SLOVENSKI STANDARD
SIST ENV 12264:2003

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Medicinska informatika – Kategorijske strukture sistemov konceptov – Model za predstavitev semantike

Medical informatics - Categorical structures of systems of concepts - Model for representation of semantics

Medizinische Informatik - Kategoriale Strukturen von Begriffssystemen - Modell zur Repräsentation von Semantik

Informatique de santé - Structures catégorielles des systemes de concepts - Modele de représentation de la sémantique

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Foreword

This European Prestandard has been prepared by Technical Committee CEN/TC 251 "Medical informatics", the secretariat of which is held by SIS.

This European Prestandard has been prepared under a mandate (BT-IT-208) given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this European Prestandard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

0 Introduction

Computer-based processing and interchange of medical information use various kinds of **terminological systems**, such as controlled vocabularies, classifications, nomenclatures, terminologies and thesauri, either including or not coding schemes — to represent that information.

The peculiarities in the field of medical informatics are

- availability of a large number of specialised terminological systems;
- a large overlap among the subject fields involved;
- a large number of codes and rubrics, typically in the order of magnitude of 10 000 or 100 000 entries, in commonly used terminological systems;
- increasing re-use of coded data in different healthcare contexts.

The integration of computer-based medical records and administrative information systems require rationalisation in the field, and a uniform way to describe the information model and the content of codes and rubrics, with the additional constraint that it is not possible to impose a rigid uniform standardised language to the healthcare providers.

The organisation and content of a terminological system can be synthetically described by its global **'categorial structure'** as defined in this European Prestandard (a few high-level semantic categories and their organisation, instead of thousands of concepts), in order to

- facilitate maintenance of terminological systems;
- increase regularity and coherence of each terminological system;
- allow systematic cross-references between items of different terminological systems;
- facilitate convergence among terminological systems;
- provide elements for negotiation about integration of terminological systems into information systems between the respective developers.

For a faster achievement of these goals, a series of specific European Prestandards on various subject fields relevant to healthcare information processing will use the present European Prestandard to describe a set of categorial structures in partially overlapping subject fields. After adequate field testing, revision and integration, these European Prestandards will provide a comprehensive basis for systematic development of computer-based terminological systems in healthcare.

0.1 Role of terminological systems in the healthcare information systems

Terminological systems restrict and regularise routine language for more effective information processing and transmission. One class of terminological systems used in healthcare communication is the class of **coding systems**, although codes are not an essential component of modern computer-based terminological systems. Very many computer systems manage and transmit information as **coded fields** in data bases or **coded entries** in messages without regard for their meaning or their possible internal organisation: such applications treat codes and rubrics as 'packed' information.

Packed information is considered by such applications as indivisible. It can be presented to the user, or it can be used as a pointer to tables containing further information but it cannot be unpacked.

This fact was recognised by the existence of data types such as 'coded entry' as distinct from other data types such as 'free text', 'date', or 'numeric' values in many information systems. Interpretation of the meaning of such packed data is left to the human users; information contained in a code can be unpacked and rearranged by specialised software.

There is a need for such specialised applications to be able to look 'inside the codes', i.e. to deal with more of the meanings that the codes involve. Newer computer-based information systems are increasingly extending the life-time and the availability of data. One of the major consequences of this change is that there is a demand for re-use of data generated in one application by other applications.

'Interworking' among heterogeneous applications is essential to the successful development of medical informatics. Different applications almost always need to organise information in different ways, and hence usually use specific terminological systems. To communicate, they need to code data according to various coding systems or possibly according to different views of the same coding system, i.e. different coding schemes.

Hence one must map coded data between environments with different underlying data models and different coding systems and maintain alternative views of the same coding systems. Such mappings and alternative views are large and complex; simple one-to-one correspondence is rare. Manually constructed look-up tables are large, error-prone to construct, and costly to maintain.

Furthermore, computer-based information systems are increasingly being extended into areas such as decision support, quality assurance, hazard warning, and intelligent user interfaces, which applications require access to the details of the information traditionally packed in 'codes'.

Such computer applications also demand more consistency and accuracy in the organisation of the terminological systems and the mappings among them than has been required of traditional terminological systems intended primarily for human interpretation. Human interpreters can often compensate for imprecision in organisation or mappings through their understanding of the meaning of the rubrics and of the overall context and use of the terminological system. Computers have no such understanding. Computer interpretation is entirely dependent on the formal representation of the **systems of concepts** (as defined by International Organisation for Standardisation, ISO) — on which the terminological systems are built.

Since more depends on them, and since there are fewer means to compensate for imprecision, there are now greater demands than before for accuracy and consistency in the representation of systems of concepts and in mappings between them. To achieve such accuracy and consistency, a formal account of the information encapsulated and the organisation of the systems of concepts is required.

0.2 Representation of systems of concepts: concepts, terms and codes

Concepts can be referred to by language or represented by formal symbols (**concept representations**).

Concept representations about a given subject field may be organised in a coherent system, a **'concept-representation system'** which reflects the **'system of concepts'** and replaces it for normal purposes.

Two functions are fulfilled by concept-representation systems:

- 'how to express and delimit' a concept;
- 'how to manipulate' the concept representations (in particular, by computer).

Focusing on the first function, **terms** and **terminological phrases** are linguistic expressions which refer to concepts. A **definition** is an attempt to capture the essence of the concept referred to by a term or a terminological phrase in a language which is unambiguous for a human interpreter. For example, most of this European Prestandard is concerned with terms and terminological phrases to represent concepts used in medical informatics, and with their definitions.

Focusing on the second function, the **formal model of a system of concepts** is a symbolic model intended to be interpreted as denoting a set of concepts and some set of the relations between them, which can be manipulated according to fixed rules without regard to their meaning, usually by computers. This manipulation includes formal classification, controlled generation, translation to and from natural language expressions. The symbols that represent concepts in such a model are often strings that human users find meaningful, but the behaviour of the model is independent of such strings. Formal models are models of concepts in the sense that, within limits, when manipulated according to the rules of the system, the symbols behave in ways that correspond to human use of the concepts represented. Typically, actual terms for the concepts represented are attached to the symbols via an 'interpretation'. Ideally, if a human user manipulates the terms guided by concepts and a computer manipulates the terms using a corresponding model, the results should be the same.

This never happens. All models provide, at best, approximations of the concepts represented. One of the tasks of this European Prestandard is to provide a framework for describing the aspects of concepts modelled by a representation and the purposes and limits of those representations.

Codes are unique agreed symbols attached to concept representations or terms. Codes allow unambiguous compact exchange of concept representations or terms without regard to their form or meaning. A 'rubric' is the term or terminological phrase linked to a code. The details of the linkage between codes, concept representations, terms and rubrics varies between different coding systems. Often the names of the symbols in a concept representation are used for all or part of a 'coding system'. In other cases, the internal names of symbols may be completely independent of the 'codes' agreed for them. In some systems, there may be separate codes for terms and for concept representations; in other systems the term and concept representation may share the same code.

For many purposes, it is convenient to blur the distinctions between concept, concept representation, and term; most texts on object-oriented design, semantic design, and knowledge representation do so routinely. Often the distinction between concept representation and code is blurred. However the differences can lead to serious confusion and unnecessary argument. For example, sets of linguistic definitions of the concepts referred to by terms can use each other, and use common-sense knowledge so that no meaningless primitives are required, and the distinction between 'elementary' and 'composite' concept is meaningless. Formal models, by contrast, inevitably contain some undefined 'primitives', and the distinction between representation of 'elementary' and 'composite' concepts is well defined.

More critically, the test of a set of definitions of terms is whether human users interpret them effectively and unambiguously; the test of a formal model is whether it can be manipulated by computer in ways that effectively model the relevant aspects of human use of the concepts represented.

In medical applications, large coding and classification systems have often been used both as sets of terms and definitions of concepts for human interpretation, and as concept representations for manipulation on computer. For example, part of the function of the ICD [WHO, 1978; 1992] is to define the meaning of concepts for statistical purposes — *e.g.* "Cirrhosis without mention of alcohol" — which is clearly meant to be interpreted by a human coder reading a medical record. Part of the function of ICD, however, is to provide a hierarchical organisation, which can be used to group diseases together for statistical purposes automatically by computer. The structure of ICD is a weak model, *i.e.* it represents only a limited amount of our usual understanding of the terms it contains and can support only a limited range of formal access and manipulation of data. Furthermore, much of the structure of ICD is implicit. It may be evident to skilled human users, who can exploit the context of the rubrics, but it is unavailable to computer applications.

Modern healthcare information systems, particularly clinical systems, require more functionality for which they require better models of medical concepts. Even more critically, interworking among information systems requires the formal and explicit description of the implicit organisation of the systems of concepts behind present terminological systems by their **categorial structures**, so that software designers know what they can depend on from the concept representation systems and what obligations they take on to ensure that they are used as intended.

0.3 Describing and using the categorial structure of a system of concepts

The description of the categorial structure of a system of concepts is a catalogue of major semantic categories addressed in the system of concepts and of relations that typically hold between them. Where appropriate, it includes references to authoritative sources to support the detailed choices made.

So far as possible, the description of a categorial structure includes (see 4.1):

i) **differentiating criteria** that may be used to differentiate concepts systematically, with the preferred order in which the differentiating criteria are applied in order to build hierarchical presentations;

ii) rules for combining semantic categories and differentiating criteria, usually in the form of **generative patterns** for the systematic production of systematic names and of formal intensional definitions;

iii) **constraints** on the use of different relations that hold between the semantic categories;

iv) **presuppositions** that underlie the categorial structure and commitments by the developers about completeness and consistency of usage.

Description of the categorial structures of systems of concepts allows comparison and convergence, and consequently more coherence among the involved terminological systems; it also allows explicit allocation of responsibility between builders of terminological systems and builders of information systems that use those terminological systems. It leads to effective application of advanced computer systems to clinical problems.

Standards on the categorial structure in specific subject fields should describe the items mentioned, and need not provide the actual content of the related terminological systems, i.e. the extensional list of all the terms compliant with such structure or of all the medically sensible systematic names that it is possible to produce according to such structure.

0.3.1 Use in one subject field: convergence among systems of concepts

A first class of uses of the categorial structures involves a particular medical speciality or a clinical sub-community, about a single subject field. In the past, there have been few successful attempts to merge, or make compatible, terminological systems on the same topic. Paper-based information systems did not demand the re-use of data; contacts amongst professionals were either restricted to the transmission of a minimum of highly organised information, *e.g.* insurance forms, or informal direct communication in natural language (*e.g.* discharge summaries, paper-based medical records). Each terminological system was built for a single specific purpose. Even where terminological systems addressed the same topic and used similar differentiating criteria, there were usually differences in the detailed order in which differentiating criteria were applied and the degree of detail captured. Comparing different terminological systems, therefore, requires making these differences explicit by providing a description of the categorial structure of each corresponding system of concepts. This will be a significant but not conclusive step, since no description of the categorial structure of the systems of concepts, however detailed, can cover all the subtle differences in the exact rubrics and in the definitions attached to concepts that reflect different intended usage by different target groups.

0.3.2 Use on various overlapping subject fields: coherence among systems of concepts

A second class of utilisation of categorial structures involves various overlapping subject fields: when a set of categorial structures — one for each individual subject field — are available, one can compare and eventually integrate them into a comprehensive categorial structure.

In particular, providing a means to describe the categorial structure of large concept representation systems, at least to a first approximation, allows systematic comparison of such systems, *e.g.* ICD [WHO, 1978; 1992], SNOMED [Côtè, 1979, 1993], ICPC [Lamberts, 1987], CCC [NHS, 1994] so that steps can be taken towards their future convergence and towards the more systematic design of future concept representation systems.

A useful step in this direction is the production and distribution of the semantic network of Meta-1 [NLM, 1994] in the UMLS initiative of the US National Library of Medicine.

CEN/TC 251 has planned a series of standards on the categorial structure of systems of concepts in different overlapping subject fields. These standards are also intended to facilitate the convergence of these systems of concepts towards a common framework, known as the Integrated System of concepts (See Work Item 2.9 ICS of the CEN/TC 251 Work Plan), which involves the whole WG2 scope. This effort will eventually allow establishment of a comprehensive computer-based formal model for representation of healthcare concepts.

0.3.3 Use in the design of healthcare information systems: division of responsibility among designers of terminological systems and software designers

The third class of applications of the categorial structures regards the use of terminological systems in the more general environment of a healthcare information system.

The availability of categorial structures to support concept-representation systems in various subject fields is a step towards homogeneous modelling in the design of complex information systems encompassing those fields.

In practice, there is usually a distinction between a general part of the model that is about medicine and medical practice (the categorial structure of the system of concepts), and the model that refers to the instances of these concepts about specific patients (the data model).

The categorial structure of the system of concepts contains the high-level semantic categories that need to be defined and standardised from a terminological point of view. The data model contains the items used in defining standards for data interchange or for building information systems.

This distinction corresponds to a division of responsibility to be negotiated between those developing terminological systems, *e.g.* coding systems, and those developing data interchange standards and information systems that use those terminological systems.

In particular, the designers of coding systems are concerned with the contents packed in the codes. The designers of data interchange standards are concerned with how those packed codes are organised into larger messages or data bases. The designers of information systems, *e.g.* medical record systems, are concerned with how those packed codes are linked together to refer to the events that happen to a particular patient. The choice of which combinations of concepts should be packed together in codes and which linked explicitly in the information model is a matter for negotiation between the two groups of developers. The boundary between the explicit representation in the data model and the packing in the coding system is, to some degree, arbitrary and depends on practical considerations.

For example, most software applications consider <disease> as a relevant data element; it is correspondingly a key semantic category in most concept-representation systems used by such applications. However the <aetiology> of a disease can be treated either by recording it explicitly as an autonomous data element linked to the disease for each individual patient in the data model, or it can be packed within the definition of each disease in a set of indivisible codes. In the first case, there will be fewer codes but a more complex data model; in the second, a larger and more complex concept-representation system but a simpler data model. Analogous choices apply in many areas, for example whether or not to include the <approach> or the <instrument> as part of the definition of each procedure in a model of <surgical procedures>.

These choices are made differently by different applications. For example, the semantic category <topography> is managed systematically by some applications using a separable code in combinatorial coding systems such as ICD-O for tumours, ICPC in general practice, or ACR-NEMA for imaging. Some software applications will be able to manage the topography portion of such codes explicitly, others will consider it as packed in the data element.

0.4 A strategy about standards for terminological systems in medicine

The scope of the standardisation work in CEN/TC 251 'Medical Informatics' does not consider the actual production of detailed terminological systems; it focuses instead on the usability and the integration of terminological systems in healthcare information systems.

Many standards about detailed terminology work and the actual construction of thesauri and coding systems are available. They come from different communities — terminologists, statisticians, computer scientists — and thus from different ISO Technical Committees (ISO TC37, ISO TC46, ISO TC69, ISO/IEC JTC1).

In the healthcare field, the vocabulary and the methods used by developers of terminological systems, nosologists of governmental or professional organisations at international and national level, such as WHO, NLM, WCC, CCC, CAP, and AMA, are not always harmonised among themselves and with respect to those standards. Moreover, none of these organisations deal with the categorial structures of large systems of concepts, except the UMLS initiative of the National Library of Medicine (Bethesda, MD, USA), CCC (UK) and WCC (NL), which use them as a method for the development or rearrangement of terminological systems.

Two series of standards are being developed by CEN / TC 251 about terminological systems:

- one series is producing a set of categorial structures of individual systems of concepts on specific subject fields (e.g. Work Items of CEN/TC 251 Work Plan on surgical procedures, quantities in laboratory medicine, drugs, medical devices); to facilitate the co-ordination of the work among them, a catalogue will be maintained, containing the high-level semantic categories used in the different standards, with references to existing lists of admitted values, and the generative patterns to combine these semantic categories to produce systematic names and systematic intensional definitions (Work Item 2.13 Metamed).
- another series (including the present European Prestandard) deals with "technical" features, e.g.:
    - a guide to develop and merge overlapping concept representation systems in a distributed way;
    - guidelines to produce terminologies supported by an integrated concept-representation system;
    - description of presentation formats for distribution of terminologies, coding systems and formal models;
    - an ordinal scale of flexibility and expressive power for systems of concepts.

The present European Prestandard (ENV) addresses the specific needs about categorial structures within CEN/TC 251 Medical Informatics, hoping that in the meanwhile further ISO and CEN standards will set up standards for general use.

0.5 Use of the present European Prestandard

The present European Prestandard can be applied to

- production of further standards on the categorial structures of specific subject fields,
- description of the categorial structure of the system of concepts behind one or more specific terminological systems.

The potential target groups may be defined in consequence.

0.5.1 Production of a series of standards on categorial structures

A target group is designers of these standards. Their goal is to produce requirements for categorial structures of terminological systems in a given subject field, by analysis of available systems (if any). They may consider optional extensions and provide references to lists of potential values for each semantic category. Revisions of conflicting standards on overlapping subject fields may be periodically required to reconcile them within a comprehensive framework.

0.5.2 Description of the categorial structure for an individual terminological system

A target group is developers of terminological systems. They may apply this European Prestandard to an existing (or planned) terminological system to

- drive its production or maintenance towards a more principled organisation;
- generate systematic names and systematic intensional definitions for its rubrics;
- generate multiaxial codes for its rubrics;
- establish a (multiple) hierarchy and generate the related hierarchical codes;
- verify its compliance to an existing standard on the categorial structure for the same subject field, and to produce tables or rules to transform its rubrics into compliant systematic names;
- verify its compliance to requirements of a specific information system or to negotiate responsibilities with designers of software;
- register it (if future registration rules require compliance to a standard categorial structure).

A target group is producers of services on terminological systems. They may use this European Prestandard to improve the presentation format in the computer-based version of the terminological system, allowing the user to browse the system according to different explicit differentiating criteria.

A target group is designers of software. They may use this European Prestandard to verify compliance of a terminological system to their requirements or to negotiate responsibilities with designers of terminological systems.

0.5.3 Description of the categorial structures for a set of terminological systems

A target group is developers of terminological systems. They may use this European Prestandard to facilitate convergence of coherent and systematic terminological systems.

A target group is producers of services on terminological systems. They may use this European Prestandard to assist the production and maintenance of a systematic mapping among terminological systems.

A target group is designers of computer-based formal models. They may use this European Prestandard to facilitate the development of a comprehensive categorial structure (formal ontology) and thus to build their formal models involving this categorial structure; in particular for distributed development of fragments of the formal model and to facilitate reconciliation. They may also use this standard to communicate among themselves about different formal models, in order to make differences explicit, discuss them systematically and reach agreements on a common structure (shared ontologies).

1 Scope

This European Prestandard is applicable to the description of the categorial structure of systems of concepts supporting computer-based terminological systems, including coding systems, for healthcare.

Categorial structures provide a mechanism to

- outline the content of a given computer-based terminological system;
- make its regularities explicit, for suitable computer-based exploitation;
- coordinate the work on design and maintenance of computer-based terminological systems, and the application of these terminological systems by software developers.

This European Prestandard allows production of specific standards on categorial structures for particular subject fields and description of requirements that computer-based terminological systems shall meet to comply with those standards.

The main target groups for this European Prestandard are

- developers of standards about categorial structures in CEN/TC 251;
- organisations in charge of production, maintenance and distribution of terminological systems and related services for healthcare;
- software developers that deal with categorial structures in the modelling of an information system for healthcare.

This European Prestandard is not meant for 'end-user' healthcare professionals.

2 Normative references

This European Prestandard incorporates, by dated or undated references, provisions from other publications. These normative references are cited in the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments and revisions of any of these publications apply to this European Prestandard only when incorporated in it by amendment and revision. For undated references the latest edition of the publication referred to applies.

ISO 1087: 1990	Terminology — Vocabulary (under revision, as ISO CD 1087-1)
ISO 2382-4	Information Processing Systems — Vocabulary — Part 04: Organisation of data
ISO 2788:1986	Documentation — Guidelines for the establishment and development of monolingual thesauri
ISO/DIS 10241:1991	Preparation and layout of international terminology standards
ISO/IEC TR 9789:1989	Coding methods and principles
CEN ENV 1068: 1993	Medical Informatics — Healthcare information interchange — Registration of coding schemes

3 Definitions

For the purpose of this European Prestandard the following definitions apply:

3.1 concept

unit of thought constituted through abstraction on the basis of properties common to a set of one or more referents

NOTE: This definition is taken from the current revision of ISO CD 1087-1.

3.2 characteristic

mental representation of a property of an object or of a set of objects

3.3 intension

set of *characteristics* comprised by a *concept*

NOTE: This definition is taken from the current revision of ISO CD 1087-1.

3.4 extension

set of objects referred to by a *concept*

NOTE: This definition is taken from the current revision of ISO CD 1087-1.

3.5 generic relation

relation between a *superordinate concept* and a *subordinate concept* where the *intension* of the former is contained in the latter

NOTE: This definition is taken from the current revision of ISO CD 1087-1.

3.6 partitive relation

relation in which a *superordinate concept* refers to a referent as a whole and the *subordinate concept* to the parts of this referent

NOTE 1: This definition is taken from the current revision of ISO CD 1087-1.

NOTE 2: *Generic relations* and *partitive relations* are hierarchical relations.

3.7 associative relation

relation between *concepts* referring to referents that have a non hierarchical proximity

3.8 superordinate concept

concept in a *generic* or *partitive relation* which is divided into lower ranking *concepts*

NOTE: This definition is taken from the current revision of ISO CD 1087-1.

3.9 subordinate concept

concept which can be grouped together with at least one more *concept* of the same level to form a higher ranking *concept*

NOTE: This definition is taken from the current revision of ISO CD 1087-1.

3.10 system of concepts

structured set of *concepts* established according to the relations between them

NOTE: This definition is taken from the current revision of ISO CD 1087-1.

3.11 definition

statement that describes a *concept* in order to permit its differentiation from related *concepts*

3.12 intensional definition

definition based on the *intension* of a concept

NOTE 1: This definition is taken from the current revision of ISO CD 1087-1.

NOTE 2: An intensional definition states the nearest superordinate concept and the essential characteristics that delimit the concept to be defined.

EXAMPLE: **granulocyte**
leucocyte with abundant granules in the cytoplasm

3.13 extension definition

definition based on the *extension* of a concept

EXAMPLE: **granulocyte**
neutrophil, eosinophil or basophil

3.14 term

designation by a linguistic expression of a general *concept* in a special language

EXAMPLES: "kidney", "cyst", "removal", "viral hepatitis"

NOTE: A term may consist of one or more words in fixed order; it may include non-alphabetic symbols.

3.15 terminological phrase

phrase containing at least one *term* and a number of other lexical items the choice of which being restricted by the *term* in question

EXAMPLES: "removal of cyst from kidney", "removal of a renal cyst", "renal cystectomy"

NOTE: A terminological phrase is usually self-explanatory and may be created or modified by the user according to natural language rules.

3.16 semantic category

concept chosen to stand for a specified set of *subordinate concepts*, considered homogeneous

EXAMPLES: <surgical procedure>, <body part>, <extent of a surgical procedure>

NOTE: In examples within this European Prestandard, semantic categories are enclosed in angle brackets < >.

3.17 target concept

concept whose designation is intended to be used in applications

EXAMPLES: "removal of cyst from kidney", in a system of concepts to describe the <surgical procedure> performed on hospital patients. The concepts: "removal", "removal of cyst", or "removal from kidney" cannot be considered adequate descriptions in that context.

3.18 target semantic category; target category

semantic category standing for a set of *target concepts*

NOTE: The coded set for a terminological coding scheme is usually a target semantic category.

3.19 systematic name; identifier

terminological phrase created according to pre-established rules and used as name for a *target concept*

NOTE: In common practice, a working name can be used in place of the systematic name. The working name may be either a *term* or a simpler *terminological phrase*.

3.20 base concept

concept used systematically as *superordinate concept* in *intensional definitions*

EXAMPLE: "removal" can be used systematically in the intensional definitions in a system of concepts to describe the target concepts of <surgical procedure> performed on patients.

3.21 base semantic category; base category

semantic category standing for a set of *base concepts*

EXAMPLE: <surgical deed>, which describes the action performed on a patient, in a system of concepts on <surgical procedure>.

3.22 semantic link

unidirectional *associative relation* from a *base concept*

EXAMPLE: 'has-aetiology:', from the base concept "inflammation" to the associated concept "virus", in a system of concepts to describe <disease>.

NOTE: A semantic link may be also used between semantic categories (which are a particular kind of concepts).

3.23 associated concept

concept connected to a *base concept* by a *semantic link*

EXAMPLE: "cyst ", in a system of concepts to describe the <surgical procedure> performed on hospital patients.

NOTE: A semantic link and an associated concept make up a differentiating characteristic, which may be used with a base concept (acting as superordinate concept) to form the intensional definition of a subordinate concept.

3.24 associated semantic category; associated category

semantic category standing for a set of *associated concepts*

EXAMPLE: <micro-organism> may stand for a set of associated concepts causing <disease>.

3.25 associated domain

set of *associated concepts* not considered as establishing a *semantic category*

NOTE: In the examples within this European Prestandard, an associated domain is represented as a set, enclosed in braces { }.

EXAMPLE: The heterogeneous set {cause-of-disease}, made of all the concepts that may cause a <disease>.

3.26 differentiating criterion

group of *characteristics* used as basis for the establishment of systematic subdivisions in a *system of concepts*

NOTE: A differentiating criterion may be expressed as a semantic link followed by an associated semantic category or an associated domain (see B.2).

3.27 generative pattern; template

expression to generate *systematic names* for a subset of *concepts* of a given *target semantic category*

NOTE: In the examples within this European Prestandard, generative patterns are enclosed within [ ].

3.28 categorial structure

reduced *system of concepts* to describe the organisation of the *semantic categories* in a particular *system of concepts*