













northern health







British Columbia Document Ontology Implementation Guide

Version 4.1

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MAINTENANCE

This document is a living document. The content may require edits, additions and/or maintenance as actual implementations provide the necessary technical validation.

Additional adjustments may be required over time to reflect requirements in British Columbia, or to align with emerging pan-Canadian Document Ontology standard development.

COMMENTS

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VERSION CONTROL

Release Date	Version	Status / Comments
January 15, 2019	1.0	Approved by B.C. Health Information Standards Standing Committee (HISCC).
November 30, 2022	3.0	Updated codes with new LOINC codes and BC Display titles in use in BC. Added "replacement preferred" as a status to indicate if a more suitable LOINC code suit is preferred for the document type. Added BC Cancer notification document types.
July 04, 2024	4.1	Added LOINC codes that were being used in CareConnect but not currently in the document ontology. Proper case all BC display name titles. Added additional LOINC codes to support FHA Meditech Expanse System. Added additional LOINC codes to support BC Women's/Children and UBC migration to Cerner platform.

APPROVAL & SIGN-OFF

This Implementation Guide has been reviewed, approved and endorsed by the following sponsors as listed below.

B.C. HEALTH INFORMATION STANDARDS STANDING COMMITTEE (HISSC)	Consensus approval for Implementation Guide and Value set	Sept 8, 2021
B.C. DIGITAL HEALTH STANDARDS OFFICE (DHSO)	Updated maintenance approval	June 30, 2024

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1.0 Introduction

The purpose of this implementation guide is to define how the British Columbia (B.C.) Document Ontology can be implemented within Health Information Systems as a foundation for standardized archiving, data mining, and information exchange based upon clinical document types and metadata attributes.

The B.C. Document Ontology consists of a set of all Logical Observation Identifiers, Names and Codes (LOINC) and non LOINC document codes currently being distributed in B.C. throughout the health information exchange networks. These document codes are built on an underlying framework and classification of the key attributes for naming clinical documents. Health Authorities across B.C. and Canada are expanding the list of document types being exchanged to include medical specialty and procedure specific document types which is driving the need for a document ontology to help classify and categorize this growing list of document types.

Work on the B.C. Document Ontology began in 2016 with collaboration between Health Authorities, Doctors of BC and the B.C. Ministry of Health. The ontology is based on the HL7 LOINC document ontology standard and is extended to include other document types currently in use or previously used in B.C. that are not specified in LOINC. This ontology is a conceptual and simple to implement structure for labeling and organizing documents within Health Information Systems.

1.1 Audience

The intended audience for this implementation guide focuses on EMR vendors and developers of healthcare systems primarily in British Columbia.

1.2 Purpose

The implementation guide is designed to give guidance to health information system developers and business analysts by providing the ability to:

- Search for specific document types using a common ontology of document names. The specific need for the ontology is to provide semantics for names of documents that are exchanged between health information systems.
- Search for focused collections of documents that have many different document types but share common attributes. This capability can be accomplished through the use of filters applied to the 5 Document Ontology axis attributes.

1.3 Scope

The scope of this implementation guide is twofold:

- Firstly, it is to build an understanding of the various document codes, names and axis attributes available in the B.C. Document Ontology.
- Secondly, this guide is intended to document integration techniques, use cases and best practices that an implementer can use to successfully integrate with the B.C. Document Ontology.

1.4 Conformance Guidelines

Conformance guidelines for the B.C. Document Ontology are loosely specified in this guide and may differ slightly from actual conformance tests. Because of the nature of the B.C. Document Ontology, conformance language in this implementation guide has a much looser level of constraints than other health interoperability standards.

- A conformant healthcare system SHALL support all document type codes listed in the B.C. Ontology that are in use in B.C. These are specified in Value Set 2.16.840.1.113883.XXX
- In addition to the subset above, a conformant healthcare system MAY support the usage of all document type codes listed in LOINC where classification = DOC.ONTOLOGY. This would help "future proof" the system as new codes are added.
- A conformant healthcare system SHALL use the 5 axis attribute value lists as is.
- A conformant healthcare system SHALL check and download the latest copy of the B.C. Ontology file annually from the B.C. Health Information Standards website.
- A conformant healthcare system MAY continue to support its own document codes and localized names in addition to the B.C. document ontology codes and names.

1.5 Use of Local Codes and Document Names

The B.C. Document Ontology produces document type codes with consistent semantics for sharing, exchanging, and aggregating documents across independent facilities or health care systems. We recognize that local document codes and names often serve many important purposes within a system and its local user base. It is assumed that local or custom document titles may be preserved in the source system that created the document and that they can be included in the exchange (along with the LOINC code) when the document is sent to an external organization. The external system may choose to use that title or "preferred" used the BC document ontology short name.

This implementation guide uses LOINC as the standard coding system for document types, but even the most comprehensive standard vocabulary will not cover every local variation in document names. If an appropriate LOINC code exists for a local document type, the LOINC code should be used as the standard identifier. If an appropriate LOINC code does not exist for a local document type, a local code may be used (referred to as an X-code) to identify the document.

Additional guidance on what to do when an implementer cannot find an appropriate LOINC code for a local document type is contained in Section 4.7 – Extending the B.C. Document Ontology.

1.6 Document Titles and Document Types

Documents in B.C. are generally exchanged in one of two message formats: HL7 v2 ORU and HL7 v3 CDA.

It is important to clarify that the document codes within the B.C. document ontology apply to the "document type" and not the "document title".

In CDA documents, the document type can be found in the clinicalDocument.code element. The human readable title of the document is found in the title element.

```
example: CDA document snippet
```

```
<code code="34816-9" codeSystem="2.16.840.1.113883.6.1"
codeSystemName="LOINC" displayName="Otolaryngology Consult note" />
<title>ENT Consult</title>
```

In HL7 v2, the document type is most often stored in the OBR-4.1 field and the title in the OBR-4.2 field.

example: HL7 v2 ORU snippet

OBR|1||30195081|34816-9^ENT Consult ||20100813135200|20100813135200|20100813135200|||||20100813135200 ||90909^MDCARE^BOB|||||20100817125019||ENTCONS3|F|||90909^MD CARE^BOB OBX

2.0 B.C. Document Ontology Structure

The structure of the B.C. Document Ontology is based on the HL7 LOINC® Document Ontology structure which is defined by Regenstrief Institute and the LOINC Committee. The Provincial LOINC Users Group members meet regularly to maintain, update and support B.C. Document Ontology value set.

2.1 Technical Approach

The technical approach of this implementation guide consists of:

- Documentation of the current B.C. Document Ontology as-is.
- Documentation of the use of metadata to support queries for document types outside of simple queries based on LOINC code alone.

2.2 B.C. Document Ontology File Structure

The B.C. Document Ontology is distributed in a single downloadable file that contains all document codes and metadata required for system designers to fully implement the B.C. Document Ontology.

2.3 Ontology File fields and relationships to LOINC

Name	Purpose	Source	Example	
Status	Is the code in use, deprecated and/or is a preferred code available	BC Ontology Committee	Active, Deprecated	
Code	Primary document type code	LOINC and B.C. Extensions	34826-8	
Replacement Code	I and an existing x-code is		87080-8	
LOINC Long Name	•		Plastic Surgery Consult Note	
BC Display Name	· · Display Name)		Plastic Surg Consult	

Name	Purpose	Source	Example	
Document Kind	General Type of document	LOINC (Component)	Note, Report, Consent	
Subject Matter Domain	Medical specialty	LOINC (Method)	Plastic Surgery	
Service	Medical service performed	LOINC (Component)	Consultation (see next table for detailed examples)	
Setting	Clinical setting where service was performed		Emergency Department	
Role	Service provider's role who performed the service	LOINC (Method)	Nurse	

Service	Examples and	Examples		
	Description			
Communication	Exchanges of information between patients and doctors	Comm, Internal Corres		
Consultation	Meeting between patients and doctors for medical advice	Consult, visit, follow up		
Evaluation	Assessment of patients' medical history and health conditions	Re-Eval, Assessment		
History and Physical, Admission Evaluation, Initial Evaluation Information about health history and findings at time of admission		H&P, Hist + Phys, Cardiology Admit		
Plan of care	Overall comprehensive plan of care outlining administration of care and/or treatments for a patient. May be specific to a chronic disease.	Treatment Plan, Coordination Plan, Diabetes Plan of Care, Cardiology Plan of Care		
Procedure	Examinations for determining, measuring, or diagnosing a patient condition.	ECRP, Food Patch Testing, non Tunnelled cath, Abscess Drain		
Surgical Operation	Procedure in which physical state of patient is altered.	Cardiology Operative Note, Gastro Operative Note.		
Referral	Meeting request from family physician for patient and specialist for medical advice	Referral, visit, follow up		
Diagnostic Study	Test and/or monitoring of a patient's physical or emotional state.	EEG, PAP, ECG Stress Test, Endoscopy		

Service	Examples and Description	Examples		
Progress, Clinic Note	Documentation of ongoing patient's state or symptoms over a period of time.	Progress notes are used for reporting on inpatient/acute progress whereas Clinic notes are used to document the patient's progress as an outpatient.		
Discharge Summary	Summarization of the patient's stay in the hospital. Generally, covers the entire encounter and may be specialty specific.	Cardiology Discharge Summary, Patient Discharge Instructions, Hospital Discharge Summary		
Notification	A system generated report generated from an admission to ED or Acute as well as Discharge from an Acute setting.	Admission Notification, Discharge Notification		

3.0 Document Ontology

The B.C. Document Ontology schema is represented by a required long name, a required short name, up to 5 attributes of additional metadata and a list of synonyms representing other localized names that this document type may be referred to in other healthcare systems and settings.

3.1 Code

The Code is the primary means to define the document type. Historically the document code was limited to only a handful of generalized document types (e.g. discharge summary, consult note, progress note, procedure note, operative note). Many Health Authorities are now expanding their document types to include hundreds of document types/codes as a means to clearly and easily describe the actual content of the clinical data in the document without requiring the user to open the document.

The Code is derived from one of two sources, the first being LOINC and the second coming from Excelleris (referred to as a custom extension or an "X" code). The need for a custom extension code is most often driven from the absence of a proper LOINC document type code in the LOINC database. Over time LOINC does add new document type codes to their system, and as this occurs custom codes in the B.C. Document Ontology may be deprecated in favor of new LOINC codes. For example, prior to June 2018, LOINC combined the specialties of "Obstetrics and Gynecology". In June 2018 LOINC International Working group accepted a recommendation from Canada Health Infoway (CHI) to break this specialty into their two respective specialties based on the understanding that each specialty was unique in its own right and a document type for a Gynecology specialist may need to be handled differently than a note classified under an Obstetrics specialty.

The current list of document types in B.C. consists of over 1500 unique document codes in the B.C. Document Ontology.

3.2 Long Name

The Long Name is pulled from the Long Common Name in the LOINC® coding system. In the event the code is a custom extension, the long name SHOULD follow the same naming convention as similar document types. Custom extensions at a provincial level SHALL be reviewed by the B.C. Health Information Standards team and approved by the DHSO.

The Long Name fully describes the document and created by joining the 5 LOINC axis attributes in the following order:

<SubjectMatterDomain><Setting><Role><Service><Document.Kind>

3.3 BC Display Name (short name format)

The BC Display Name is a simplified/shorter document name that uses common medical abbreviations or acronyms to replace certain words in the long name. Generally, document titles are preferred to fit within 40 characters in length. In the event the code is a custom extension, the short name SHOULD follow the same naming convention as similar document types. Custom extensions at a provincial level SHALL be reviewed by the B.C. Health Information Standards team and approved by the DHSO.

3.4 Document Kind

The Document Kind is a LOINC ontology standard the describes the classification of the document type. In the BC Document Ontology, it provides little value as most documents are classified as Note.

3.5 Subject Matter Domain

Individual clinical domains and medical specialties are established at the top of the ontological structure to allow for initial query functions to be implemented through traversing a clinical domain. The domains within the ontology are used to classify the subject matter domain of a specific document.

Refer to Appendix 7 for a complete list of codes (LOINC Attribute Part Number).

3.6 Service

The type of Service refers to the specific detail about the type of care delivered to the patient and represents the overall context of the document.

Refer to Appendix 7 for a complete list of codes (LOINC Attribute Part Number).

3.7 Setting

The Setting within the ontology classifies documents according to the types of settings (e.g. department, unit) where they are created and used. Setting is not meant to mean a specific location, but rather to correlate with the setting in which a service is provided.

Many document names include a setting (at least at the top level) to avoid confusion between important classes of documents. For example, an admission History & Physical is usually taken to be the Hospital Admission History & Physical, but it could be confused with an extended care nursing home History & Physical if not distinguished by the setting.

Refer to Appendix 7 for a complete list of codes (LOINC Attribute Part Number).

3.8 Role

The Role in the context of this Document Ontology refers to the document author's training or professional level. It refers to the role the author played at the point in time when creating the document (e.g. admitting physician).

Refer to Appendix 7 for a complete list of codes (LOINC Attribute Part Number).

4.0 Implementation of the Ontology

Implementing the Document Ontology provides a foundation for standardized searching, archiving, data mining and information exchange based upon clinical document types. This will provide immediate value to the end user for existing documents that have already been received and captured as well as future clinical documents that will be exchanged.

The current list of document codes in the B.C. Document Ontology covers ALL past and present clinical documents that have been delivered from Health Authority sources to end user EMR systems via Excelleris and Clinical Document Exchange (CDX).

For the purposes of this guide, it is important to clarify that document codes within the B.C. Document Ontology applies to "Document Types" and not "Document Titles".

In HL7v3 CDA documents, the Document Type is represented by the clinicalDocument.code, and is intended to convey a universally understandable description of the content and intent of the document. The Document Title is generally represented by the clinicalDocument/title and is intended to convey the local title for a document which may or may not have significant meaning between different systems.

4.1 Implementation Techniques

Implementation techniques may vary based on the EMR system and the level of skill of the system implementer but in general the implementation guidelines described below are geared to provide the full value of the B.C. Document Ontology without requiring any data manipulation or transformation of data in an existing system.

4.2 The B.C. Document Ontology mapping file

The core data comprising the B.C. Document Ontology consists of one ontology file. It is available in Excel format. The key for each row in this document is the "document code" in the first column. The remaining columns contain the ontology axis values which will be referred to as the "Ontology metadata". The document code matches the clinical document type code that is sent from the Health Authority system. The ontology file is fairly small in terms of current memory standards and can easily be stored in cached memory for EMR systems to use in real-time for display purposes or it could be persisted into a database table and referenced whenever a new document is received or opened.

Note: Implementers should be prepared to update this file once a year. As LOINC adds new document codes and expands the list of values, this ontology file will be updated, versioned and published by the B.C. Health Information Standards team.

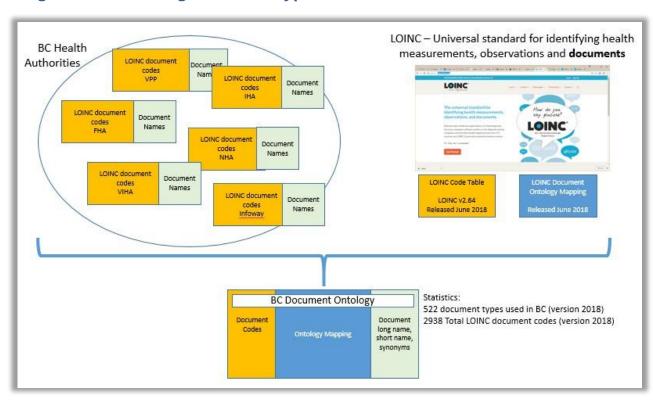


Image 4.2.1. Gathering document type workflow

Image 4.2.2 B.C. Document Ontology Value Set Layout

Status	Code	Replacement Code	LOINC Long Name	BC Display Name	Document Kind	Subject Matter Domain	Service	Setting	Role
1	2	3	4	5	6	7	8	9	10
А	98858-4		Esophageal pH monitoring study Document	24 hr Esophageal Impedence Test	Report	Gastroenterology	Diagnostic study		
А	X10660			24 hr pH Probe Test	Report	Gastroenterology	Diagnostic study		
D	X10661	87080-8		Abdominal Paracentesis	Report	Gastroenterology	Diagnostic study		
D	X10887	87080-8		Abdominal Paracentesis	Report	Gastroenterology	Diagnostic study		
А	87080-8		Guidance for paracentesis of Peritoneum	Abdominal Paracentesis	Report	Gastroenterology	Diagnostic study		
D	87260-6	87252-3	Addiction Medicine Initial Evaluation Note	Addiction Med Admit	Note	Addiction Medicine	Initial evaluation		
А	87252-3		Addiction medicine Admission evaluation note	Addiction Med Admit	Note	Addiction Medicine	Admission evaluation		
Α	87249-9		Addiction medicine Outpatient Note	Addiction Med Clinic Note	Note	Addiction Medicine		Outpati ent	
А	87254-9		Addiction Medicine Consult Note	Addiction Med Consult	Note	Addiction Medicine	Consultation		
D	34857-3	87249-9	Addiction Medicine Note	Addiction Med Note	Note	Addiction Medicine			
D	86212-8	87249-9	Addiction Medicine Attending Note	Addiction Med Note	Note	Addiction Medicine			Physician

4.3 Document Type Code and Ontology metadata storage

A clinical document sent from a health authority system to an EMR system does not contain the Ontology metadata therefore the system implementer needs to decide if they want to apply the Ontology metadata at the time of receipt and store it with the document or leave the Ontology metadata as stand-alone data elements within the Ontology file/table only to be referenced during search and retrieval actions.

If the Ontology is stored stand-alone, the link to the metadata can be done through a HashMap key lookup if stored in memory or through a SQL database join statement if stored in a database table.

Note: If the implementer is applying and storing the Ontology metadata with the document at time of receipt, the implementer SHOULD consider how to modify the meta-data if it changes in the future with an updated version of the Ontology. Although the document code (key) would not change, some values in the Ontology may be changed (e.g. additional synonyms may be added in the future).

4.4 Search and Filter

The primary reason for the B.C. Document Ontology is to allow users to query and filter clinical documents based on standardized subsets of metadata values. The EMR system SHALL allow the user to search and/or filter clinical documents based on two or more of the 5 axis values (kind, domain, service, role, setting). The most important axis values are "Subject Matter Domain" and "Service".

"Subject Matter Domain" can be referenced and referred to as the author's specialty and the "Service" can be referred to as the specific service that the author provided to the patient.

example: Dr. Johnson in Cardiology provided a consultation to the patient; this was captured in a document with a document type code = 34099-2. The ontology metadata for code 34099-2 is (Subject Matter Domain = cardiovascular disease) (Service = Consultation)

Implementers SHOULD build search capability to search based on a multi-select pick lists of axis values and combinations thereof.

example: User should be able to search for (service=Consultation) documents that match (Subject Matter Domain = Cardiac surgery OR Cardiovascular disease OR Pulmonary disease)

4.5 Display and Implementation Approaches

EMR clinical document list display standards may already be addressed through other conformance processes but can be enhanced using the B.C. Document Ontology. Although most systems send a document title or name along with the document code, it is often a localized system name and may not match the name that another system uses for the same type of document or document code.

This is where the B.C. Ontology "Long Name" and "Short Name" can provide the end user with a standardized naming convention across platforms and EMRs. The long name fully represents the document's name from a LOINC perspective, and the short name provides a more simplified easy to read name based on current medical naming conventions and feedback gathered from providers through a Doctors of BC working group. In addition, the short name assists with space and size restrictions in the GUI and on mobile devices. Both Long Name and Short Name SHOULD be optional view settings accessible by the end user.

example: a provider is working at Lions Gate Hospital and is accustomed to viewing patient document lists that use the long name format (standard for the LGH Cerner system). This view can be represented in a local EMR by allowing the user to switch to the B.C. Ontology long name view which pulls the long name from the B.C. ontology file and uses that as the primary display title for the document in a list view.

4.6 Display using Ontology metadata combined with document metadata

A fully comprehensive display of the document that represents not only the document type but also the source of the document can be achieved by combining the Ontology metadata (marked in <red>) with discrete data that is sent along with the document (marked in <green>). Extensive work with a Doctors of BC working group has produced the following recommendation when it comes to this type of display.

Medical Documents:

```
<Subject Matter Domain> + <Service> + <Document Kind> + <Author's Name> + <Setting>or<Setting>+ <Location>
```

example: Cardiology Consult, Dr. Heart, Inpatient, RJH

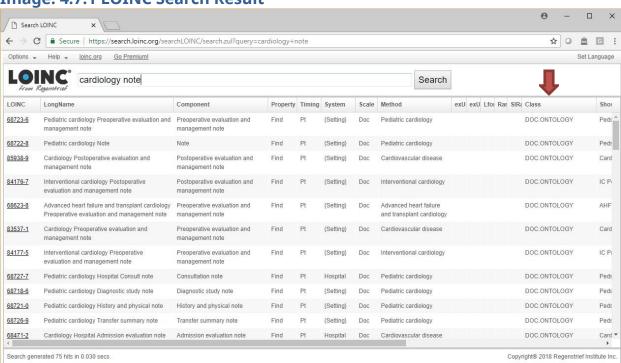
Procedural Documents:

<Procedure Name> + <Service> + <Document Kind> + <Author's Name> + <Location> example: Left Total Arthroplasty, Surgical Note, Dr. Orthopedic, VGH

4.7 Extending the B.C. Document Ontology

When a system implementer (EMR or Health Authority) is using a new document code that does not exist in the B.C. Document Ontology the following process should apply:

- Search LOINC.org for an appropriate LOINC document code that has a "DOC.ONTOLOGY" classification. See image (4.7.1) below.
- If an appropriate document code can be found on LOINC.org, contact the B.C. Health Information Standards team at (<u>HLTH.HISSupport@gov.bc.ca</u>) to have it added to the B.C. Document Ontology value set. Include details for the clinical distribution systems (e.g., Excelleris, CareConnect) this applies too.
- 3. If an appropriate code is NOT found in LOINC, contact the B.C. Health Information Standards Team at (https://huth.hissupport@gov.bc.ca) to request a new document code and title. If an appropriate LOINC document code does not already exist, the Health Information Standards Team will assign an x-code for the interim until an appropriate LOINC code is available.
- 4. A request may be submitted by the Health Information Standards Team to Canada Health Infoway (CHI) for creation of a new replacement code in a future release of the LOINC International Ontology as appropriate.



5.0 Change Management / Maintenance

The Document Ontology is supported and maintained by the B.C. Health Information Standards team (<u>HLTH.HISSupport@gov.bc.ca</u>).

As new document codes are requested and used for distribution or sharing in B.C., a final review and approval process is made by the B.C. Document Ontology team.

5.1 Frequency of updates

The Document Ontology is updated semiannually, based on the February and August LOINC releases.

6.0 References

Various sections of this document are based on:

- HL7 Implementation Guide: LOINC Document Ontology, Release 1) June 2015 https://loinc.org/document-ontology/ (articles and resources)
- LOINC Document Ontology Accessory File (v 2.77) 2024-02-27 https://loinc.org/document-ontology/current-version/

7.0 Appendix: Five (5) LOINC Axis Used in Ontology

The following axis/attributes are used in the BC Document Ontology value set for classification purposes.

LOINC Document Ontology: Current Axis Values - LOINC

Released 2024-02-27

Version 2.77

Subject Matter Domain

Note: Updated as of June 2024 v4.1 of the BC Ontology.

Kind of Document

Note: Updated as of June 2024 v4.1 of the BC Ontology.

Service

Note: Updated as of June 2024 v4.1 of the BC Ontology.

Setting

Note: Updated as of June 2024 v4.1 of the BC Ontology.

Role

Note: Updated as of June 2024 v4.1 of the BC Ontology.