hiso Health Information Standards Organisation
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Health Information Exchange Content Model Architecture Building Block

HISO 10040.2

To be used in conjunction with
HISO 10040.0 Health Information Exchange Overview and Glossary
HISO 10040.1 Health Information Exchange CDR Utility Services
HISO 10040.3 Health Information Exchange Structured Documents

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Glossary

A glossary of all the terms used throughout this suite of draft standards is located in the Health Information Exchange Introduction and Overview document.

Contents

Table of Figures

1. Introduction

This document describes the Health Information Exchange (HIE) Content Model architecture building block of the Interoperability Reference Architecture for the New Zealand health and disability sector.

1.1. Purpose

The purpose of this suite of documents is to be an authoritative reference in stating how systems interoperability is to be achieved in the sector.

The document is in direct support of the National Health IT Plan and its model of health information sharing based on regional CDRs, national patient and provider indexes, and Connected Health networks.

1.2. Context

Figure 2 in the 10040.0 HIE Overview and Glossary shows the place of the building block in the Interoperability Reference Architecture and its relationship to the other key building blocks.

An overview and the glossary of terms relating to the Health Information Exchange Architecture Building Blocks accompanies the building block documents:

- 10040.0 HIE Overview and Glossary

The building blocks are:

- 10040.1 HIE CDR Utility Services, specifying transport and identity services for information exchange
- 10040.2 HIE Content Model, a framework for the creation of a common set of logical data definitions (the subject of this document)
- 10040.3 HIE Structured Documents, a framework for structured documents as the currency of information exchange

1.3. Scope

This building block frames a common shared content model for semantic interoperability in information exchange.

It is about the derivation and makeup of a common shared content model or information model. It is about how information should be represented. It is not about information governance or the rules around how information should be collected or used

The scope is information exchange only; the building block is not intended to address how data is represented and held in individual information systems.

1.4. Related Specifications

Related Documents and websites are:

National Health IT Plan http://www.ithealthboard.health.nz/content/national-health-it-plan

Health Information Standards Organisation http://www.ithealthboard.health.nz/hiso-2010

Interoperability Reference Architecture http://www.ithealthboard.health.nz/content/sector-architects-group

Health Information Privacy Code 1994 and commentary (2008 edition)

International Standards Organization http://www.iso.org/iso/home.htm:

ISO 13606 Parts 1 – 5: Health informatics -- Electronic health record communication

ISO 11179 Parts 1 – 6: Information technology -- Metadata registries (MDR)

ISO 21090: Health informatics -- Harmonized data types for information interchange

Continuity of Care Record (CCR) http://www.astm.org/Standards/E2369.htm

OpenEHR http://www.openehr.org

HL7 http://www.hl7.org or http://www.hl7.org.nz/

Other relevant websites and documents are listed in the 10040.0 HIE Overview and Glossary document.

2. Architecture Building Block

This section presents the Health Information Exchange Content Model architecture building block, which frames a common shared content model to achieve semantic interoperability in information exchange.

The building block comprises architectural principles and requirements, organised under these headings:

- Semantic Interoperability
- Content Model
- Data Definitions
- Detailed Clinical Models
- Archetypes
- Terminology

2.1. Semantic Interoperability

Semantic interoperability requires information exchange to preserve meaning and context in a computable way. In order to achieve this, it is crucial to have a common language: the syntax, structure and semantics of information should be made explicit and shared. These definitions have to be formal and computable.

Information exchange shall be based on a definitive information model called the HIE Content Model

The purpose of the Content Model is to enable semantic interoperability by providing fit-for-purpose, agreed and communicated data definitions.

2.2. Content Model

This section describes the nature, scope, derivation and extensibility of the Content Model.

Figure 1 shows the high level context and relationships of components used by the building blocks Content Model.

The components of the diagram are discussed in more detail later in this document.

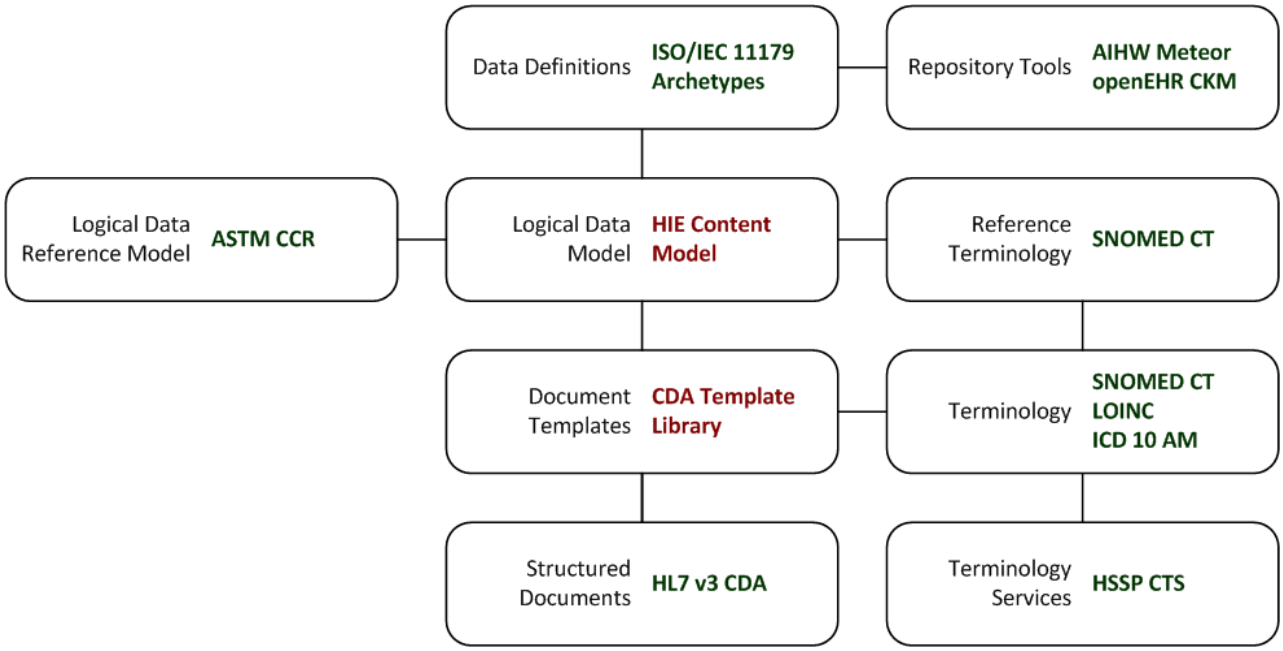

Figure 1: Content Model Standards

2.2.1. The Content Model shall derive from the ASTM Continuity of Care Record (CCR) specification

The Content Model will not adopt CCR in its entirety - it will be adapted using the following ways:

- Subject areas – the Content Model will adopt CCR's subject area headings and scope
- Conceptual data elements – the Content Model will adopt CCR's conceptual data element definitions in each subject area
- Business descriptions – the Content Model will borrow CCR's business descriptions in each subject area

CCR will be used as the logical data reference model of the Content Model. The Content Model will tend to localise CCR and overall will be geared towards practical alignment with it rather than total conformance. The main departures are that the CCR XML schema will not be used, and that the contents of the model will be extended to suit New Zealand requirements. CCR, IHE Content Profiles and international DCMs (where appropriate) as well as existing data models in New Zealand shall be used to populate the Content Model.

Figure 2 shows CCR's place in defining subject areas of the Content Model, with the 'keyhole' indicating extension into some specialty area.

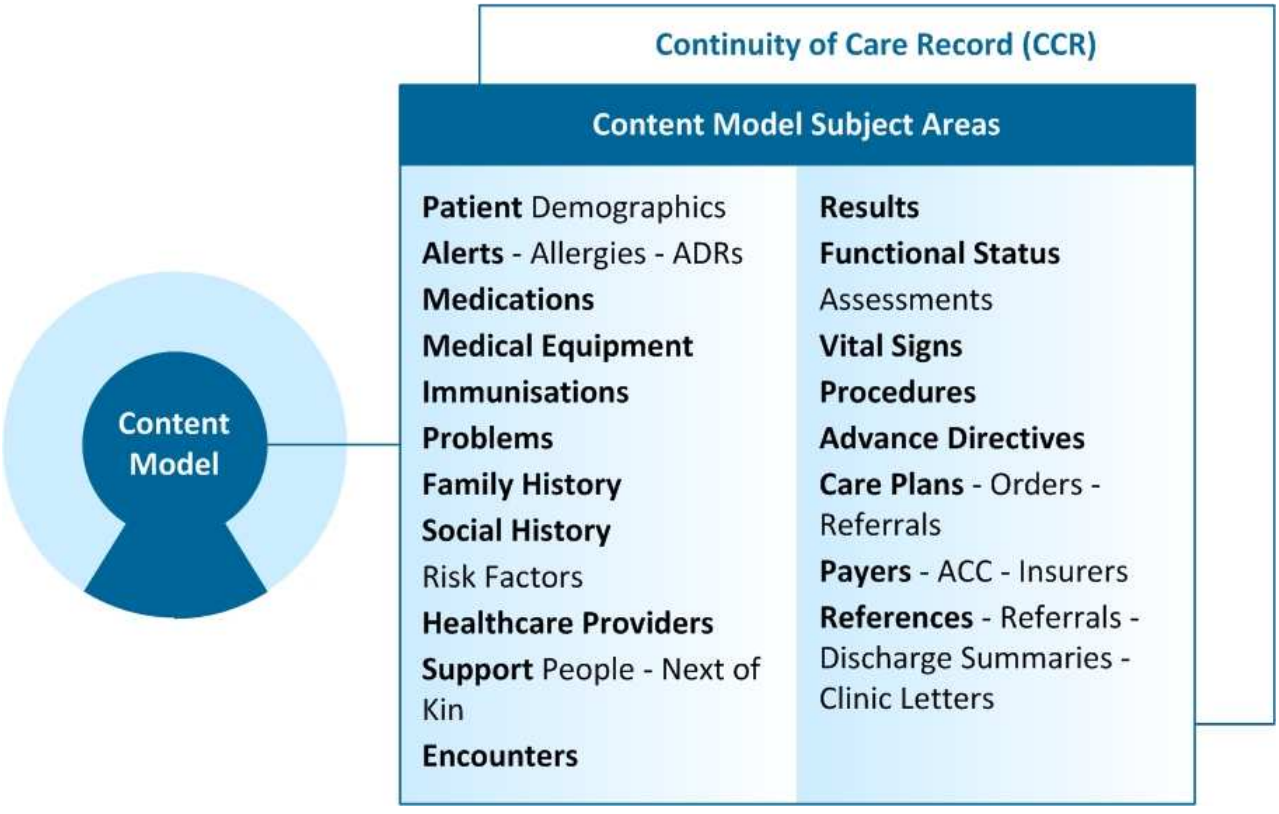

Figure 2: Content Model Subject Areas

2.2.2. The Content Model shall be extensible

The scope of the Content Model will increase over time as data requirements in specialty areas are established and documented. The Content Model must be able to accommodate any business driven change and be resilient to its effects. Using CCR as the logical data reference model, the process of developing the Content Model in some subject area will in technical terms involve specialising content adopted from CCR.

Methodology principles for extending the Content Model are:

- New items can be added to extend content for different parts
- Items providing more detail to existing content can be added
- Existing content can be constrained (e.g. provide pick lists for free text areas or value ranges can be defined for numeric fields etc.)

Figure 3 shows examples of extending the Content Model to allow three additional specialty areas.

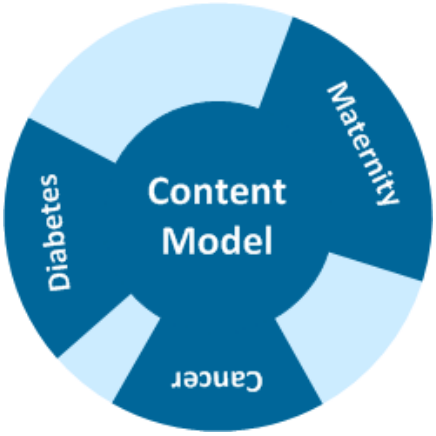

Figure 3: Example of Content Model Extension

Reuse of definitions throughout the Content Model is essential.

Extensions will be based, wherever possible, on existing proven definitions/programmes developed by other recognised / established organisations. This will achieve not only internal consistency in the Content Model but will also promote its international alignment. There may also be additional local requirements.

2.3. Data Definitions

This section describes how the data definitions of the Content Model will be formally expressed.

2.3.1. Content Model data definitions shall be formulated according to the ISO/IEC 11179 metadata standard

This is the authoritative expression of the Content Model.

In ISO/IEC 11179 terms, the Content Model will comprise definitions of datasets, data elements, data element concepts, object classes, properties, value domains and classification schemes.

Dataset definitions will be used to derive CDA section templates.

2.3.2. The data definitions of the Content Model shall be formulated as openEHR archetypes

This is an alternative expression of the Content Model.

See the sections following on DCMs and archetypes for the reasons behind this dual approach.

The use of archetypes is recommended rather than required.

2.3.3. Content Model data definitions shall be registered in accord with ISO/IEC 11179 processes and stored in a compliant registry

AIHW METeOR is the chosen metadata registry tool and is ISO/IEC 11179 compliant.

HISO 10014.1 Data Concept Repository Processes Standard is the local adaptation of the HISO endorsed ISO/IEC 11179. It is currently under review to bring it up-to-date with the selection of METeOR and evolution of the base standard.

Use of a single metadata registry with search facilities to hold the details of the Content Model and its datasets will make use and extension of the model easier and promote consistency and reuse.

2.3.4. Units of measure shall follow the UCUM standard

The Unified Code for Units of Measure provides a single coding system for units that is complete, free of all ambiguities, and that assigns to each defined unit a concise semantics.

In all cases units of measure will be expressed using standard Unified Code for Unit of Measure (UCUM) and description.

2.4. Detailed Clinical Models

This section describes the development of the Content Model under the Detailed Clinical Model (DCM) approach.

2.4.1. Development of the Content Model shall follow the DCM approach

The DCM approach is about creating discrete, modular, reusable, controlled and above all rounded specifications of information requirements in some clinical domain or subdomain.

This approach supports the above keyhole concept, by allowing the Content Model to be built up piecemeal around an established shared and generic set of data defintions.

2.4.2. DCMs may be reused from other national programmes

DCMs may be adopted and adapted from other national programmes, to save time and effort in developing the Content Model.

2.4.3. DCMs shall define maximal datasets

DCMs will define maximal datasets, i.e. they will include all possible data elements that may be mandatory, optional or inapplicable depending on the application or context.

2.5. Archetypes

Archetypes are a robust way of describing structured health information in a way that can easily be understood and maintained. They are suited to the involvement of healthcare professionals in the development process. They combine healthcare concepts, clinical context, data elements and their organisation, terminology and metadata in a technology agnostic and computable way. Practically they specify labels, data structures, types and valid value ranges and enumerations. The premise of archetypes is that data, user interface, information exchange and integration are all based on the same specifications.

2.5.1. openEHR archetypes may be used to develop and express DCMs

Archetypes lend themselves to the development of new DCMs, and representing DCMs in graphical form. Finished archetypes may be inputs to the process of formulating new ISO/IEC 11179 data definitions.

2.5.2. openEHR archetypes may be transformed into other information modelling forms

Archetypes may be transformed as required from their native ADL representation into human readable (e.g. mind maps, UML) or computable (e.g. XML, CDA) artefacts.

While it is possible to do this transformation automatically by creating XSLT transforms per DCM, this will be progressed at a later stage.

2.5.3. There shall be a shared archetype library

The openEHR Clinical Knowledge Manager (CKM) web-based tool will be used to provide the shared archetype library.

2.6. Terminology

2.6.1. SNOMED CT Reference Sets shall be used wherever possible

SNOMED CT Reference Sets are the default choice of terminology for data elements in the Content Model. The exception of this directive is when a SNOMED CT Reference Set does not exist, has not been endorsed for use in New Zealand or when another HISO standard (such as NZPOCS) requires another terminology and has precedence.

LOINC, ICD 10 AM and ICD 0 coding and classification systems – all mapped to SNOMED CT – have HISO endorsement and are acceptable in their respective domains.

The New Zealand Medicines Terminology (NZMT) is a SNOMED CT Reference Set.

CCR as the data reference model supports the use of SNOMED CT Reference Sets in most subject areas.

2.6.2. The Content Model shall have explicit terminology bindings

Data elements in the Content Model shall be directly associated with exactly one SNOMED CT Reference Set or another permitted coding system.

ISO/IEC 11179 data elements supports explicit terminology bindings using value domains.

3. Use Cases

3.1. CCR Use Case Example

This is an example use case for deriving data definitions from CCR. This example concerns the problem list. The following rules can be derived from the specification list.

- CCR supports a problem list, which may be any length, of the patient's current and resolved problems
- A problem may be classified as either a condition, diagnosis, symptom, finding, complaint or functional limitation
- Problems can be described using SNOMED CT and/or narratively
- Problems have a status of either active, inactive, chronic, intermittent, recurrent, or resolved
- Problem episodes are recorded
- The problem list can be ranked or filtered by date of onset or order of importance, e.g. for a referral
- The source of problem information may be recorded, including who and when
- Whether the subject is aware of the problem – and if not, why not – can be recorded
- There's a link to medications – when a listed problem is an indication for certain medication
- Details of functional limitation may be recorded against a problem
- Clinical documents may be associated with problems
- Problems may be recorded as the cause of allergies or adverse reactions
- The existence of a problem may be flagged as an alert
- Orders and results may be linked to problems
- A problem may be an indication for a procedure
- A problem may be a reason for an encounter
- Family history may be expressed in terms of problems (not necessarily associated with an individual)