



Strategy on implementing LOINC for laboratory in Switzerland

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Christian Lovis^{1*}, Nicolas Vuilleumier², Alexander Leichtle³, Nicolas Rosat⁴, Michel Rossier⁵, Isabelle Dupanloup Duperret⁶

Introduction

The availability of large amount of data on biological parameters is of major importance to precision medicine, especially in the era of #omics, where these data can be seen as an important source of the results of the expression of the chain of events that start with the genetic information.

However, there is a major lack of semantic interoperability of these data. Laboratory interoperability is an important step towards building interoperable capacity in the SPHN network. The “*Logical Observation Identifiers Names and Codes*” (LOINC) is a terminology developed and maintained by the Regenstrief Institute (1), used throughout the world in numerous settings, that has a strong focus on laboratory test orders and results reporting to achieve interoperability (2). More recently, LOINC has gained considerable attention to provide a unified terminology for radiology, which could play a significant role in SPHN (3,4).

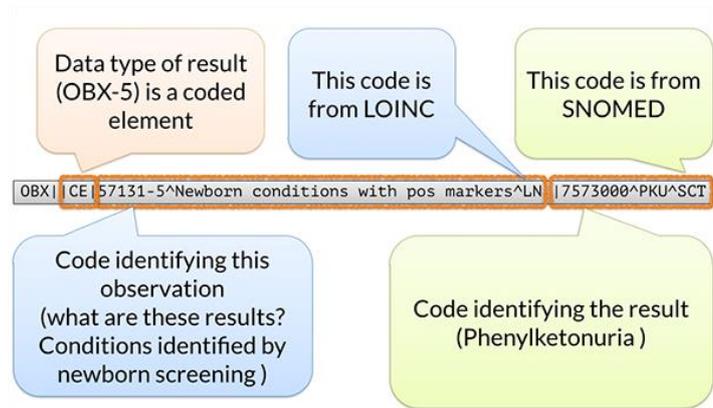
Mapping the laboratory with LOINC codes is a complex and time-intensive task. This is due to the variability of samples, methodologies, references, units, and devices used to proceed to analyses of human samples. Many different approaches have been tried, such as high level mapping to existing ontologies, either manually (5) or semi-automatically (6,7); manual mapping by professional coders or by the crowd (8); or automatic based on machine learning or information retrieval approaches mapping using large existing corpuses (9).

In Switzerland, an initiative led by HUG and involving several other large hospitals groups from the above-mentioned authors have contributed a file of about 1500 laboratory analyses described and mapped to LOINC.

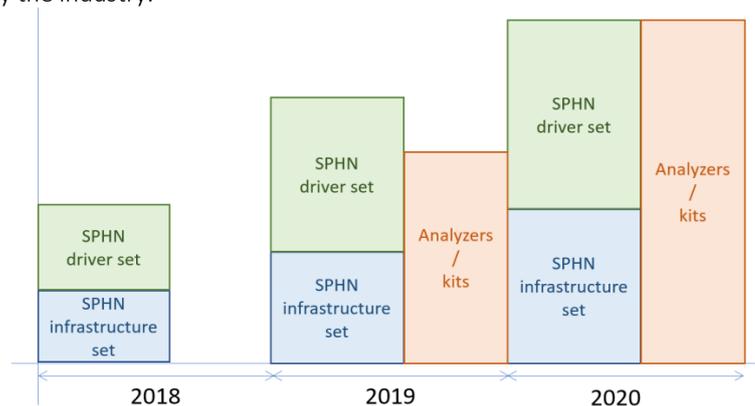
Strategy

There are numerous factors influencing the feasibility of using a unified standard for lab representation and then that will influence the adoption of the representation. Taken into account the above mentioned elements, the diversity of the Swiss lab market, the public/private shares, the little success of existing initiatives since several years despite a good support:

- 1) LOINC as a common language
It is proposed to have LOINC as a target for a common language. While LOINC doesn't cover all needs, some alternatives will have to be chosen for some specific lab activities, such as infectiology, LOINC is a major tool to achieve interoperability.
- 2) Using LOINC for identifying analysis, not results
In many situations, LOINC represents the “order”, the “question” for a test or measurement, but not the result of that test (10)
Example using HL-7 messages (source (10)):



- 3) Enforcing the classifications, but not enforcing the specific coding
Using standards to represent lab can lead to long discussions. Rather than trying to have everybody *using exactly the same codes in the same coding system*, a first important step is to have everybody *using the same coding system*. As the biggest step is to move from mostly legacy management of lab encoding, to an external validated source. Mapping codes within LOINC, or using the hierarchical properties of LOINC to evaluate proximity of codes, is then a computational task.
- 4) Stepwise introduction based on analyzers/assays kits
A stepwise approach based on commercially available analyzers and standards kits of assays will be pursued.
Most labs in Switzerland use a limited number of commercially available analyzers for the high-volume routine lab, such as the Roche Cobas® 8000 analyzer series that can handle a throughput of 1,000 samples per hour. Thus, trying to get the industry providing precoded kits that would deliver the proper encoding directly from the analyzers seems to be an attractive solution.
- 5) Converging approach in SPHN
The infrastructure of SPHN, namely the mandate with hospitals, the DCC and the infrastructures projects on one side, and the drivers projects on the other side, are the sources of requirements definition for lab needs. Here too, a stepwise approach is promoted to progressively move towards having most encoding provided in the assay kits delivered by the industry.



- 6) Alternatives when required
Whenever needed because of the limitations of LOINC, a process must allow the creation of a provisory code that will have to be enforced until it can be globally replaced by an appropriate code in a suitable classification.
- 7) Build consensus between the Swiss care system and the Swiss research and Development environment
There will be no possible future in a strategy that will require a double encoding, one for the care system, such as patient care, billing, quality assessment, etc. and another one for the R&D environment, including personalized medicine. Therefore, it is of highest importance to have a tight collaboration between the care system bodies, and the R&D bodies in Switzerland.
- 8) Governance and sustainability
A sustainable governing structure involving several bodies, such as FOPH, FAMH, SPHN, SNF must be put in place guarantying that the major group of stakeholders are properly represented: private/public sectors; care system/research and development environments; data providers/data consumers; etc.

Conclusion

The project group proposes a strategic approach based on 8 pillars:

- 1) Enforce LOINC as a common language
- 2) Use LOINC for identifying analysis, not results
- 3) Enforce the classifications, not specific encoding
- 4) Stepwise introduction based on commercially available analyzers/assays kits
- 5) Converging approach between the major SPHN supported initiative
- 6) Accept alternatives encoding when required
- 7) Alignment between care system requirements and R&D bodies and needs
- 8) Governance and sustainability

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Authors

- 1*) Corresponding author, Christian Lovis, university hospitals of Geneva, christian.lovis@hcuge.ch
- 2) Nicolas Vuilleumier, university hospitals of Geneva, Nicolas.Vuilleumier@hcuge.ch
- 3) Alexander Leichtle, Inselspital, Alexander.Lleichtle@insel.ch
- 4) Nicolas Rosat, centre hospitalier universitaire Vaudois, nicolas.rosat@chuv.ch
- 5) Michel Rossier, Institut Central des Hôpitaux – Hôpital du Valais, michel.rossier@hopitalvs.ch
- 6) Isabelle Dupanloup Duperret, Swiss Integrative Center for Human Health, isabelle.duperret@sichh.ch