

Using LOINC and SNOMED CT in the EHR without overlap – part 1

SNOMED CT Expo

October 2015

Montevideo, Uruguay

Delivering

SNOMED CT

The global
language of
healthcare

A tale of two terminologies: LOINC and SNOMED CT

- Overview of LOINC and SNOMED CT
- Plan for alignment
- Benefits of project
- Alignment nuts and bolts
- Work to date
- Distribution of products
- References

LOINC

- Laboratory and clinical observations
- Terms, codes, axes
- 5 Hierarchies of LOINC Parts for organization
- Owned by the Regenstrief Institute Inc. (RII)
- Typically provides “question” in EHR
 - “What organism is present in this blood sample?”

SNOMED CT

- Clinical terminology
- Rich polyhierarchy
- Concepts, descriptions, relationships
- Built on description logic
- Owned by the IHTSDO
- SNOMED CT typically provides “answer” in EHR
 - “Proteus mirabilis”
- *Previously, links between SNOMED CT and LOINC have not been provided by the terminology managers*

Plan for alignment

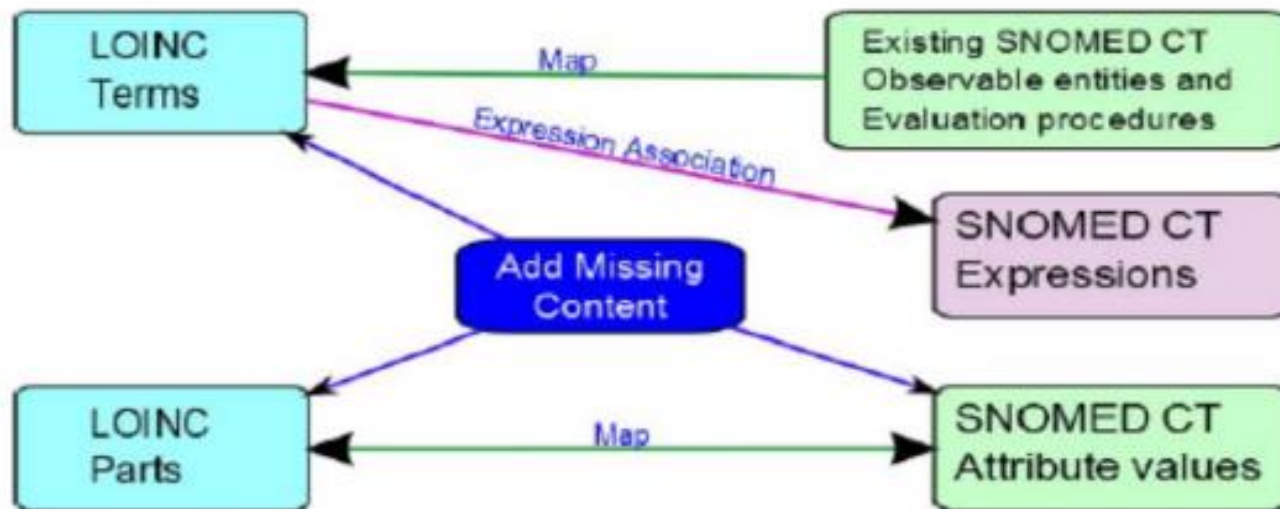
- Cooperative agreement between RII and IHTSDO - July 2013
 - Builds on strengths of each terminology
 - Minimize and manage duplication
 - SNOMED CT and LOINC work better together
 - Provide links between LOINC and SNOMED CT
- Work commenced in January 2014
- Initial scope: laboratory, vital signs, physiologic measurements, anthropomorphic measurements and evaluations
- Focus on Top 2000 Lab LOINC Terms first

Benefits of project

- Consistent order entry and result reporting
- Improved analytics, decision support and quality control
 - Query LOINC via SNOMED CT hierarchy and relationships
 - Biosurveillance (animal/human health) networks
 - Clinical laboratory reporting (mostly Microbiology area)
 - Better identification and maintenance of laboratory tests value sets for public health reporting
 - Enhanced tracking and management of infectious disease outbreaks
 - Lab test in LOINC with elements in patient chart in SNOMED CT (e.g. allergies, chief complaint, vital signs, age)
- Improvements in each terminology
- Clearer guidance on use

Alignment nuts and bolts

- Map LOINC Parts to atomic SNOMED CT concepts
- Map of LOINC Terms to post-coordinated SNOMED expressions
- Map of LOINC answer list to SNOMED concepts
- Content added, modified in each terminology
- Guidelines developed for use together



LOINC Term to SNOMED Expression Refset Example – Quality Observable

| id | Map Target (LOINC Code) | SNOMED CT Expression |
|--------------------------------------|--|--|
| 7fff2988-6dd1-4c9c-a916-2ca2cce27537 | 41995-2 Hemoglobin A1c:MCnc:Pt:Bld:Qn | 363787002 Observable entity :70434600 Specified by =(386053000 Observation procedure :704347000 Observes =(414237002 Feature of entity :704319004 Inheres in =87612001 Blood ,704320005 Towards =259690008 Glycosylated hemoglobin-c fraction (substance) ,704318007 Property type =118539007 Mass concentration),704327008 Direct site =119297000 Blood specimen ,370132008 Scale =30766002 Quantitative) |

LOINC Term

SNOMED attribute concept

SNOMED value concept

Expression is an exact match and is fully defined

Work to date

- What has been accomplished thus far?
 - Collaboration between IHTSDO and RII on content development
 - 75% of Top 2000 LOINC codes have been mapped to SNOMED expressions
 - ~14000 LOINC Terms have been mapped to SNOMED expressions
 - ~4000 LOINC Parts have been mapped to SNOMED atomic concepts
 - ~1500 new atomic concepts added to SNOMED CT
 - One alpha prototype and two Technology Preview development and releases
 - Feedback received on first two releases, modifications made
 - Implementation guidance document development:
 - Phase 1: horizon and scoping
 - Phase 2: implementation guidelines

Distribution of products

1. LOINC Parts to SNOMED CT Concept Map
 - a. Distributed in IHTSDO RF2 Refset format
 2. LOINC Terms to SNOMED CT Expressions Map
 - a. Distributed in IHTSDO RF2 Refset format
 3. Maps available on IHTSDO CollabNet and LOINC website
 4. Implementation guidance published in Word documents on IHTSDO CollabNet
- ❖ Note that the preview content:
- ❖ Has been made available in alternative formats for review (Excel, OWL)
 - ❖ Contains a nested Observables model; release of a flat model likely to occur soon

References

- Content
 - Alpha prototype files (including OWL file)
 - https://csfe.aceworkspace.net/sf/frs/do/viewRelease/projects.snomed_ct_international_releases/frs.3_other_releases.loinc_snomed_alpha_prototype
 - Technology Preview files (including Owl file and Excel file)
 - https://csfe.aceworkspace.net/sf/frs/do/listReleases/projects.snomed_ct_international_releases/frs.technology_preview_packages
- Implementation
 - Horizon and scoping report (Phase 1)
 - <https://csfe.aceworkspace.net/sf/go/doc10329>
 - Draft implementation guidance (Phase 2)
 - <https://csfe.aceworkspace.net/sf/go/doc10699>
- Observables redesign
 - <https://csfe.aceworkspace.net/sf/go/doc12009>
- RII – IHTSDO Agreement
 - http://ihtsdo.org/fileadmin/user_upload/Docs_01/About_IHTSDO/Harmonization/Cooperation_Agreement_between_IHTSDO_and_RII_20130817.pdf

Contact information

- IHTSDO Project Team
 - info@ihtsdo.org
 - Subject: LOINC – SNOMED CT Cooperation Project

Guidelines for Using LOINC and SNOMED CT Together

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Cooperation, not duplication

SHARED VISION

LOINC provides codes that represent the names of information items (e.g. questions) and SNOMED CT provides codes that may represent nominal and ordinal values (e.g. answers) for these named information items.

MUTUAL ENDORSEMENT

July 2013 Cooperation Agreement between Regenstrief Institute and IHTSDO



Guidance on use of SNOMED CT and LOINC together

OCTOBER 2014

Date: 2014-10-14
Version: 0.30
Status: DRAFT

*Guidelines from this document on the use of
SNOMED CT and LOINC together in the countries
that use both terminologies are presented in the
next few slides*



Guideline 1

VITAL SIGNS

RECOMMENDATION

Use LOINC to identify the vital sign observable

| LOINC# | LOINC Name | R/O/C |
|-------------------------|--|-------|
| 34565-2 | Vital signs, weight and height panel | |
| 34566-0 | Vital signs with method details panel | R |
| 8867-4 | Heart rate | R |
| 9279-1 | Respiratory rate | R |
| 35094-2 | Blood pressure panel | |
| 8480-6 | Systolic blood pressure | R |
| 8462-4 | Diastolic blood pressure | R |
| 8478-0 | Mean blood pressure | O |
| 8357-6 | Blood pressure method | O |
| 8358-4 | Blood pressure device Cuff size | O |
| 8359-2 | Peripheral artery measurement site | O |
| 9856-6 | Blood pressure device Institution inventory number | O |
| 9857-4 | Blood pressure device Vendor model number | O |
| 9858-2 | Blood pressure device Vendor serial number | O |
| 35095-9 | Body temperature panel | |
| 8310-5 | Body temperature | R |
| 8326-1 | Type of Body temperature device | O |
| 8327-9 | Body temperature measurement site | O |
| 9849-1 | Body temperature device Institution inventory number | O |
| 9850-9 | Body temperature device Vendor model number | O |
| 9851-7 | Body temperature device Vendor serial number | O |
| 8302-2 | Body height | R |
| 3141-9 | Body weight Measured | R |
| 8361-8 | Body position with respect to gravity | |
| 8352-7 | Clothing worn during measure | |

RECOMMENDATION

Use SNOMED CT for vital sign coded result values

SNOMED CT answer list to LOINC code [8361-8]

Body position:

Sitting position (finding) [33586001]

Unsupported standing position (finding) [404927005]

Supine body position (finding) [40199007]



Putting this to work

**LOINC/SNOMED CT
EXPRESSION ASSOCIATIONS**

Query example

[8867-4] Heart rate

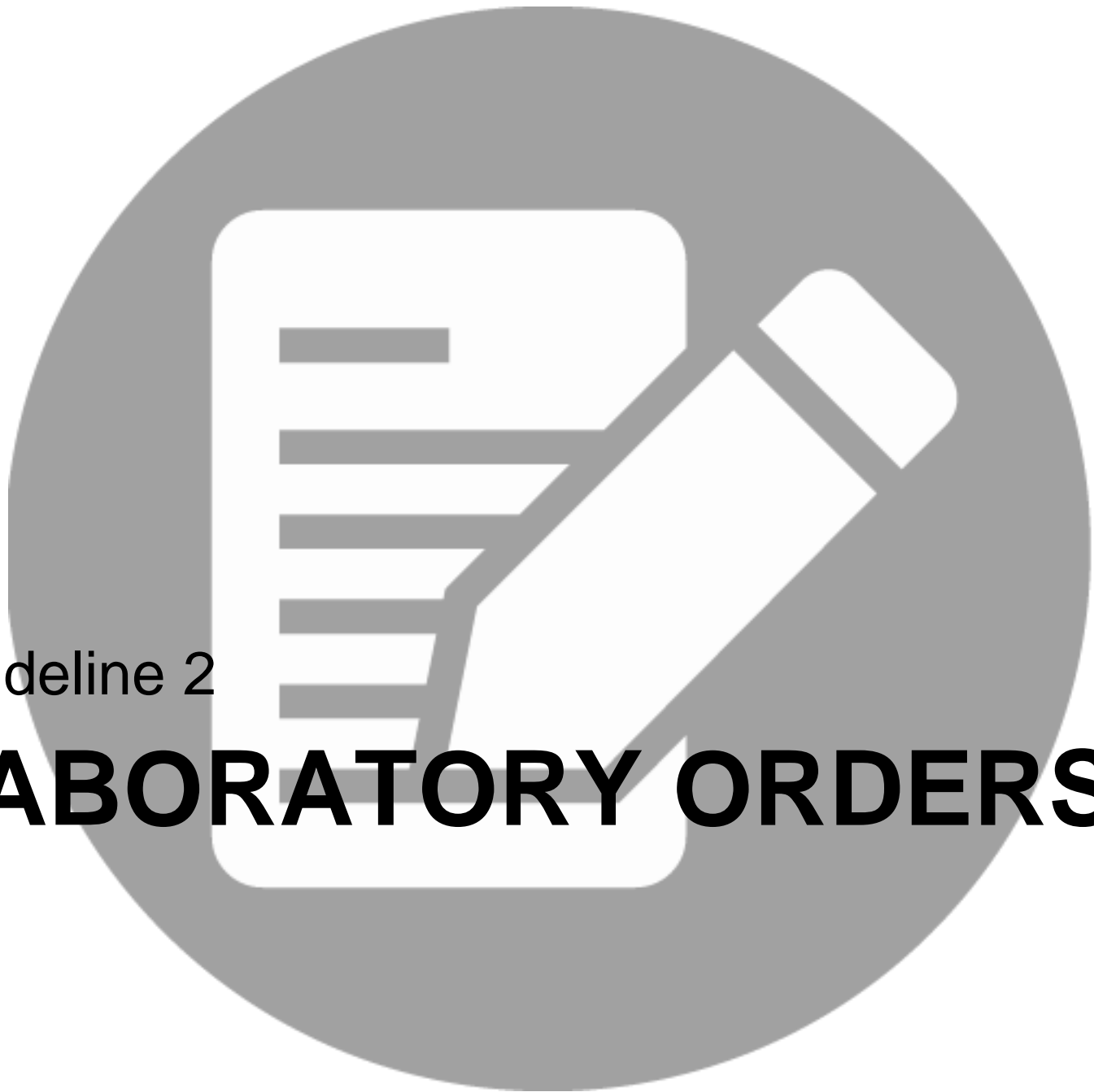
Heart rate [364075005] *is a* cardiac feature [364072008]

Cardiac end-diastolic volume [408719002]

Characteristic of heart sound [364077002]

Heart murmur [421493004]

Heart rate [364075005]



Guideline 2

LABORATORY ORDERS

RECOMMENDATION

**Use LOINC to order
laboratory test/panel**

31,900+ order terms



Guideline 3

LABORATORY RESULTS

RECOMMENDATION

**Use LOINC to identify the
laboratory observables**

47,000+ observable terms (questions)

RECOMMENDATION

Use SNOMED CT for lab result coded result values

Works nicely for nominal values such as microorganism names, substances (allergens, antibodies, etc.) and presence/absence findings, etc.

SNOMED CT answer list to LOINC code [600-7] Bacteria identified in Blood by Culture:

Neisseria meningitidis (organism) [17872004]

Brucella melitensis (organism) [72829003]

Staphylococcus aureus (organism) [761983013]

...



Putting this to work

**LOINC/SNOMED CT
EXPRESSION ASSOCIATIONS**

Query example

(can be used for value set creation)

Has my patient had an HbA1c test?

Lab tests with *Towards*:

Glycosylated hemoglobin-c fraction (substance) [259690008]

[41995-2] Hemoglobin A1c:MCnc:Pt:Bld:Qn

[4548-4] Hemoglobin A1c/Hemoglobin.total:MFr:Pt:Bld:Qn

[17855-8] Hemoglobin A1c/Hemoglobin.total:MFr:Pt:Bld:Qn:Calculated

[4549-2] Hemoglobin A1c/Hemoglobin.total:MFr:Pt:Bld:Qn:Electrophoresis

[17856-6] Hemoglobin A1c/Hemoglobin.total:MFr:Pt:Bld:Qn:HPLC

Query example

(can be used for value set creation)

Has my patient had an HIV Ab or Ag test?

Lab tests with *Towards*:

Human immunodeficiency virus antibody [259855002] **OR**

Human immunodeficiency virus antigen [116982009] **OR**

Child concepts of either

Human immunodeficiency virus antibody [259855002]

Human immunodeficiency virus type 1 antibody [120841000]

Human immunodeficiency virus 1 protein 24 antibody [444013004]

[43011-6] HIV 1 p24 Ab [Presence] in Serum

[40437-6] HIV 1 p24 Ab [Presence] in Serum by Immunoassay

[35448-0] HIV 1 p24 Ab [Presence] in Saliva (oral fluid) by Immunoblot (IB)

...

Human immunodeficiency virus 1 protein 68 antibody [445463006]

[12894-2] HIV 1 p68 Ab [Presence] in Serum by Immunoblot (IB)

...



Guideline 4

SPECIMEN SOURCES

RECOMMENDATION

Use SNOMED CT for coded specimen source details

Most lab observation names (LOINC) include specimen type.

SNOMED CT can provide codes for additional specimen details when conveyed in other parts of the message (e.g. SPM):

Specimen type: Specimen hierarchy [123038009]

Specimen source site: Body structure hierarchy [123037004]

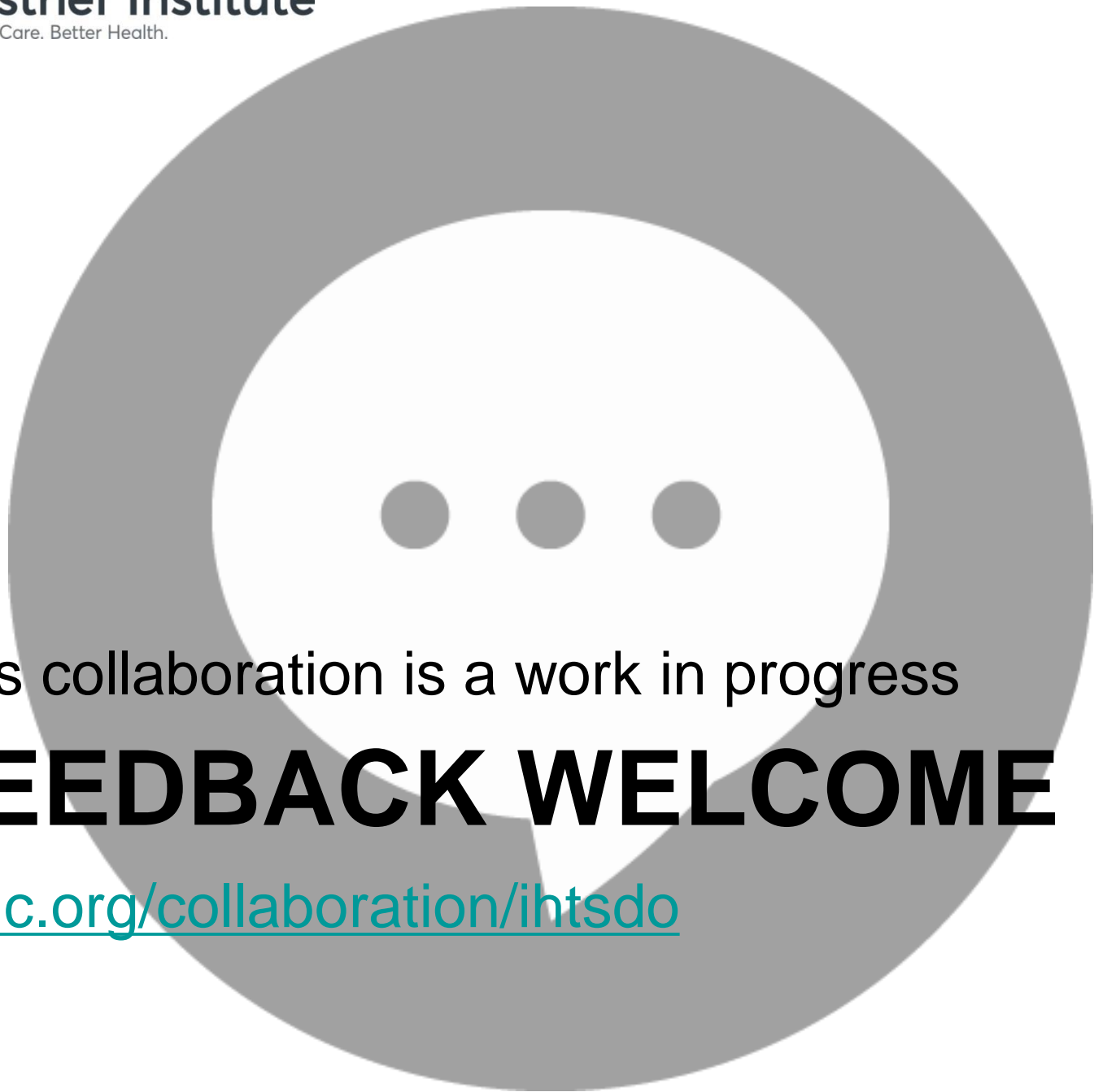
Specimen collection method: Procedure hierarchy [71388002]



LOINC and SNOMED CT have complementary strengths.

These in-process collaborative works enable effective and efficient use together.

FINAL THOUGHTS



This collaboration is a work in progress

FEEDBACK WELCOME

loinc.org/collaboration/ihtsdo