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Health informatics — Workforce roles and capabilities for terminology and terminology services in healthcare (term workforce)

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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.

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

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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

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

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

Introduction

Countries that began the adoption of Health Information and Communication Technology (HICT) products have reported shortfalls in the quantity and skills of the workforce in Health Information Technology (HIT), Health Information Management (HIM), and Health Informatics (HI).

This document addresses workforce needs when implementing terminology resources (products) in healthcare organizations and related supporting organizations, including regional, national, and international HICT programs.

The purpose of this document is to enable healthcare organizations and related supporting organizations that deploy HICT products to safely and effectively support semantic interoperability within systems and between systems locally, nationally, or globally. Semantic interoperability, the ability of computer systems to exchange data with unambiguous and shared meaning, is impacted by the generation, management and sharing of health-related data and information.

Implementation and operation of complex terminologies in healthcare organizations and related supporting organizations without proper knowledge and skills of personnel in those terminological resources is a contributing factor in the resulting failure to deliver expected care outcomes, in delays in Electronic Health Record (EHR) and Health Information Systems (HIS) implementations, and in some cases, in injury caused to patients. Employers need to be able to hire workers with confidence that they have the right skill set for the job.

This document specifies tasks associated with electronic capture, management, sharing, and use of health record content in EHR and HIS in the context of clinical care, business processes, and information governance activities in healthcare.

This document is targeted to stakeholders involved in HICT products development, deployment, and use. Specific value includes:

— **Healthcare organizations and HICT vendors**: Requirements and guidance for tasks and the skills for human resource staff to guide hiring of terminology standards personnel.

— **Professional associations**: Guidance for terminology skill requirements, training and certification of HIT, HIM, and Informatics professionals, as well as accreditation of terminology services programs.

— **Academia**: Guidance for (a) the overall curricula development to support semantic interoperability education under HIT, HIM, and informatics programs, and (b) terminology competencies to support course development.

— **eHealth**, HIM, HIT, Informatics professionals and others: Provide a mechanism to consistently and accurately indicate career pathways and skill expectations.

— **Consumers** (patients, clinicians, governments, society): Safe, quality information is available.

This document supports the deployment of semantic content standards developed by TC 215 in healthcare organizations and governmental entities involved in electronic information sharing using interoperable standards-based HICT products. It provides direction on workforce needs for deployment and operation of terminological resources as well as the roles, competencies and skills to support these needs. Consideration of a business case development and potential numbers needed (i.e. terminology workers) would also be helpful in determining workforce requirements.

It also supports the development of the TC 215 reference standards portfolio (an assembly of individual standards) for interoperable HICT solutions in specific health domains, by identifying specific content area(s) for which a qualified terminology services workforce is needed.

ISO 21298 also describes a number of roles in healthcare. It is possible that some staff with roles as described in ISO 22287 roles might also undertake roles as described in ISO 21298 roles, or there might be naming collisions.

Health informatics — Workforce roles and capabilities for terminology and terminology services in healthcare (term workforce)

1 Scope

This document specifies the tasks, roles, and key skills, requirements and competencies for personnel involved in terminology services in healthcare organizations.

This document specifies

— terminology services in healthcare organizations including the selection, authoring, and deployment and use of terminology subsets and maps; developing and managing terminology management processes and health information management related policies; performing terminology business analysis; and supporting the adoption, planning, and deployment of terminologies,

— workforce needs to perform these services

— job roles in the healthcare organizations and related organizations responsible for performing terminology related tasks, and

    NOTE   Examples of these roles include terminologist, terminology standards developer/manager, mapping specialist, data conversion analyst, interface analyst, coding specialist, data developer/designer, data modeler, and content manager (including Clinical Documentation Improvement [CDI] specialist).

— skill and competency level requirements to safely and effectively undertake each task, taking into account the focus of the task from the perspectives of HICT, information management, information governance including information privacy and security, clinical practice, and healthcare decision making.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

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

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

3.1
adoption
act of taking up or following something

3.2
author
entity or set of entities that create and might modify an asset

3.3
classification
terminology which aggregates data at a prescribed level of abstraction for a particular domain

3.4
code set
set of codes used for encoding data elements, such as tables of terms, medical concepts, medical diagnostic codes, or medical procedure codes

3.5
code system extension
set of code system components and derivatives that add to and are dependent on a published code system

3.6
competency
ability of an individual to perform a job properly through a combination of training, demonstrated skills and accumulated experience

3.7
conformity
conformance
fulfilment of specified requirements

3.8
interface terminology
collection of commonly used terms to support user entry of health information

3.9
information management
planning, collection, control, distribution and exploitation of information resources within an organization, including systems development, and disposal or long-term preservation

[SOURCE: ISO 5127:2017, 3.2.1.23, modified — Note 1 to entry has been removed.]

3.10
information governance
processes by which an organization obtains assurance that the risks to its information, and thereby the operational capabilities and integrity of the organization, are effectively identified and managed

3.11
information privacy
rights and obligations of individuals and organizations with respect to the collection, use, retention, disclosure and disposal of personal information

[SOURCE: ISO/TS 14441:2013, 3.26]

3.12
information technology
resources (especially computers and telecommunication) used to acquire, process, store, and disseminate information

[SOURCE: ISO/IEC 38500:2015, 2.12]

3.13
mapping
process of defining a relationship between concepts in one coding system to concepts in another coding system in accordance with a documented rationale, for a given purpose

3.14
safety
freedom from unacceptable risk

3.15
security
combination of confidentiality, integrity, and availability

3.16
semantic interoperability
ability of computer systems supporting health care practice and management to correctly and consistently interpret the information being exchanged

3.17
skill
ability to perform a task or activity with a specific intended outcome acquired through education, training, experience or other means

[SOURCE: ISO/IEC/TS 17027:2014, 2.74]

3.18
standards developing organization
organization one of whose functions is to create and/or publish standards

[SOURCE: ISO/TS 27790:2009, 3.70]

3.19
subset
set that contains only elements that are also contained in the set from which it is derived

Note 1 to entry: The subset may be identical to the set from which it is derived.

[SOURCE: ISO/IEC 14496-10:2014, G.3.60, modified — Part of the definition was moved to Note 1 to entry.]

3.20
terminology
language, words and terms used in a specific domain

3.21
terminology service
service that lets healthcare applications make use of codes and *value sets* (3.23) without having to become experts in the fine details of code system, value set and concept map resources, and the underlying code systems and terminological principles

3.22
terminology standards certification
general accomplishments, competences or skills that fulfil the requirements as outlined in a terminology standards' program

3.23
value set
uniquely identifiable set of values consisting of concept representations drawn from one or more code system

3.24
workforce
people who provide a service or labour to contribute to business or organizational outcomes

[SOURCE: ISO 30400:2016, 10.1]

4 Abbreviations

CDA   Clinical Document Architecture

CDI   Clinical Documentation Improvement

CPT   Current Procedural Terminology

CT	Controlled Terminology
DICOM	Digital Imaging and Communications in Medicine
EHIS	Electronic Health Information Systems
EHR	Electronic Health Record
FHIR	Fast Healthcare Interoperability Resources
HI	Health Informatics
HIM	Health Information Management
HICT	Health Information and Communication Technology
HIT	Health Information Technology
HL7	Health Level Seven
ICD	International Classification of Diseases
LOINC	Logical Observation Identifiers Names and Codes
SNOMED	SNOMED International
SNOMED CT	Systematized Nomenclature of Medicine Clinical Terms
WHO	World Health Organization

5 Terminology and terminology services in healthcare

The use of clinical terminologies, such as SNOMED CT and LOINC, has been increasing as part of the growing investments in health information technologies. There is a business need in health care organizations to establish services to support the implementation and maintenance of e-health solutions including electronic capture, management, sharing and use of health record content in the context of clinical care, business processes, and information governance activities. The following "terminology" roles, activities, and products have been identified as in demand or anticipated to be in demand in healthcare organizations:

— **Terminology subsets:** Create, maintain, extend, quality assure, and distribute and/or publish subsets and supporting derivatives.

— **Terminology maps:** Create, maintain, extend, quality assure, and distribute and/or publish maps and supporting material.

— **Terminology management processes/policies:** Develop, manage, and update health information management related policies and processes to manage terminologies including how to create subsets and terminology maps, how to maintain terminologies and requests for change, how to engage clinical experts for validation, and overall decision making processes related to terminology management.

— **Terminology business analysis:** Gathering terminology requirements and defining terminology needs for e-health solutions and/or other tools (e.g. terminology tools, tools to support health analytics), development of recommendations for adopting, adapting or developing terminologies to meet specific business needs, supporting the definition of functional requirements, evaluating requirements as part of a procurement process, documenting workflow, providing terminology guidance to support configuration as required, support deployment of solutions from a terminology perspective (e.g. may include development of training manuals, development of test scenarios, testing).

— **Adoption planning and deployment of terminologies:** Support adoption planning and deployment of terminologies within an organization, region, or jurisdiction as part of an overall strategic plan or solution deployment including communication, education, change management, etc.

— **Data retrieval and analysis:** Utilize terminologies for effective meaning-based retrieval to support epidemiology, research, evidence gathering and service planning (clinical and administrative), and ensuring the organization is using health information standards appropriately and effectively.

— **Decision support protocols, guidelines and other knowledge resources:** Provides guidance from a health information management perspective on how to integrate terminologies into these resources (e.g. policy requirements, patient care outcome improvements).

— **Research of clinical terms and definitions:** Provide an understanding of clinical terms and how context plays a role in selecting the correct concept or term for the right usage or setting.

Healthcare organizations and supporting organizations need a trained and experienced workforce to support terminology activities.

6 Healthcare terminology professionals

6.1 Workforce shortage and impact

Healthcare terminology professionals are those members of the workforce who are involved in the tasks associated with the terminology services described above. Countries that have begun HICT adoption have reported shortfalls in the quantity and skills of the workforce in health information technology, health information management and health informatics. Specific examples of countries' workforce needs are presented in Annex A.

Annex A indicates the human resource competencies and skills impact on adoption of HICT technologies, investments in HICT, and workforce impact have been identified as the following two key demand drivers in various countries:

a) the "employment effect" - increases the number of professionals required;

b) the "skill broadening effect" - many professionals require additional training or experience to meet terminology services demands.

The occupational group of terminology specialist was specifically identified as needing to grow in number and also requiring broader skills[22]. Organizations such as SNOMED International have begun investing in developing educational materials to promote the effective deployment and use of its product – SNOMED CT.

6.2 Terminology specialists: Roles, job and skills requirements, and qualifications

Annex B provides the list of specific roles related to terminology and terminology services in healthcare organizations and related supporting organizations. These include, but not limited to

— terminologist,

— terminology author,

— terminology standards developer/manager,

— mapping specialist,

— data conversion analyst,

— user interface analyst,

— coding specialist,

— data developer/designer,

— data modeler, and

— content manager (including clinical documentation improvement specialist).

These various roles can be consolidated under the three levels of specialists performing terminology services:

Level 1 — Terminology technical specialist

Level 2 — Terminology specialist

Level 3 — Terminology advanced specialist

The following sections describe the roles, job requirements, terminology skill requirements, general skills and qualifications for each level. Specific tasks under these roles have to take into account the focus of the task from the perspective of HICT, information management, information governance (including information privacy and security), clinical practice and healthcare decision making.

6.2.1 Terminology technical specialist

6.2.1.1 Role

The role of the Terminology technical specialist is to be responsible for the technical and/or tooling aspects of terminology development, mapping, terminology analytics, maintenance and implementation. The Terminology technical specialist will work in a team setting with clinicians, project teams, operational teams, business analysts, mapping specialists and terminology specialists providing knowledge transfer to clients and team members, implementation support, development of terminology deliverables and overall maintenance of mappings or other products. A key function of this role is the ability to contribute to data quality development and maintenance by enabling the primary and secondary functional aspects of developing, implementing, and managing terminology products.

6.2.1.2 Job requirements

— Responsible for technical management of healthcare data including but not limited to the following:

  — Data export from a database to a terminology tool;

  — Design and execution of queries on data within a terminology tool or database to support terminology business functions including data analytics;

  — Configuration and maintenance of terminology tools including application rules engine(s);

  — Installation of version upgrades and managing database functions;

  — Provision of backups and ensuring redundancy of data holdings.

— Participate in the selection of tools for mapping, terminology searching, browsing and selecting terminology authoring, and maintenance.

— Provide terminology tool training, installation, and updates.

— Manage subscription services.

— Support both the clinical, business and technical resources within a project and program.

  — Provide the liaison between both types of resources;