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Health informatics — Categorial structures of clinical findings in traditional medicine

Part 1: Traditional Chinese, Japanese and Korean medicine

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National foreword

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Part 1:
Traditional Chinese, Japanese and Korean medicine

Informatique de santé — Structures catégorielles des recherches cliniques en médecine traditionnelle —

Partie 1: Médecine traditionnelle de l'Asie de l'est

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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The committee responsible for this document is ISO/TC 215, *Health informatics*.

Introduction

In most countries there are many types of traditional medicine that are distinct from the health care system based on biomedicine. In some countries this traditional medicine has been institutionalized; in other countries it may have a significant role in health care as an alternative medicine. One type of traditional medicine is traditional Chinese, traditional Japanese, and traditional Korean medicine (TM-CJK), which has spread from ancient China to other East Asian regions over thousands of years. TM-CJK is now relatively homogenous in terms of theory and practice including: disease classification; diagnostic methods; and treatment modalities such as acupuncture and use of herbs.

As in biomedicine, health care professionals specializing in this clinical discipline use specific terminologies in their clinical records and documentations as well as in their practice, research and education. There will be several standard TM-CJK terminologies used around the world in Electronic Health Record (EHR) systems both in separate systems supporting TM-CJK practice and in systems combining TM-CJK and biomedicine content. Interoperability of health record systems is a core objective of informatics standards; this can be supported by standards for terminologies such as those used in TM-CJK and biomedicine.

This Technical Specification provides categorial structures of clinical findings in TM-CJK for the requirements. An essential requirement for sematic interoperability of TM-CJK health records is a categorial-structure driven terminology system for TM-CJK diagnosis. Although there are many terminological resources in TM-CJK in electronic format and also some International Standard TM-CJK terminologies, there are none that meet the requirements of health informatics such as interoperability between systems and machine readability. However, the ICD-11 Traditional Medicine (TM) chapter and ICTM are being developed by the World Health Organization (WHO) and will meet this criteria with their formal content model which identifies TM diagnostic entities, their properties and value sets.[15] Hence This Technical Specification refers to the ICTM content model.

This Technical Specification describes the core, underlying components of terminological expressions (i.e. the Categorial Structure) of clinical findings in TM-CJK. It is aligned with ISO/TS 22789:2010 *Health informatics — Conceptual framework for patient findings and problems in terminologies*, which deals with the same domain in biomedicine. It specifies a concept system detailing the categories of the domain (clinical findings in TM-CJK) and a domain constraint of sanctioned characteristics, each composed of a semantic link and an applicable characterizing category. An item enclosed by single brackets <> refers to a category of domain or a characterizing category that can be specialized to various concepts as required. An item enclosed within the text by single accolades { } identifies a semantic link.

The Technical Specification does not specify the names of individual TM-CJK concepts in the definitions. However, when it is necessary to give examples with names of concepts in TM-CJK, the WHO International Standard Terminologies on Traditional Medicine in the Western Pacific Region is used. [1] Also current ICD-11 Traditional Medicine chapter(Beta Draft), which is the global reference point, will serve as a repository for examples in the next revision.[15] International Standard Chinese-English Basic Nomenclature of Chinese Medicine of World Federation of Chinese Medicine Societies (WFCMS) was accessible and considerable for the Technical Specification.[13] A future revision of this Technical Specification will incorporate examples from other authorized standards when they are fully established.

When a unique category is introduced and its name is already used in biomedicine, the '-TM' after the name is used to indicate that the term has a different concept in TM-CJK, for example, 'disorder-TM' is a different concept from 'disorder' in the biomedicine field.

Comparison and alignment with ISO/TS 22789:2010 is presented in Annex A. In Annex B, an informative description of Categorial Structures and their implementation in terms of intersection between terminology models and information models is provided.

The building methodology of the categorial structure in this Technical Specification is the one that was defined by CEN in EN 12264 and applied to different domains, from surgical procedures (EN 1828[2]) to nursing care (ISO 18104[3]) and clinical findings of the biomedicine area (ISO/TS 22789).

The potential uses for this categorial structure are to:

— provide a core model to describe the structure of TM-CJK, and facilitate improved semantic correspondence with information models;

— facilitate the representation of TM-CJK using a standard core model in a manner suitable for computer processing;

— support developers of new terminology systems concerning TM-CJK clinical findings;

— support developers of new detailed content areas of existing terminology systems concerning TM-CJK clinical findings ;

— facilitate the mapping or integration between TM-CJK terminologies and biomedicine terminological systems.

The direct users for this Technical Specification are:

— developers of terminology systems concerning TM-CJK patient findings;

— developers of information systems that require a structured framework of concepts of TM-CJK patient findings to facilitate implementation.

The following will benefit from this Technical Specification;

— informaticians, analysts and epidemiologists who require common models of knowledge to facilitate analysis of current and legacy data from one or more information systems;

— clinicians and coders, to provide greater consistency in structure and organization when entering and retrieving data using one or more terminology systems.

Health informatics — Categorial structures of clinical findings in traditional medicine —

Part 1:
Traditional Chinese, Japanese and Korean medicine

1 Scope

This Technical Specification defines a categorial structure for clinical findings in terminological systems for Traditional Chinese Medicine, Traditional Japanese Medicine, and Traditional Korean Medicine (TM-CJK). This Technical Specification defines three subcategories: pattern-TM, disorder-TM and sign&symptom-TM. Concept representations within these three categories are used to describe the states of patients in clinical records and communications.

This Technical Specification is not applicable to:

— a comprehensive categorial structure for TM-CJK;

— an exhaustive list of all possible characterizing concepts that could be used to describe clinical findings;

— terms/descriptions for individual TM-CJK concepts;

— a detailed terminology of clinical findings in TM-CJK;

— categorical structure of diagnosis and treatment on clinical findings in TM-CJK.

NOTE   This Technical Specification is limited to a subpopulation of clinical findings in traditional medicine. Other types of clinical findings are represented in ISO/TS 22789 although it has not been tested for this purpose.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies

ISO/TS 22789:2010, *Health informatics — Conceptual framework for patient findings and problems in terminologies*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 General

3.1.1
concept
unit of knowledge created by a unique combination of characteristics

[SOURCE: ISO 1087-1:2000, definition 3.2.1]

3.1.2
categorial structure
minimal set of *categories* (3.1.4) and the valid relationships between them for representing **concept**s (3.1.1) in terminological systems for a specified subject field

[SOURCE: ISO 18104, definition 3.1.2]

3.1.3
characterizing category
category (3.1.4) which is allowed by a domain constraint (3.1.7) to specialise a concept (3.1.1) in a particular domain

EXAMPLE   in   {performedUsing}   <instrument>;   {hasLocation}   <bodyPartOrImplantedDevice>, "<instrument>" and "<bodyPartOrImplantedDevice>" is the *characterizing category* (3.1.3).

Note 1 to entry: (3.1.1).

3.1.4
category
type of *entity* (3.1.8) shared by all the individual instances in existence in the present, past and future

EXAMPLE   The *category* (3.1.4) <Route> is instantiated by *oral route* and all other routes that meet the defining **characteristic**s (3.5) for <Route>.

Note 1 to entry: category (3.1.4) is usually described by a superordinate and generic *concept* (3.1.1).

Note 2 to entry: **categor**ies (3.1.4) may be more or less general. Where one *category* (3.1.4) is subsumed by another, the *isA* relation is asserted to obtain a hierarchy between the more specific or subsumed *category* (3.1.4) and the more general or subsuming *category* (3.1.4). For example, *parenteral route* is more general than *intravenous route*.

Note 3 to entry: Each *entity* (3.1.8) instantiates some *category* (3.1.4).

[SOURCE: ISO 18104, definition 3.1.3]

3.1.5
characteristic
abstraction of a property of an object or of a set of objects

[SOURCE: ISO 1087-1:2000, definition 3.2.4]

EXAMPLE   Red and gold are the *characteristic* (3.1.5) colours of autumn.

Note 1 to entry: **Characteristic**s (3.5) are used for describing **concept**s (3.1.1).

3.1.6
clinical findings-TM
any state observed directly or indirectly concerning a patient and their relationship with the environment according to TM-CJK theories

Note 1 to entry: Modified from ISO/TS 22789 for TM-CJK theories.

3.1.7
domain constraint
rule prescribing the set of **sanctioned characteristic**s(3.1.9) that are valid to specialise a concept representation in a certain subject field

EXAMPLE   "Infection possibly hasLocation SkeletalStructure" explains that an infection in a certain context can be located in a structure that is a kind of skeletal structure.

[SOURCE: ISO 17115:2007, definition 2.3.2]

Note 1 to entry: The rule describes the set of **sanctioned characteristic**s (3.1.9) by combining the *semantic link* (3.1.10) and the *characterizing category* (3.1.3).

3.1.8
entity
any concrete or abstract thing of interest

EXAMPLE   Aspirin, environment, parent, symptom, mobility.

Note 1 to entry: While in general the word entity can be used to refer to anything, in the context of modelling it is reserved to refer to things in the universe of discourse being modelled.

Note 2 to entry: This definition is similar to that for *object* in ISO:1087–1[4] which is: *anything perceivable or conceivable.* ISO 1087-1 notes that *Objects may be material (e.g. an engine, a sheet of paper, a diamond), immaterial (e.g. conversion ratio, a project plan) or imagined (e.g. a unicorn).* However, the term *object* is normally interpreted as representing a material thing, therefore *entity* is preferred.

3.1.9
sanctioned characteristic
formal representation of a type of *characteristic* (3.1.5)

[SOURCE: ISO 17115:2007, definition 2.3.1]

EXAMPLE   {performedUsing}   <Instrument>;   {hasLocation}   <BodyPartOrImplantedDevice>, where "{performedUsing}" and "{hasLocation}" are the *semantic links* (3.1.10), and "<Instrument>" and "<BodyPartOrImplantedDevice>" is the *characterizing category* (3.1.3).

Note 1 to entry: A *sanctioned characteristic* (3.1.9) is typically made up of a combination of a *semantic link* (3.1.10) and a *characterizing category* (3.1.3), and can be used in **domain constraint**s (3.1.7).

3.1.10
semantic link
formal representation of a directed associative relation or partitive relation between two concepts (3.1.1)

[SOURCE: ISO 17115:2007, definition 2.2.3]

EXAMPLE   {hasLocation} (with inverse {isLocationOf}) and {isCauseOf} (with inverse {hasCause}).

Note 1 to entry: A *semantic link* (3.1.10) always has an inverse, i.e. another *semantic link* (3.1.10) with the opposite direction. The inverse may or may not be explicitly stated.

3.2   Core categories

3.2.1
pattern-TM
condition which represents a typical constellation of symptoms or complete clinical presentation of patients including symptoms at a given moment in time and is a known or assumed dysfunction of body function-TM(3.3.3.2), body structure-TM (3.3.1) or body substance-TM (3.3.2.1)

EXAMPLE   <heart yang collapse pattern> is a pattern marked by sudden profuse sweating and cold skin, reversal cold of limbs, feeble breathing, palpitations, clouding or loss of consciousness, pale complexion and hardly perceptible pulse.[1] <greater yang cold damage pattern> is a pattern caused by pathogenic cold attacking the greater yang meridian, chiefly manifested by fever, chills, absence of sweat and floating pulse, also called the greater yang cold damage.[1]

Note 1 to entry: *pattern-TM* (3.2.1) indicates a set of signs and symptoms at a given moment in time that can be captured by body system-TM (3.3.1.1) and their derivatives based on TM-CJK.

Note 2 to entry: This concept (3.1.1) may be expressed by pattern, syndrome, or disease pattern in English, 证 or 證 in Chinese and Japanese and 증 in Korean in TM-CJK related literature.

Note 3 to entry: This concept (3.1.1) is subcategories of clinical findings-TM and it can be used for *characterizing category* (3.1.3) with semantic link(3.1.10) such as **hasAssociatedPattern**-TM(3.4.5) and **hasAssociatedFinding**-TM(3.4.6).

3.2.2
disorder-TM
condition which represents a set of dysfunction with associated manifestations and is often defined by typical chief symptom, sequential pathological process-TM (3.3.3.3), body state-TM (3.3.3.1), or aetiology according to TM-CJK theories

EXAMPLE   <consumptive disorder>, <lung distention>, <heat wheezing>, <plum-pit qi>, <water distention>, <qi strangury>.

Note 1 to entry: Disorder-TM may have multiple underlying causes, corresponding multiple patterns-TM (3.2.1), and consequently multiple different treatments.

Note 2 to entry: It is useful to capture an individual health condition over time using a fixed concept (3.1.1) in disorder-TM while pattern-TM may change over time.

Note 3 to entry: This concept (3.1.1) may be expressed by disease or disorder in English, 病 in Chinese and Japanese, and 병 in Korean in TM-CJK related literature.

Note 4 to entry: This concept (3.1.1) is subcategories of clinical findings-TM and it can be used for *characterizing category* (3.1.3) with semantic link (3.1.10) such as **hasAssociatedPattern**-TM (3.4.5) and **hasAssociatedFinding**-TM (3.4.6).

3.2.3
sign&symptom-TM
manifestation of a dysfunction classified only by TM-CJK

EXAMPLE   <night sweating>, <cold sweating>, <floating pulse>, <slippery pulse>, <relaxed pulse>, <hollow pulse>, <pale tongue>, <red tongue>, <yellow fur tongue>.

Note 1 to entry: *sign&symptom* (3.2.3) may be identifiable by the affected person or the health worker.[6]

Note 2 to entry: This concept (3.1.1) is subcategories of clinical findings-TM and it can be used for *characterizing category* (3.1.3) with semantic link(3.1.10) such as **hasAssociatedPattern**-TM (3.4.5) and **hasAssociatedFinding**-TM (3.4.6)

3.3   Characterizing categories

3.3.1
body structure-TM
abstract or physical arrangement of parts of the body for explanatory framework according to TM-CJK

3.3.1.1
body system-TM
body structure-TM (3.3.1) that works to perform a certain task as a part of a whole in intimate interconnection according to TM-CJK

EXAMPLE 1   <liver-TM>, <heart-TM>, and <lung-TM>.

EXAMPLE 2   <liver meridian-TM>, <heart meridian-TM> and <lung meridian-TM> of meridian system and also <exterior–TM> and <interior-TM>.

Note 1 to entry: A body system-TM (3.3.1.1) can include anatomical structure, functional system and abstract notion for its constituents. They are mutually independent as well as complementary because they may reflect different aspects of body and health problems and are also closely related to each other.

Note 2 to entry: Body system-TM (3.3.1.1) may have subcategories according to different needs of the terminology system. Meridian system, Sanjiao system and Four constitutional system could be examples.

3.3.1.2
body part-TM

body structure-TM (3.3.1) that is physical anatomical *entity* (3.1.8), has a spatial dimension, and is uniquely used in TM-CJK

EXAMPLE 1   Any acupuncture points.

EXAMPLE 2   <high bone-TM> that is the bony area including the styloid process of the radius.

EXAMPLE 3   <upper orifices-TM> that refers to the eyes, ears, mouth and nose.

3.3.2
substance-TM

continuous abstract or physical *entity* (3.1.8) that has no inherent shape according to TM-CJK

3.3.2.1
body substance-TM

substance-TM (3.3.2) that is originated in body

Note 1 to entry: This refers to an entity (3.1.8) which is contained by body structure-TM (3.3.1). Because the body structure-TM (3.3.1) is abstract as well as physical, the body substance (3.3.2.1) is abstract or physical.

EXAMPLE 1   <essence-TM>, <vitality-TM>, <qi, <blood-TM>.

EXAMPLE 2   <phlegm-TM>, < static blood-TM>, <yang of yang collapse pattern>, <deficiency fire> which deficiency of yin fluid give rise to, <stagnant qi>.

3.3.2.2
non-body substance-TM

substance-TM (3.3.2) that is not originated in body

EXAMPLE   Cold of <greater yang cold damage pattern>.

3.3.3
state-TM

series of abstract or physical actions over time or condition in certain time in body according to TM-CJK

Note 1 to entry: While <body system-TM> (3.3.1.1) has an explanatory framework for human body and health problems, many individual findings also can be related to <state-TM> (3.3.3). It includes functional aspects like <body state-TM> (3.3.3.1) among entities of <body system-TM> (3.3.1.1) and also <pathological process-TM> (3.3.3.3) impairing the normal <body function-TM> (3.3.3.2) in TM-CJK.

3.3.3.1
body state-TM

normal or abnormal condition of body structure-TM (3.3.1) or body substance-TM (3.3.2.1)

EXAMPLE 1   <cold state-TM>, <heat state-TM>, <deficiency state-TM>, <excess state-TM> in eight principle.

EXAMPLE 2   <lung sector excessiveness> of four constitutional medicine, <yin deficiency constitution>.

Note 1 to entry: There can be more specific or subsumed category (3.1.4) like normal *body state-TM* (3.3.3.1) or abnormal *body state-TM* (3.3.3.1) if needed.

Note 2 to entry: *body state-TM* (3.3.3.1) refers to relatively static condition of body and sometimes refers to consequence of body function-TM (3.3.3.2). Dynamic change in body is described by pathological process-TM (3.3.3.3).

Note 3 to entry: *body state-TM* (3.3.3.1) includes constitutional characteristics of patients, which are the characteristics of an individual, including structural and functional characteristics, temperament, capability of adapting to environments. See Example 2.

3.3.3.2
body function-TM
activity or purpose natural to or intended for body structure-TM (3.3.1) or body substance-TM (3.3.2.1)

EXAMPLE 1   <upbearing and effusion of qi-TM> and <purification and down-sending of lung-TM> function, <transportation and transformation-TM> of <spleen-TM function>, <regulation of waterways-TM>, <qi absorption-TM> as collaborated function between <lung-TM> and <kidney-TM>.

EXAMPLE 2   Functional interaction between <body systems-TM> (3.3.1.1) or between <body system-TM> (3.3.1.1) such as <heart-kidney interaction-TM>, <spleen opening at the mouth-TM>.

3.3.3.3
pathological process-TM
process occurring as consequence or induction of clinical finding-TM (3.1.6)

EXAMPLE   <qi movement stagnation>, <qi movement disturbance>, <inhibited qi transformation>, <water qi intimidating the heart>.

3.3.4
causal property-TM
aetiological factor that give rise to or influence clinical finding-TM (3.1.6) according to TM-CJK

EXAMPLE   <abnormal body substances-TM> (3.3.2.1) such as <phlegm-TM> and <static blood-TM>, concepts (3.1.1) related to weather factors such as <external wind-TM>, <external dryness-TM>, <external cold-TM> and <external heat-TM>; <pathological processes-TM> (3.3.3.3) such as <qi movement stagnation> and <qi movement disturbance>; <**body state-TM**> (3.3.3.1) such as <cold-TM>, <heat-TM>, <deficiency-TM>, <excess-TM>, <lung sector excessiveness-TM>; concepts (3.1.1) related emotional state or trait such as <anger-TM>, <anxiety-TM> <joy-TM>; life styles such as <sexual overindulgence-TM>.

Note 1 to entry: <causal property-TM> (3.3.4) may include concepts (3.1.1) from <body substance-TM> (3.3.2.1) and <state-TM> (3.3.3) when those work as aetiological factors.

Note 2 to entry: <causal property-TM> (3.3.4) also includes underlying explanatory construct or environment for aetiological factor in TM-CJK, such as weather factors, emotional factors, life style or many other risk factors.

3.4   Semantic links (3.1.10) with domain constraints (3.1.7)

NOTE   For the **semantic links** (3.1.10) in this Technical Specification, general **semantic links** (3.1.10) such as one that connects <clinical finding-TM> (3.1.6) and <body structure-TM> (3.3.1) are proposed rather than specific links such as one that connects <clinical finding-TM> (3.1.6) and <body system-TM> (3.3.1.1). It is because the user of this Technical Specification will be given more flexibility. If more specific **semantic links** (3.1.10) are needed, the next revision will consider this.

3.4.1
hasAssociatedBodyStructure-TM
semantic link (3.1.10) between the <clinical finding-TM> (3.1.6) and the *characterizing category* (3.1.3) <body structure-TM> (3.3.1)

EXAMPLE   <spleen qi deficiency pattern> {hasAssociatedBodyStructure-TM (3.4.1)} <spleen-TM>.

3.4.2
hasAssociatedSubstance-TM
semantic link (3.1.10) between the <clinical finding-TM> (3.1.6) and the *characterizing category* (3.1.3) <substance-TM> (3.2.2)

EXAMPLE   <Qi deficiency lumbago> {hasAssociatedBodySubstance-TM(3.4.2)} <qi>.

3.4.3
hasAssociatedState-TM
semantic link (3.1.10) between the <clinical finding-TM> (3.1.6) and the *characterizing category* (3.1.3) <state-TM> (3.3.3)

EXAMPLE 1   <lung-kidney qi deficiency pattern> {hasAssociatedState-TM (3.4.3)} <qi absorption>.

EXAMPLE 2   <spleen failing to control the blood pattern> {hasAssociatedState-TM (3.4.3)} <controlling blood>.

EXAMPLE 3   <liver qi invading the stomach pattern> {hasAssociatedState-TM (3.4.3)} <qi depression>.

3.4.4
hasAssociatedCausalProperty-TM
semantic link (3.1.10) between the <clinical finding-TM> (3.1.6) and the *characterizing category* (3.1.3) <causal property-TM> (3.3.4)

EXAMPLE 1   <Phlegm syncope> {hasCausalProperty-TM (3.4.4)} <phlegm>.

EXAMPLE 2   <Kidney yin deficiency pattern> {hasCausalProperty-TM (3.4.4)} <sexual overindulgence>.

EXAMPLE 3   <Taiyang wind-cold pattern> {hasCausalProperty-TM (3.4.4)} <external wind-TM>.

3.4.5
hasAssociatedPattern-TM
semantic link (3.1.10) between the <clinical findings-TM> (3.1.6) and the *characterizing category* (3.1.3) <pattern-TM> (3.3.1)

EXAMPLE   <liver qi depression pattern> {hasAssociatedPattern-TM (3.4.5)} <liver depression and spleen deficiency>.

3.4.6
hasAssociatedFinding-TM
semantic link (3.1.10) between the <**pattern-TM**> (3.2.1) or <**disorder-TM**> (3.2.2) and the *characterizing category* (3.1.3) <sign&symptom-TM> (3.2.3)

EXAMPLE 1   <spleen qi deficiency pattern> {hasAssociatedFinding-TM (3.4.6)} <decreased blood production-TM>.

EXAMPLE 2   <spleen deficiency and blood depletion pattern> {hasAssociatedFinding-TM (3.4.6)} <pale tongue>.

3.5   Semantic links (3.1.10) adopted from ISO/TS 22789:2010

3.5.1
hasAnatomicalSite
semantic link (3.1.10) between the <clinical finding-TM> (3.1.6).and the *characterizing category* (3.1.3) <anatomical structure>

EXAMPLE   <cold lumbago {hasAnatomicalSite (3.5.1)} <lower back>.

Note 1 to entry: This domain constraint (3.1.7) would mainly be used to describe <disorders-TM>.

3.5.2
hasCourse
semantic link (3.1.10) between the <clinical finding-TM> (3.1.6) and the *characterizing category* (3.1.3) <courses>

EXAMPLE   <fluid collapse> {hasCourse (3.5.2)} <paroxysmal>.

Note 1 to entry: This domain constraint (3.1.7) would mainly be used to describe <disorders-TM>.

3.5.3
hasEpisodicity
semantic link (3.1.10) between the <clinical finding-TM> (3.1.6) and the *characterizing category* (3.1.3) <episodicity>

EXAMPLE   <chronic cold lumbago> {hasEpisodicity (3.5.3)} <chronic episode>.

**3.5.4
hasOccurrence**
semantic link (3.1.10) between the <clinical finding-TM> (3.1.6) and the *characterizing category* (3.1.3) <temporal period>

EXAMPLE 1   <afternoon tidal fever> {hasOccurrence (3.5.4)} <afternoon>.

EXAMPLE 2   <fifth-watch diarrhoea> {hasOccurrence (3.5.4)} <early morning>.

**3.5.5
hasOnset**
semantic link (3.1.10) between the <clinical finding-TM> (3.1.6) and the *characterizing category* (3.1.3) **<onset>**

**3.5.6
hasSeverity**
semantic link (3.1.10) between the <clinical finding-TM> (3.1.6) and the *characterizing category* (3.1.3) <severities>

EXAMPLE 1   <interior sinking of severe fire pattern> {hasSeverity (3.5.6)} <severe>.

EXAMPLE 2   <intense heat pattern> {hasSeverity (3.5.6)} <severe>.

4   Categorial structure (3.1.2) for clinical findings in TM-CJK

4.1   General considerations

Clinical finding-TM in TM-CJK is a type of clinical finding in which there are three different subcategories: <pattern-TM> (3.2.1), <disorder-TM> (3.2.2), and <sign&symptom-TM> (3.2.3). Those three have different theoretical status from disease and disorder as they are used by the biomedicine community. They are unique concepts (3.1.1) for TM-CJK, which are not replaceable or interchangeable.

4.2   Principles

To describe a categorial structure, of clinical findings in Traditional Chinese, Traditional Japanese and Traditional Korean Medicine the following information shall be provided:

a)   clinical finding-TM (3.1.6), a categories (3.1.4), that organize the entities (3.1.8) and the semantic links (3.1.10) dividing their representation in the domain;

b)   precise goal of the categorial structure (3.1.2);

c)   list of the representations of semantic links (3.1.10) authorized by domain constraints (3.1.7);

d)   list of minimal domain constraints (3.1.7) required by the goal of the categorial structure (3.1.2).

4.3   Domain constraints (3.1.7)

4.3.1   A categorial structure (3.1.2) of clinical findings in TM-CJK claiming conformance to the present Technical Specification shall provide the information described by items 4.2 above shall be conformant to the following three minimal domain constraint (3.1.7) requirements:

4.3.2   Each clinical finding-TM (3.1.6) terminological phrase shall, as a minimum, consist of one among <pattern-TM> (3.2.1) <disorder-TM> (3.2.2), and <sign&symptom> (3.2.3).

4.3.3   Each clinical finding-TM (3.1.6) terminological phrase containing <pattern-TM> (3.2.1), <disorder-TM> (3.2.2) shall contain the <functional body system-TM> (3.3.1.1)., in relation to the semantic link <hasFunctionalBodySystem-TM>.

4.3.4 Each clinical finding-TM (3.1.6) terminological phrase containing <pattern-TM> (3.2.1), <disorder-TM> (3.2.2) may contain the <sign&symptom> (3.2.3), in relation with the semantic link <hasAssociatedFinding-TM> (3.4.6).

4.4   Category names in Clause 3

The names of categories in Clause 3 may be used or modified as they prefer or need in any terminology system. Category names are often used in terminological systems to name specific hierarchies. In this Technical Specification, an attempt was made to introduce meaningful names for categories. However, the name of a category could be replaced by the system implementers provided the concept (3.1.1) remains as specified. More useful information would be the definition and provided example for their terminology works. See also Figure 1.

4.5   Adoption from and harmonization with existing standards

4.5.1   In case there is no semantic link that is needed to describe clinical findings of TM-CJK, the semantic links in ISO/TS 22789:2010 are recommended.

4.5.2   Any requirements that this Technical Specification does not cover but that is needed for clinical findings of TM-CJK will be covered by ISO/TS 22789 which is compatible with this Technical Specification (see Annex A).

4.5.3   For this Technical Specification, WHO WPRO IST terminologies[1] and their definitions are used as examples. But in case of the terms that are not distinguishable with existing terms of biomedicine, TM is added at the end of each term.

4.5.4   This Technical Specification will be further harmonized with the WHO International Classification of Traditional Medicine when that is available (as well as with the related ICD-11 Chapter on Traditional Medicine Conditions chapter that will be released in 2017). For TM concepts the ICD-11 TM Chapter and ICTM will be a global reference point and show serve as repository for examples.[6,15]

4.5.5   It is recommended that any related works about categorial structures in TM-CJK are compatible with this Technical Specification and furthermore ICTM Content model.

4.5.6   Where there are terms that are used in this Technical Specification and are not defined in this clause, they are considered to be generic to the English language or not specific to this document. In cases where they are not defined in this Technical Specification nor generic to the English language, terms can be found at the international health informatics Standards Knowledge Management Tool and Glossary (SKMTglossary) website www.skmtglossary.org.
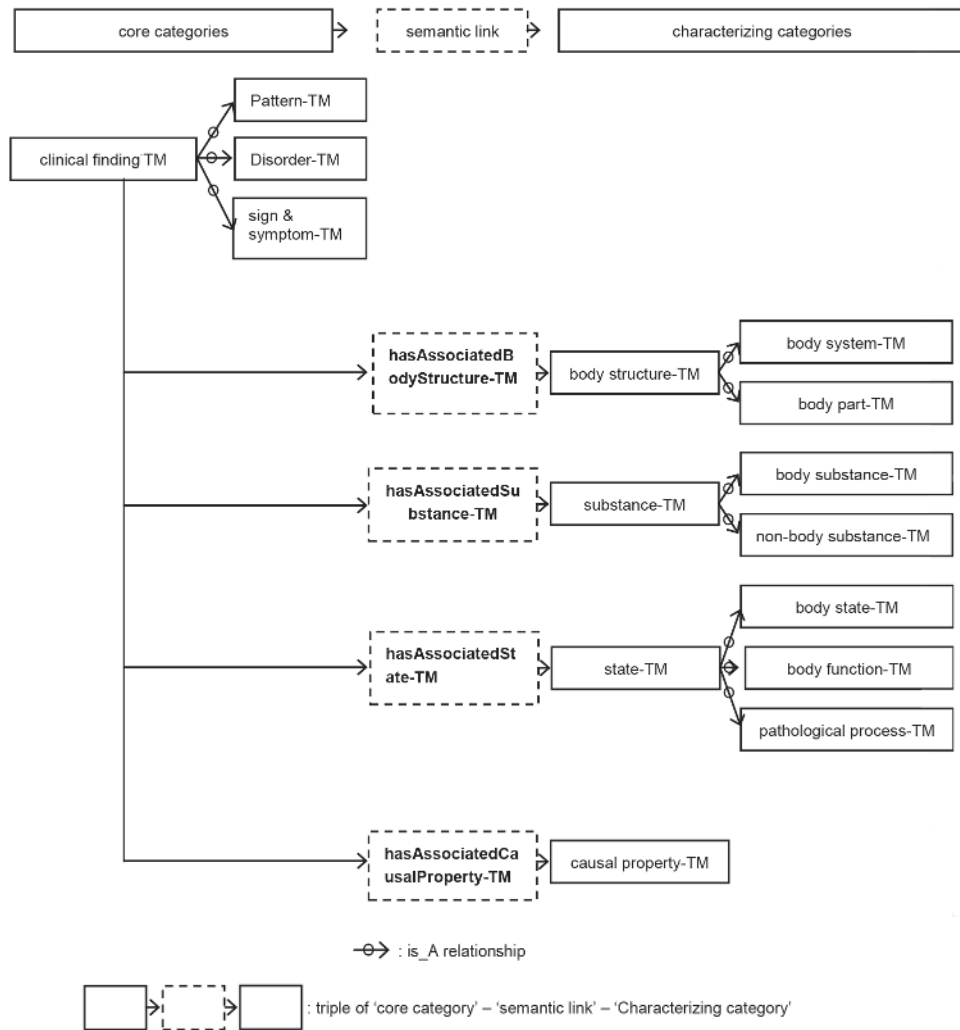
Note   Categorial structures within clinical finding-TM, the triple relationships with hasAssociatedPattern-TM and hasAssociatedFinding-TM, are omitted for sake of simplicity of the diagram. Also this diagram shows exclusive categorial structure used for TM-CJK.

Figure 1 — Categorial structure for clinical finding-TM in TM-CJK

Annex A
(informative)

Comparison of semantic links with ISO/TS 22789:2010

This Technical Specification provides the semantic links and their constraints that could be used only for TM-CJK field. The user of this Technical Specification will be supported also by ISO/TS 22789:2010 while this Technical Specification provides support for TM-CJK with unique semantic links and categories. Common part refers to general part which is used for any health care system.

Some of the semantic links that are kept from ISO/TS 22789:2010 are displayed with examples in 3.5. In actual clinical settings for TM-CJK, some frequently used concepts will be from common parts of Figures A.1 and A.2. In this case, this Technical Specification does not give examples because they are given in ISO/TS 22789.
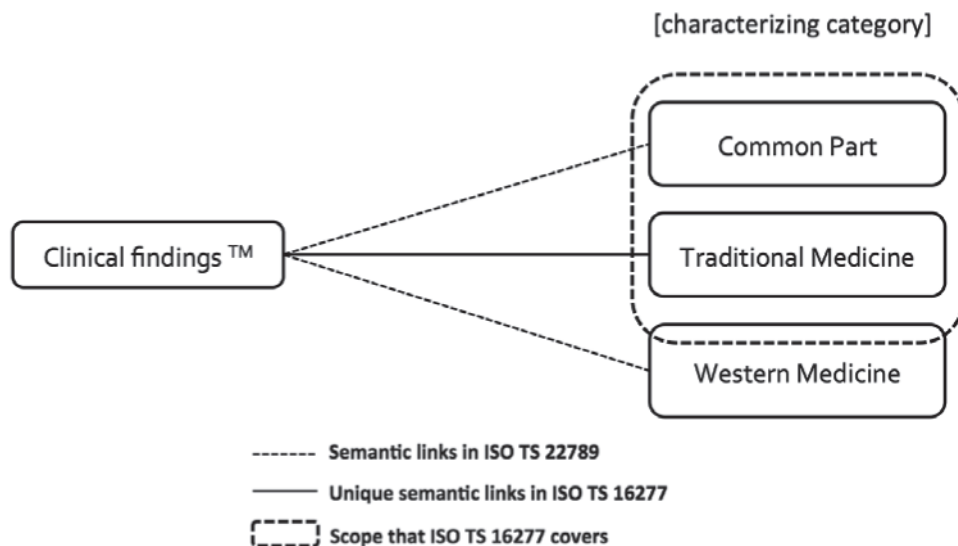

Figure A.1 — Clinical findings of TM-CJK described by unique concepts (3.1.1) of TM-CJK with the semantic links

ISO/TS 22789	ISO/TS 16277	note
hasAbnormalAnatomicalLocation		removed
hasAnatomicalSite	hasAnatomicalSite	keep
	HasAssociatedBodyStructure-TM	added
hasStructuralEmbryologicalDefect		removed
hasOnset	hasOnset	keep
hasEpisodicity	hasEpisodicity	keep
hasCourse	hasCourse	keep
hasOccurrence	hasOccurrence	keep
hasMorphology	hasMorphology	keep
hasCausativeAgent	hasCausativeAgent	keep
	hasCausalProperty-TM	added
hasSeverity	hasSeverity	keep
hasStage		removed
hasPathologicalProcess	hasPathologicalProcess	keep
hasExternalCause		removed
hasPlaceOfOccurrence	hasPlaceOfOccurrence	keep
hasSubjectOfInformation	hasSubjectOfInformation	keep
hasQuantity		removed
hasPsychosocialAspect		removed
hasAssociatedFinding	hasAssociatedFinding	keep
hasAssociatedFunction	hasAssociatedFunction	keep
	hasAssociatedState-TM	added
hasInterpretation	hasInterpretation	keep
hasAssociatedTest		keep
	hasAssociatedPattern-TM	added
	hasAssociatedFinding-TM	added
	hasAssociatedSubstance-TM	added
	hasAssociatedState-TM	added

Figure A.2 — Semantic links from ISO/TS 22789 are used for non-unique concepts (3.1.1)

Annex B
(informative)

Guidance notes for using categorial structures

B.1 General considerations

Examples used in this informative annex are illustrative and do not imply ISO support for any specific terminological system. Content of this annex are taken from Annex D in ISO 18104:2014[3], a standard for the nursing field.

B.2 What are categorial structures?

Everyday understanding of the world is based on our ability to group things according to their common characteristics. We can visualize and talk about trees because we know the characteristics that trees have in common – wooden roots, trunks and branches. Being able to categorize things according to their shared characteristics helps us to organize our thoughts and makes communication possible.

The categorial structure is one approach to organizing concepts that represent things of interest in a particular subject field (such as nursing). It was first considered in Europe as a practical way to support the harmonization of clinical terminologies that existed already and were continuing to be developed.[7]

Categorial structures can be seen as high level models of categories, or *types of concepts* and the relationships among them. In the tree example, the hypothetical category 'plant' (e.g. tree) might be related to another category 'substance' (e.g. wood). In the categorial structure for nursing diagnosis 'subject of care' is a type of concept that can be related to a 'focus'. Types of concepts (i.e. categories) that can take the role of 'focus' include: 'property' (e.g. colour, height) and 'behaviour' (e.g. treatment compliance, risk taking).

A categorial structure describes the main properties for a terminology in the stated subject field, covering:

1) the list of categories (e.g. 'subject or care', 'behaviour', 'judgement');

2) the list of semantic links between the categories (e.g. hasFocus, hasSite);

3) the goal (purpose and scope) (e.g. representation of nursing diagnoses in terminological systems);

4) minimal constraints (rules) for the generation and validation of well formed terminological phrases.[7]

An example of a minimal constraint is: '*all nursing diagnosis expressions must have either a descriptor for a clinical finding or descriptors for both focus and judgement*').The categories represented in health informatics terminologies need to be organized in ways that will support the specific requirements that users have. For example, 'routes of drug administration' need to be listed separately from 'devices for drug administration' so that a system designer can correctly populate picking lists in a prescribing system. Organizing all the different 'routes of administration' in a parent/child (isA) hierarchy supports the requirement to, for example, analyse data by whether the route was enteral or parenteral.

All health informatics terminologies have an underlying structure (sometimes referred to as a 'terminology model'), which ideally should be explicitly stated. Specifying a standard, high level categorial structure (a 'model for terminology models') for a specific subject field supports interoperability among health informatics systems in that field.

B.3   Use of categorial structures

B.3.1   For terminology development and review (conformance)

A category in a categorial structure might provide the heading for a hierarchy or list of concepts within a terminology. For example, in the 7-axis representation of the International Classification for Nursing Practice (ICNP), there is a hierarchy ('axis') for focus terms and one for judgement terms.[8] In any terminology that claims conformance to the categorial structure for nursing actions, for example, you would expect to see, at a minimum, hierarchies of concepts covering: actions, targets, sites, routes and means.

The rules (constraints) for relationships in the terminology should also be consistent with those in the Standard, as in the ICNP example where those developing nursing diagnoses for ICNP catalogues must include a term from the focus axis and a term from the judgement axis.[8]

The first step in reviewing a terminology for conformance is to identify the components of the terminology model i.e. its categorial structure. In many cases, the model may be implicit - the goal of this Technical Specification is to drive interoperability by requiring terminology developers to make their models explicit. Note that the names for categories/hierarchies may differ, for example, in SNOMED CT[9] the 'observable entity' hierarchy is similar to the 'focus' category in this Technical Specification. As when mapping between elements in terminologies, the comparison must be done on the concepts (as clarified in definitions) rather than on the name of the hierarchy. Note also that terminologies supporting representation of nursing diagnoses and nursing actions in electronic records may have more categories than those specified in this Technical Specification.

B.3.2   For establishing relationships between terminologies (supporting mapping)

Mapping means '*assigning an element in one set to an element in another set through semantic correspondence*'[10]. There are a number of reports where 'semantic correspondence' has been established between two or more terminologies using the categorial structure to undertake dissections of pre-coordinated expressions from the terminologies.

Dissecting an expression reduces it to its atomic content, allowing easier comparison between expressions in one terminology and those in another. Some examples:

urethral catheterization	insertion of urethral catheter
hasAction: insertion	hasAction: insertion
actsOn: urethral catheter	actsOn: urethral catheter
risk of raised body temperature	risk of pyrexia
hasFocus: body temperature	hasFocus: body temperature
hasJudgement: raised	hasJudgement: raised
hasPotential: risk for	hasPotential: risk for
removal of tracheal tube	tracheal extubation
hasAction: removal	hasAction: removal
actsOn: tracheal tube	actsOn: tracheal tube

It also allows comparison to identify when expressions are not the same as in this example:

ineffective family coping	ineffective coping
hasFocus: coping	hasFocus: coping
hasSubject of Care: family	hasSubject of Care: individual
hasJudgement: ineffective	hasJudgement: ineffective

Published reports on the use of ISO 18104:2003 for establishing relationships between terminologies are included in Annex A of ISO 18104:2014. In addition, a number of unpublished reports were made available to the expert group preparing this revision. Work by Bousquet et al.[11] to relate two terminologies for representing adverse drug reactions is another example of the use of categorial structures for this purpose. These works were undertaken for different reasons but the process was similar and the lessons learnt about the process are useful to others attempting mapping work. In summary:

— Licences may be required to use particular terminologies for mapping purposes.

— Mapping may be undertaken to produce maintained mapping products in a form that can be implemented in applications or it may be undertaken as a 'paper exercise' for a specific purpose such as comparing coverage for a specific domain.

— Comparison between elements must be based on the concept meaning (as clarified in definitions) not on the term.

— Independent comparison by more than two experts followed by consensus activity leads to a better result.

— Those undertaking the mapping should have expertise in the source terminologies and in doing dissections.

— Mapping activity provides useful quality checks on terminologies leading to improvement ('mutual enhancement'[12]) – results should be fed back to the terminology owners.

B.3.3   For informing design of system content

Informal feedback during the ISO review of ISO 18104:2003 indicated that providers of health informatics systems valued the categorial structure for nursing diagnoses and nursing actions, as it provides a nursing model framework for use as the foundation for the internal terminology structure in the system. It also allows the system provider to explain and justify the rationale behind the terminology infrastructure.

The categorial structure itself is a foundational element for the necessary categorial structures expressed within information models and other content models (e.g. clinical decision support rules, clinical process definitions) that utilize a terminology to consistently express their content. It helps define a minimum data set and data relationships. The underlying terminology model drives data collection of terminology-based, standardized, structured data essential to driving system behaviour, communicating consistently with end users, supporting secondary data use, and the sharing of actionable data with other health informatics systems. By converging on a standardized categorial structure for terminology within health informatics systems, the interoperability of nursing data, a key objective of this Technical Specification, is facilitated.

The immediate and direct assimilation and use of a standard categorial structure is not often practical, however. Existing health informatics system implementations are difficult and expensive to change at the data and content levels. But at some level, system content can be informed by such a standard. Specifically, it provides a common reference point for mapping to external systems, each with their own varying terminologies. End users of the health informatics system can continue to use their existing local vocabularies, and still consistently communicate with other systems, end users, organizations, and patients. However, if there are severe discontinuities between existing system content and this Technical Specification, an effective and accurate mapping may not be possible without losing meaning.

Design strategies that may be considered include:

— The simplest case is where the development of new health informatics function allows the direct assimilation of a complete categorial structure for terminology. By directly adopting this Technical Specification, analysis and development time and expense are reduced. Also, the more that a solution conforms to this Technical Specification, the easier it will be to support interoperability and multidisciplinary care.

— Where gaps in categories exist within existing system structures, they can be added in conformance to those in the Categorial Structure. The additional data provides richer content for driving decision support, general performance management, and research.

— Where finer grained categories than those in this Technical Specification exist in the system, maps can be defined to more general categories within this Technical Specification, as described in B.3.2 above, for interoperability.

— Where coarser grained categories exist in the system, the finer grained categories in this Technical Specification can possibly be added. This decomposition will ultimately be necessary to achieve interoperability across systems. The Categorial Structure represents a minimum. In the interim, mapping may not be possible, and meaning is lost in the transfer of data across systems.

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