Meeting terminology requirements for order entry and result reporting

Daniel Vreeman,
Regenstrief Institute / LOINC
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International Health Terminology Standards Development Organisation
Overview

- Requirements
- Background and status of the agreement
- An introduction to LOINC
- Practical details of the agreement
- Implementing the agreement and looking forward
Requirements for order entry & result reporting

- Consistent ways to represent types tests and measurements in …
  - Requests (or orders) for investigation
  - Reports of results of investigations
  - Clinical records of subjects of investigation
  - Aggregated clinical information for research
  - Aggregated data for service management and audit
Possible ways of meeting the requirements for order entry & result reporting

- SNOMED CT the leading global clinical terminology
  - Contains concepts representing laboratory tests & observables
  - However, its coverage in the laboratory domain is incomplete
- LOINC the most widely used code system for requesting and reporting laboratory tests
  - Contains codes for specific tests in ways that meets practical requirements for communication of orders and reports
  - However, it lacks some of the detailed semantics that the SNOMED CT concept model offers
- A combination of LOINC and SNOMED CT
  - Already used in several countries
  - However, currently this results in duplication of effort, perceived competition and mixed semantics where the domains overlap
Practical overlaps between laboratory and clinical terminology
Logical overlaps between laboratory and clinical terminologies

Findings

Laboratory Tests / Observables

- Organism
- Body structure
- Morphology
- Substance
- Method
- ...

Attribute Values

Procedures

When reported with a value represent findings

Are observed or measured by procedures

Can be defined by common attributes
Background: An Opportunity for Cooperation

- SNOMED CT is the leading global clinical terminology
  - IHTSDO, the owner of SNOMED CT, is a not for profit organisation with objectives directed at enhancing health care delivery to serve the public good.

- LOINC is the worlds most widely used code system for requesting and reporting laboratory tests
  - Regenstrief Institute (RI), the owner of LOINC, is a not for profit organisation with objectives directed at enhancing health care delivery to serve the public good.

- An cooperation agreement between IHTSDO and RI
  - Should be possible due to shared objectives
  - Could address SNOMED CT/LOINC boundary issues
  - Would thus provide an effective way to address requirements for order entry and result reporting
Update: The Opportunity is being Taken

- Good progress has been made
  - Shared objectives
  - Agreement on practical issues at operational level in both organizations
  - Common understanding on key business issues at executive level in both organizations
  - The governance bodies in both organization have accepted the proposed agreement in principle (subject to contract)

- Next step
  - Drafting and signature of a final legal agreement

- Future steps
  - Undertaking work on implementing the agreement including …
    - Making links between SNOMED CT and LOINC content
    - Providing implementation advice on using SNOMED CT and LOINC together
Objectives of the proposed agreement

- To support consistent coding of order entry and result reporting
  - by addressing coding and modeling of terminology content in the domains covered by LOINC orders and observations
- To avoid unnecessary duplication of effort
- To develop cooperation between IHTSDO & Regenstrief
  - Not a one-off activity
  - Not an acquisition or merger
  - Not an exclusive arrangement

✓ A long-term working relationship
An introduction to LOINC

Daniel Vreeman
Origins of LOINC
The lingua franca of clinical observation exchange
The rain forest canopy is a seamless web through which arboreal creatures efficiently move to reach the edible fruits without any attention to the individual trees.
Arboreal Informatics Pioneers

40 years of EMR work

Indiana Network for Patient Care

Nation’s most comprehensive and longest tenured HIE

Regenstrief
– the “Data Switzerland”
A universal code system that facilitates exchange, pooling, and processing of results
Same or Different?  
What you see in the test catalog

**Lab A**
- **Test Name:** Lyme Disease Serology
- **Measures:** B. burgdorferi Ab IgG
- **Method:** ELISA
- **Scale:** quantitative
  - e.g.: Titer 1:40

**Lab B**
- **Test Name:** Lyme Disease Antibody
- **Measures:** B. burgdorferi Ab IgM
- **Method:** Immune blot
- **Scale:** qualitative
  - e.g.: Positive

**LOINC Code = 5062-5**

**LOINC Code = 6321-4**
Similar name, different meaning...

meerkat   meerkat   mere cat   meerkat
MEASUREMENTS

“Я”

US

photo via puuikibeach
# Anatomy of a LOINC Term

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<th>Component</th>
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<th>Timing</th>
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There are six major LOINC axes
If an observation is a question and the observation value is an answer...

LOINC provides codes for questions

Where needed, other vocabularies (e.g. SNOMED CT) provide codes for answers
What is my patient’s hemoglobin level?

718-7:Hemoglobin:MCnc:Pt:Bld:Qn
How fast does my patient usually walk?

41959-8: Walking speed: Vel: 1 W^mean: ^ Patient: Qn: Calculated
Result with a Coded Value

Data type of result (OBX-5) is a coded element

This code is from LOINC

This code is from SNOMED CT

Code identifying this observation (what are these results? listeria culture)

Code identifying the result (L. monocytogenes)
Microbiology Tests

Chemistry non challenge tests

Allergy Testing

Drug toxicology tests

Challenge chemistry tests
Clinical LOINC

Radiology Studies

PhenX
Laboratory LOINC Committee Chair:
Clem McDonald, MD

Clinical LOINC Committee Chair:
Stan Huff, MD
LOINC Collections
Panels, forms, surveys, and other patient assessments
Standardized Assessments and Collections

Representing Patient Assessments in LOINC®

Daniel J. Vreeman, PT, DPT, MSc, Clement J. McDonald, MD, Stanley M. Huff, MD
Regenstrief Institute, Inc and Indiana University School of Medicine, Indianapolis, IN; Lister Hill Center, National Library of Medicine, Washington DC; University of Utah and Intermountain Healthcare, Salt Lake City, UT

ABSTRACT

Without being included in accepted vocabulary standards, the results of completed patient assessment instruments cannot be easily shared in health information exchanges. To address this important barrier, we have developed a robust model to represent assessments in LOINC through iterative refinement and collaborative development. To capture the essential aspects of the assessment, the LOINC model represents the hierarchical panel structure, global item attributes, panel-specific item attributes, and structured answer lists. All assessments are available in a uniform format within the freely available LOINC distribution. We have successfully added many assessments to LOINC in this model, including several federally required assessments that contain functioning and disability content. We continue adding to this “master question file” to further enable interoperable exchange, storage, and processing of assessment data.

INTRODUCTION

Despite progress on many fronts, interoperable health information exchange continues to be hampered by the plethora of idiosyncratic conventions for representing clinical concepts in different electronic systems. Many times, the lack of interoperable connections between systems means that valuable results are unavailable to clinicians when they need it. LOINC® (Logical Observation Identifiers Names and Codes) is a universal code system for identifying representation of assessments since its early development when it included codes for standardized scales such as the Glasgow Coma Score and the Appgar Score. Prior work has demonstrated the capability of LOINC’s semantic model to represent many assessments with only modest extensions.

Over time, we have both significantly refined LOINC’s model for patient assessments and added much new content. Here we present a summary of this progress. Specifically, the purpose of this paper is to describe LOINC’s model for assessments, the methods and rationale by which this model was developed, the current assessment content, and some of the lessons learned in the process.

BACKGROUND

Fully specified LOINC names are constructed on six main axes (Component, Property, Timing, System, Scale, and Method) containing sufficient information to distinguish among similar observations. Different LOINC codes are assigned to observations that measure the same attribute but have different clinical meanings. The LOINC codes, names, and other attributes are distributed in the main LOINC database made available at no cost in regular releases on the LOINC website (http://loinc.org). In addition to the LOINC database, Regenstrief develops and distributes at no cost software programs called RELMA that provides tools for searching the LOINC database, viewing detailed accessory content, and for mapping local terminology to LOINC terms.


Open Development

It's free, but invaluable

Worldwide distribution at no cost

New terms from end-users

Welcome all comers

Committees are volunteers
Funding Support

Main current sources are:
U.S. National Library of Medicine
Regenstrief Foundation

Prior support from
Several other U.S. federal agencies,
John A. Hartford Foundation
Logical Observation Identifiers Names and Codes (LOINC®)

A universal code system for identifying laboratory and clinical observations. From serum levels of hepatitis B surface antigen to diastolic blood pressure, LOINC has standardized terms for all kinds of observations and measurements that enable exchange and aggregation of electronic health data from many independent systems.

More than 18,000 people in 148 countries use LOINC to help make bridges across their islands of health data.

It's free, but invaluable. Both LOINC and the RELMA mapping program that helps link your local codes to LOINC terms are distributed at no cost by the Regenstrief Institute. LOINC is your key to interoperable data exchange.

Ready to get started?

Common LOINCs
Get started with the most frequently used LOINC result codes.
Top 2000 Results plus Mapper's Guide
You might also like: Top 300 Orders | Common UCUM units

Explore LOINC
Search the latest version of LOINC right from your browser.
search.loinc.org

Share your Mappings
We're building tools to help tap the "wisdom of the crowd".
Add Your Mappings to a Shared Repository
Deadline for 1st round of mapping contributions is October 12, 2012

New to LOINC? Watch the LOINC Introduction Webinar
LOINC: An Introduction to the Universal Catalog of Laboratory and Clinical Observations
Daniel J. Vreeman, PT, DPT, MSc
Runtime: 58 mins
18,900+ users in 148 countries
loinc.org members

Doubled in 19 months!

15 new members per day
480 new members per month
downloads: ~1400/month
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loinc.org/terms-of-use
Copyright is for losers™
Just kidding.

Copyright is a *good* thing for standards.

It’s the licensing part that is interesting.
No cost
Worldwide
In perpetuity
Any purpose:
commercial
non-commercial

photo via Refracted Moments™
CANNOT use any Licensed Material to develop or promulgate a different standard for orders or observations.
That would defeat the purpose of having a standard!
<table>
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<tr>
<th>Available Linguistic Variants</th>
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Adopted as National Standard

Brazil
Canada
France
Germany
The Netherlands
Mexico
Rwanda
Thailand
USA
Large Implementations

SIGA Saúde project
Canada Health Infoway
ePSOS
Assistance publique - Hôpitaux de Paris
Red Agrolab
BiTAC
Hong Kong Hospital Authority

Many more...
Now we’re ready to get LOINCing!
Enabling
SNOMED CT and LOINC
to work together
The practical approach

- Maps between LOINC Parts and SNOMED CT
  - Addition of content where necessary to complete these maps
- LOINC terms linked to “SNOMED CT Expressions” to provide SNOMED CT semantic view of LOINC Terms
  - Limited additions of content subject to specific restrictions intended to limit duplication of effort and content
Planned outcomes

- **Additions to SNOMED CT International Release**
  - Map Refset to/from LOINC Parts
  - Association Refset from LOINC Terms to SNOMED CT Expressions

- **Additions to LOINC release files**
  - Equivalent SNOMED CT concept identifiers added to relevant LOINC Parts
  - SNOMED CT Expressions linked to LOINC Terms
  - Associations between LOINC Terms & sets of SNOMED CT answer values

- **Licensing and distribution of LOINC and SNOMED CT will continue according to the policies & practices of each organization**

- **Consistent advice on implementing SNOMED CT and LOINC together supported by both IHTSDO and RI**
  - Taking account of recommendations of HL7 TermInfo R2 project
  - Based on a model of observables which will allow semantic comparison of combinations of LOINC questions and SNOMED CT coded answers
How Much Work is Involved?

- Putting this agreement into effect will require both IHTSDO and the LOINC Committee to do some work
  - Creating maps & associations between LOINC & SNOMED CT
  - Adding content
  - Developing implementation guidance
- Without this agreement work would have been needed to cover the known content gaps in SNOMED CT coverage of the laboratory domain
- With the agreement there are many benefits
  - Working together reduces the barriers to adoption of both SNOMED CT and LOINC
  - Cooperation will also encourage IHTSDO Membership growth in countries that have already adopted LOINC
Summary

- Objective and approach have been agreed at operational levels in both organization
- The governance bodies of IHTSDO and Regenstrief Institute have accepted the principles of the agreement
- The next step is to finalize a legal agreement
- Beyond this there is work to be done!

Note:
- This presentation is a brief summary of key points from the agreement
- More details of the proposal will be made publicly available as soon as possible
Thank you for your attention

Questions?

- Contact IHTSDO: info@ihtsdo.org
- Web site: www.ihtsdo.org