as an *intensional definition*, i.e. the *superordinate concept* along with the *delimiting characteristics*.

EXAMPLE 2

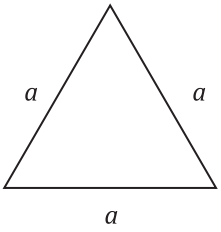
The following abstract illustration can be used as an ostensive definition of the *concept* 'equilateral triangle'.

Intensional definition (using *characteristics* based on a *generic relation*):

equilateral triangle
triangle that has all three sides the same length

Ostensive definition:

equilateral triangle



Generic concept: 'triangle'.

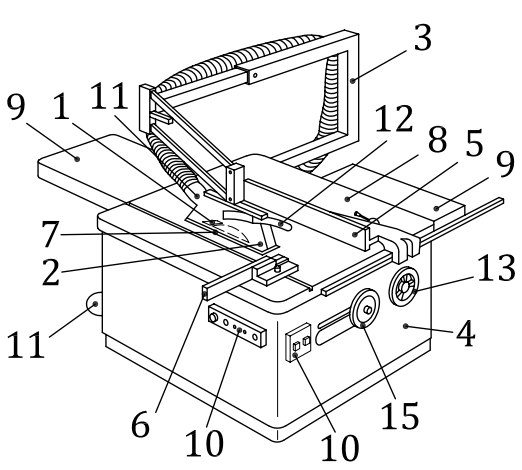
Delimiting characteristic:

— 'all three sides being the same length, where *a* = length'.

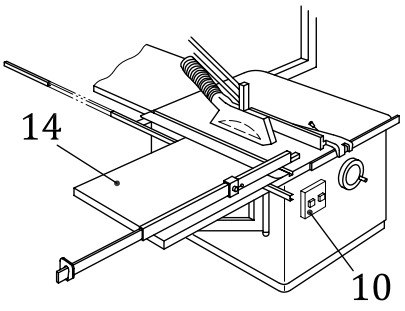
Iconic illustrations present *objects* or their *properties*. They are especially useful in complementing *partitive extensional definitions* since they show the relation between a whole and its parts.

EXAMPLE 3

A saw bench (with and without sliding table) and its parts
<machine tools>



a) Saw bench



b) Saw bench with sliding table

Key

1	riving knife	9	extension table
2	saw blade guard	10	controls
3	saw blade guard support	11	exhaust outlet
4	fixed guard beneath table	12	push stick
5	rip fence	13	cutting height adjustment
6	cross-cut fence	14	sliding table
7	table insert	15	inclination adjustment
8	machine table		

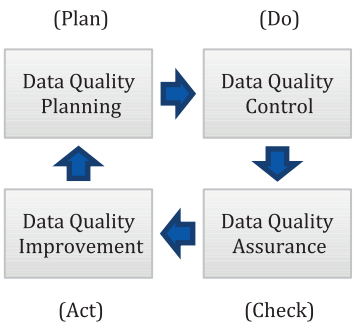
[SOURCE: ISO 19085-9:2019, 3.2]

Iconic illustrations are also useful for clarifying *associative relations* between *concepts*.

EXAMPLE 4

Data quality management process, part "implementation" (*concepts* connected by a *temporal relation*)

data quality management
<automation systems>



[SOURCE: ISO 8000-61:2016, 5.1]

However, the *object* or mainly non-linguistic representation depicted in the ostensive definition should not be confused with the *concept* itself. A graphic representation is but a depiction of only one *object* among all the other *objects* that make up the *extension* of the *concept*. For this reason, a graphic representation of a *concept* is best used to complement a *definition*. A graphic representation complements a *definition* well if it further clarifies the *characteristics* of a given *concept* and/or its relations to other *concepts*. Graphic representations can provide a means of visualizing a *concept* that can be difficult to grasp from *definitions* alone.

EXAMPLE 5

This picture of a fir tree can be used to illustrate the *concept* 'tree', but not to define it. However, the illustration is merely a representation of the *object*, not the *object* itself. Furthermore, the specific fir tree illustrated is not the same as the *concept* 'tree', whose *extension* includes other *objects* such as 'deciduous trees'.

A.3 Lexical definitions

Dictionaries describing *general language* often contain lexical definitions, also called lexicographic(al) definitions or dictionary definitions. A *terminology resource* can include such lexical definitions in the following cases: when the *superordinate concept* of a *concept* is not specialized or when the top *superordinate concept* has become so generalized it no longer qualifies as a *concept* of the relevant *domain* or *subject*. Lexical definitions can be the basis for producing précising definitions (see Clause A.4).

EXAMPLE

The *generic concept* for 'mouse pad' is 'pad' and is a candidate for the relevant *concept system*.

pad
thin, cushionlike mass of soft material, used to fill, to give shape, or to protect against jarring, scraping or other injury

SOURCE: Reference [64].

A.4 Précising definitions

Précising definitions, also called precising definitions or exacting definitions, can be necessary when adapting a *definition* to a specific *domain* or *subject*. Terminological analysis can begin with a lexical definition (a more vague description) and can involve turning it into a précising definition. The objective is to identify the given *concept* designated by a *designation*. The specific *domain* or *subject* shall be clearly indicated at the beginning of the *definition*.

A précising definition narrows the *objects* in the *extension* of the *concept* by adding more precise *characteristics* to a lexical definition. Therefore, the *concept* 'fish' is made more precise by specifying *characteristics* that limit the *concept* to the *domain* of ichthyology. In the end, an *intensional definition* can be written based on the précising definition.

EXAMPLE

Lexical definition: **fish**
A limbless cold-blooded vertebrate animal with gills and fins living wholly in water.

SOURCE: Reference [75].

Précising definition: **fish**
<ichthyology> any of a large group of cold-blooded, finned aquatic vertebrates, divided into three classes: Agnatha, Chondrichthyes and Osteichthyes

SOURCE: Based on Reference [59].

Intensional definition: **fish** <ichthyology> cold-blooded, finned aquatic vertebrate NOTE There are three classes of fish: Agnatha, Chondrichthyes and Osteichthyes. SOURCE: Based on Reference [59].

A.5 Stipulative definitions

A.5.1 Using stipulative definitions

Where a *concept* needs to be interpreted specifically based on a unique situation, it can be described by a stipulative definition. Stipulative definitions do not follow common terminological practice, but serve the specific purposes of individual bodies, e.g. standards bodies, legislators or businesses. They should be used only when absolutely necessary.

When the *concept* is limited to a given situation and the need for a stipulative definition is valid, it shall be clearly identified as such. The *definition* shall begin with a qualifier, such as "For the purposes of <document name>, …". Stipulative definitions shall be located only within the parent document or set of related documents to which they apply. In some cases, they are identified with special wording, such as "Definition specific to this standard".

A stipulative definition can narrow or widen the *extension* of the *concept*. It can thus contradict the norms of understanding in its *domain* or *subject*, while a précising definition does not.

EXAMPLE

Stipulative definition: **obstruction** In this Act, […] obstruction means any slide, dam or other thing impeding wholly or partially the free passage of fish […]. SOURCE: Reference [61], p. 3.

A.5.2 Writing stipulative definitions

A particular *context* rarely refers to all the *objects* making up the *extension* of a *concept*. *Definitions* in laws and regulations tend to be interpretive and are often stipulative definitions. The stipulative definition defines a (new) *concept* that is narrower than the one usually represented by the *designation*. The stipulative definition is not inaccurate with regard to this (new) *concept*, only with regard to the usual one. Therefore, it is important to include a specification clause at the beginning of the *definition* (see the Example below). *Definitions* in International Standards are defining rather than interpretive. If a *concept* is restricted to a particular interpretation, it shall be explained in the body of the International Standard rather than by creating a new *concept* with a smaller *extension*. If specification information is associated with the *concept*, then this shall be given in an appropriate specification clause rather than in a *definition*.

The following *definition* of 'organization' does not define the *concept* 'organization' but merely signals how to interpret the *concept* in a given situation. From all the *objects* that make up the *extension* of the *concept* 'organization', this stipulative definition considers only those not operating for profit.

EXAMPLE

	organization
***definition* too narrow**	for the purposes of this regulation, a body not operating for profit