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**Health informatics — Syntax to  
represent the content of healthcare  
classification systems — Classification  
Markup Language (ClAML)**

*Informatique de santé — Syntaxe de représentation du contenu des  
systèmes de classification des soins de santé — Langage de marquage  
de la classification (ClAML)*

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# Contents

	Page
<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
1.1 Main purposes.....	1
1.2 Topics considered outside the scope of this International standard.....	1
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Abbreviated terms</b> .....	<b>2</b>
<b>4 Conformance</b> .....	<b>2</b>
<b>5 Conventions</b> .....	<b>2</b>
<b>6 Classification markup language</b> .....	<b>2</b>
6.1 Basis of the syntax.....	2
6.2 Document Type Definition.....	2
6.3 Semantic description of the Classification Markup Language.....	6
<b>Annex A (informative) Examples of usage of this International Standard</b> .....	<b>31</b>
<b>Annex B (informative) Suggested usage of ClAML attributes</b> .....	<b>35</b>
<b>Bibliography</b> .....	<b>37</b>

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 13120 was prepared by Technical Committee ISO/TC 215, *Health informatics*.

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## Introduction

Healthcare classifications are developed and distributed in a variety of informal formats, such as MS Word, with little consistency in approach between developers. Exchanging data from these systems or attempting to parse the informal text into a more formal structure, say for publishing purposes, presents many challenges because unwanted mistakes are easily made, and difficult to detect. For example, the accidental deletion of a tab can transform a sibling rubric into a parent. ASCII files with comma separated value fields is another mechanism widely used for storing and transferring data, but as a solution here is limited by insufficient formal structuring capabilities.

In the interests of safely exchanging and distributing the content and hierarchical structure of healthcare classification systems, this International Standard presents a simple XML specification, ClaML, for exchange and distribution of healthcare classifications systems. XML is the chosen format for this International Standard as: a) XML provides the necessary structuring elements, and b) there are many readily available XML parsers in existence.

This International Standard builds on CEN/TS 14463:2002 in that the primary focus of CEN/TS 14463:2002 was to support electronic data processing. Assessment of CEN/TS 14463:2002 revealed the need to extend the areas for version control and maintenance within the Standard and this was supported by insight from the health informatics community who have been active in the implementation of this International Standard.

This International Standard is intended to serve as the core representation from which all publication forms can be derived. It contains information of a depth sufficient to uniquely identify and describe the structure and relevant element of healthcare classification systems. This International Standard does not intend to prescribe to developers how healthcare classification systems should be structured, nor does it define or explain the meaning of the structuring elements. This International Standard is not meant to be a direct format for printing or viewing the content of a healthcare classification system. Views and prints are to be derived from this representation by post processing.

This International Standard is targeted at:

- a) developers of first generation<sup>[2]</sup> healthcare classification systems, to assist in the construction, maintenance and publication (both in paper and electronic formats) of a particular system;
- b) developers of information systems to assist in the inclusion of mechanisms for unambiguous loading of healthcare classification systems in their applications;
- c) organizations responsible for updating healthcare classification systems;
- d) institutions receiving updated healthcare classification systems.

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# Health informatics — Syntax to represent the content of healthcare classification systems — Classification Markup Language (ClAML)

## 1 Scope

### 1.1 Main purposes

The main purpose of this International Standard is to formally represent the content and hierarchical structure of healthcare classification systems in a markup language for the safe exchange and distribution of data and structure between organizations and dissimilar software products.

The scope of healthcare classifications systems covered in this International Standard encompasses terminologies, and is constrained to traditional paper-based systems (like ICD-10) and systems built according to categorial structures and a cross thesaurus (like ICNP).<sup>[3]</sup> This International Standard is intended for representation of healthcare classification systems in which classes have textual definitions, hierarchical ordering, named hierarchical levels (such as “chapter”, “section”), inclusion- and exclusion criteria, and codes. It is not intended to cover any formal representation, either for definition or composition, of concepts, or for specification of classification rules. Systems with such formal specifications can at best be partially represented using this International Standard, and are hence out of scope.

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### 1.2 Topics considered outside the scope of this International standard

This International Standard is not intended to:

- a) provide a normative syntax on how a healthcare classification system is to be constructed;
- b) define link types between elements in a healthcare classification system; this is left to the developers of healthcare classification systems;
- c) provide a representation for direct viewing or printing.

## 2 Normative references

The following referenced documents are indispensable for the application 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 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

ISO 639-1, *Codes for the representation of names of languages — Part 1: Alpha-2 code*

### 3 Abbreviated terms

ClAML	Classification Markup Language
XML	eXtensible Markup Language 1.0
DRG	Diagnosis-Related Group
DTD	Document Type Definition
IANA	Internet Assigned Numbers Authority
ICD	International Classification of Diseases
ICF	International Classification of Functioning, disability and health
ICNP	International Classification for Nursing Practice
OPS	“Operationen und Prozedurenschlüssel”, the German procedure classification
WHO	World Health Organization

### 4 Conformance

The normative part of this International Standard is written in the form of a document type definition (DTD). Many commercially available XML tools provide facilities to test the conformance of an XML document with a DTD. Users of this International Standard are encouraged to perform such a test before distributing their healthcare classifications in the format of this International Standard. Alternatively, a conformance test using an XML Schema Definition (XSD) can be performed, but an XSD is not part of the current revision of this International Standard.

### 5 Conventions

The font Courier New is used to denote the DTD of ClAML.

**Bold** text is used to denote elements and attributes defined in the DTD. For names of elements CamelCase is used (i.e. a single string, without spaces, consisting of multiple words, each starting with a capital); for names of attributes lowercase is used.

## 6 Classification markup language

### 6.1 Basis of the syntax

The basis of the syntax is to represent the content of healthcare classification systems. The syntax defined in this International Standard is called Classification Markup Language. It is defined here in the form of a DTD. The reference to this syntax will be headed to ClAML in the remainder of this document. The Version of ClAML described in this document is Version 2.0.0.

### 6.2 Document Type Definition

```
<!ENTITY % rubric.simple "#PCDATA | Reference | Term">
<!ENTITY % rubric.complex "%rubric.simple; | Para | Include | Include Descendants | Frag-
ment | List | Table">
<!ELEMENT ClAML (
  Meta*,
  Identifier*,
  Title,
  Authors?,
```



```

        Variants?,
        ClassKinds,
        UsageKinds?,
        RubricKinds,
        Modifier*,
        ModifierClass*,
        Class*)
>
<!ATTLIST ClaML
  version CDATA #REQUIRED
>
<!ELEMENT Meta EMPTY>
<!ATTLIST Meta
  name CDATA #REQUIRED
  value CDATA #REQUIRED
  variants IDREFS #IMPLIED
>
<!ELEMENT Identifier EMPTY>
<!ATTLIST Identifier
  authority NMTOKEN #IMPLIED
  uid CDATA #REQUIRED
>
<!ELEMENT Title (#PCDATA)>
<!ATTLIST Title
  name NMTOKEN #REQUIRED
  version CDATA #IMPLIED
  date CDATA #IMPLIED
>
<!ELEMENT Authors (Author* )>
<!ELEMENT Author (#PCDATA)>
<!ATTLIST Author
  name ID #REQUIRED
>
<!ELEMENT Variants (Variant+)>
<!ELEMENT Variant (#PCDATA)>
<!ATTLIST Variant
  name ID #REQUIRED
>
<!ELEMENT ClassKinds (ClassKind+)>
<!ELEMENT UsageKinds (UsageKind+)>
<!ELEMENT RubricKinds (RubricKind+)>
<!ELEMENT ClassKind (Display*)>
<!ATTLIST ClassKind
  name ID #REQUIRED
>
<!ELEMENT UsageKind EMPTY>
<!ATTLIST UsageKind
  name ID #REQUIRED
  mark CDATA #REQUIRED
>
<!ELEMENT RubricKind (Display*)>
<!ATTLIST RubricKind
  name ID #REQUIRED
  inherited (true|false) "false"
>
<!ELEMENT Display (#PCDATA)>
<!ATTLIST Display
  xml:lang NMTOKEN #REQUIRED
  variants IDREF #IMPLIED
>
<!ELEMENT Modifier (
  Meta*,
  SubClass*,
  Rubric*,
  History*)
>
<!ATTLIST Modifier
  code NMTOKEN #REQUIRED
  variants IDREFS #IMPLIED
>
<!ELEMENT ModifierClass (

```

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```

        Meta*,
        SuperClass*,
        SubClass*,
        Rubric*,
        History*)
>
<!ATTLIST ModifierClass
  modifier NMTOKEN #REQUIRED
  code NMTOKEN #REQUIRED
  usage IDREF #IMPLIED
  variants IDREFS #IMPLIED
>
<!ELEMENT Class (
  Meta*,
  SuperClass*,
  SubClass*,
  ModifiedBy*,
  ExcludeModifier*,
  Rubric*,
  History*)
>
<!ATTLIST Class
  code NMTOKEN #REQUIRED
  kind IDREF #REQUIRED
  usage IDREF #IMPLIED
  variants IDREFS #IMPLIED
>
<!ELEMENT ModifiedBy (
  Meta*,
  ValidModifierClass*)
>
<!ATTLIST ModifiedBy
  code NMTOKEN #REQUIRED
  all (true|false) "true"
  position CDATA #IMPLIED
  variants IDREFS #IMPLIED
>
<!ELEMENT ExcludeModifier EMPTY>
<!ATTLIST ExcludeModifier
  code NMTOKEN #REQUIRED
  variants IDREFS #IMPLIED
>
<!ELEMENT ValidModifierClass EMPTY>
<!ATTLIST ValidModifierClass
  code NMTOKEN #REQUIRED
  variants IDREFS #IMPLIED
>
<!ELEMENT Rubric (
  Label+,
  History*)
>
<!ATTLIST Rubric
  id ID #IMPLIED
  kind IDREF #REQUIRED
  usage IDREF #IMPLIED
>
<!ELEMENT Label (%rubric.complex;)*>
<!ATTLIST Label
  xml:lang NMTOKEN #REQUIRED
  xml:space (default|preserve) "default"
  variants IDREFS #IMPLIED
>
<!ELEMENT History (#PCDATA)>
<!ATTLIST History
  author IDREF #REQUIRED
  date NMTOKEN #REQUIRED
>
<!ELEMENT SuperClass EMPTY>
<!ATTLIST SuperClass
  code NMTOKEN #REQUIRED
  variants IDREFS #IMPLIED

```

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## ISO 13120:2013(E)

```
<!ATTLIST TFoot
      class CDATA #IMPLIED
>
<!ELEMENT Row (Cell*)>
<!ATTLIST Row
      class CDATA #IMPLIED
>
<!ELEMENT Cell (
      %rubric.simple;
      | Para
      | Include
      | List
      | Table) *
>
<!ATTLIST Cell
      class CDATA #IMPLIED
      rowspan CDATA #IMPLIED
      colspan CDATA #IMPLIED
>
<!ELEMENT Term (#PCDATA)>
<!ATTLIST Term
      class CDATA #IMPLIED
>
```

### 6.3 Semantic description of the Classification Markup Language

#### 6.3.1 ClaML

##### 6.3.1.1 General

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The element **ClaML** identifies a Classification Markup Language file.

##### 6.3.1.2 Contents

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The element **ClaML** shall contain:  
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- an optional number of **Meta** elements;
- an optional number of **Identifier** elements;
- one **Title** element;
- one optional **Authors** element;
- one optional **Variants** element;
- one **ClassKinds** element;
- one optional **UsageKinds** element;
- one **RubricKinds** element;
- an optional number of **Modifier** elements;
- an optional number of **ModifierClass** elements;
- an optional number of **Class** elements.

##### 6.3.1.3 Required attribute

The attribute **version** shall specify the version of ClaML used in the remaining document. The value to indicate the current version shall be “2.0.0”.

#### 6.3.1.4 Optional attribute

The element **ClAML** has no optional attributes.

### 6.3.2 Meta

#### 6.3.2.1 General

The element **Meta** shall be used to define meta information about a class or the classification.

#### 6.3.2.2 Contents

The element **Meta** has no content.

#### 6.3.2.3 Required attributes

The attribute **name** defines the name for the meta information.

The attribute **value** defines the content of the meta information.

The attribute **variants** defines the variants in which this **Meta** element is valid. When the attribute is absent the **Meta** element is valid in all **variants**. The variants are defined in the element **Variants** (6.3.7).

EXAMPLE

```
<Meta name="DRG" value="J1"/>
```

NOTE The example is taken from the OPS. It indicates that the class is used for coding in a DRG-System.

#### 6.3.2.4 Optional attribute

The element **Meta** has no optional attributes.

### 6.3.3 Identifier

#### 6.3.3.1 General

The optional element **Identifier** may occur multiple times. It defines an issuing authority and the unique identifier for the classification defined by that authority.

#### 6.3.3.2 Contents

The element **Identifier** has no content.

#### 6.3.3.3 Required attribute

The attribute **uid** is required and defines the unique identifier for the classification.

#### 6.3.3.4 Optional attribute

The optional attribute **authority** identifies the authority that issued the uid.

EXAMPLE

```
<Identifier authority="HL7" uid="2.16.840.1.113883.6.3"/>
```

NOTE The example shows a HL7 registered identifier specifying that the ClAML-file is containing ICD-10 data.