HL7’s Comprehensive Standards Set and Its International Collaboration for Enabling Semantically Interoperable eHealth and pHealth Solutions

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Abstract. The workshop is organized by HL7 and its affiliates to present and to discuss HL7’s activities for providing international standards and specifications to enable advanced semantically interoperable eHealth and pHealth solutions, adaptable to national health systems through localization. The workshop especially focuses on the multi-disciplinary structure of HL7 and its liaisons with international and national standards developing organizations as well as important health informatics initiatives. Demonstrating existing and emerging solutions and strategies within HL7’s broad scope and spectrum, the international scope of HL7 standards is highlighted.

Keywords. HL7, semantic interoperability, standards, frameworks, collaboration, eHealth

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1. Introduction

Meeting the challenge for high quality and safe health services as well as for efficient and trustworthy healthcare delivery processes, an increasing number of national and international Standards Developing Organizations (SDOs) are active in creating the relevant standards hoping to achieve semantic, technical, and organizational interoperability for the benefit of the people’s health and improved patient outcome. This has led to a jungle of competing, incomplete and inconsistent specifications.

Launched in 1987 in the USA to enable communication between different hospital and departmental information systems, Health Level 7 Inc., named due to the definition of communication at the seventh layer of the ISO Open Systems Interconnection standard, soon grew to be the largest health information standards development organization in the US, accredited by ANSI, the American National Standards Institute, with over 95% of the American hospitals and ambulatory facilities using HL7 standards. From the beginning, HL7 recognized the international relevance of health informatics standards and the need for direct collaboration with national communities affected by Health Information Technology (HIT). Affiliated organizations were established around the world to translate HL7 standards, to train the local users, and to develop and maintain national implementation guides. Furthermore with their contributions, the HL7 Affiliates facilitate HL7’s readiness for the globalization of the health care market. Nowadays with 32 actively engaged Affiliate Members, HL7 is the most widely recognized SDO in the health informatics arena.

At the same time, the mission and scope of HL7 is continuously being extended with new specifications and standards, embracing for instance the latest developments in biomedical research, supporting comprehensive eHealth services and diligently transforming health care processes.

2. HL7’s Organizational Structure

Supervised by a Board of Directors, HL7 is represented through its CEO and technically directed by a CTO supported by the HL7 Technical Steering Committee. As its organizational structure and scope have been permanently growing, a re-organization has been undertaken, structuring HL7 into four Steering Divisions (SDs). The Foundation & Technology Steering Division focuses on providing the fundamental tools and building blocks that other Work Groups should use to build the standards, and upon the technology infrastructure that implementers of HL7 standards must manage. The following Work Groups make up the steering division: Implementable Technology Specifications (ITS), Implementation/Conformance, Infrastructure & Messaging (InM), RIM-based Application Architecture (RIMBAA), Modeling & Methodology (MnM), Security, Service Oriented Architecture (SOA), Templates, and Vocabulary. The primary feature of the Technical & Support Services Steering Division is that their projects and products provide direct support to the Technical Work Groups and thereby enabling the Work Groups to function efficiently. The following Work Groups belong to the Technical & Support Services SD: Education, Electronic Services, Process Improvement, Project Services, Publishing, and Tooling. The Structure & Semantic Design Steering Division focuses on the creation of basic patterns and common messages that could exist on their own, but are mostly used by others. This SD covers the following Work Groups: Arden Syntax, Clinical Context Object Workgroup
(CCOW), Clinical Decision Support, Clinical Genomics, Clinical Statement, Electronic Health Record (EHR), Financial Management, Orders & Observations, Patient Administration, Scheduling & Logistics, and Structured Documents. The Domain Experts Steering Division focuses on the creation of messages, services, and documents using many of the common structures in place, yet expanding it in key areas as well. The following Work Groups make up the steering division: Anatomic Pathology, Anesthesiology, Attachments, Clinical Interoperability Council, Community Based Collaborative Care, Emergency Care, Government Projects, Health Care Devices, Imaging Integration, Laboratory, Patient Care, Patient Safety, Pediatrics Data Standards, Public Health Emergency Response (PHER), Pharmacy, and Regulated Clinical Research Information Management (RCRIM). Two councils provide platforms for collaboration: the Affiliates Council addressing the international communication and cooperation between the national HL7 organizations, the Clinical Interoperability Council connects to health professionals and especially to clinicians for bridging the chasm between standards developers and the user community.

HL7 aims to provide the global HIT community with a comprehensive infrastructure including seamless end-to-end tools for standards development, implementation guides, and training. The creation of high quality standards requires close collaboration with specialized SDOs, associations, and initiatives. HL7 is an active participant and co-founder of the Joint Initiative on SDO Global Health Informatics Standardization (http://www.global-e-health-standards.org/) along with ISO, CEN, IHTSDO, and CDISC, aiming to harmonize standards developing processes and expedite the development of highly effective and globally accepted HIT standards. Furthermore, HL7 has established collaboration and in many cases bilateral agreements with many organizations including DICOM, IHE, OASIS, OMG, IEEE, Continua, EuroRec Institute, etc.

The HL7 Affiliates around the world are the driving force in the enablement of advanced eHealth and pHealth solutions. They are the ones that work closely with the local governments, the academic community, and the industry, translating the HL7 standards, adapting them to local needs, and educating the community spreading the word of standards for high quality eHealth services.

3. Objectives of the Workshop

Being the basis for successful and efficient eHealth and pHealth solutions, the navigation through the standards jungle is extremely challenging. While the number of SDOs is steadily increasing, the number of useful, i.e., correct, consistent, implementable and meeting the users’ requirements standards, is rather limited. As communication and collaboration in integrated care settings which even turn towards eHealth or pHealth, are growing, the complexity and multi-disciplinarity of supporting HIT infrastructures increases more than proportionally. The process of harmonizing and/or mapping specifications from different SDOs demands appropriate methodologies, processes and leadership.

Invited experts, but also participating scientists and practitioners will discuss challenges and solutions of standardization especially from, but not limited to, the HL7 perspective, focusing on best practices and lessons learned to further improve processes and collaboration for high quality eHealth/pHealth standards following the motto: one problem – one standard.
4. Structure of the Workshop

The workshop is organized by HL7 and the HL7 Affiliates Council. After presenting the achievement of the global HL7 community and its liaison partners, the discussion of partially competing approaches as well as the vision of harmonized and collaborative standards development will be presented. It will be followed by a panel to enable wide participation and an open exchange of viewpoints.

The series of presentations providing the basics for intensive discussions will be opened by William E. Hammond, Chair of the HL7 Board of Directors, talking about HL7 in the US as well as the global HI context including implications to Europe. Explaining why it is critical to support a common base of standards and how to insure standards can meet global needs and at the same time national requirements, he will provide some details and updates on SDO collaboration for Health Informatics Standardization and the related policy/political approach.

In its more than 20 years history, HL7 offer a set of messaging standards for enabling over the time advancing levels of interoperability. Starting with an EDI protocol providing structural interoperability in its earliest versions, HL7 grew up to syntactic interoperability in the later 2.x version offering agreed terminology and low level clinical documents. With the advent of HL7’s model-based approach of version 3 and the definition of the HL7 development framework, semantic interoperability could be defined at specification level, also including application roles and implementation guides. In parallel, the approach the service interoperability has been pushed. Bernd Blobel will highlight the HL7 Architecture Framework for representing and interconnecting HL7’s different artifacts and work products, thereby also discussing future needs and possible developments.

For a healthcare provider institution of some size, investing in new software for an Electronic Health Record (EHR) is a decision worth many million euros, dollars or pounds – certainly if you include the hours spent on selection, implementation and training. In addition to EHR systems, there is great worldwide interest in Personal Health Record (PHR) systems in support of patient empowerment and continuity of care. Confidence in the right choice of EHR system and understanding the role of PHR systems is therefore important. In this contribution, we discuss the value of the HL7 EHR-S and PHR-S reference models. These reference models are important in establishing confidence in the choice of an EHR system and it’s linkage with one or more PHR systems. Robert Stegwee will briefly highlight the process to develop a country-specific profile based on the HL7 EHR-S Functional Model.

Besides the lack of sufficient quality and inconsistency between related specifications, not meeting the users’ needs and missing their acceptance is one of the major reasons for the insufficient deployment of health informatics standards. Therefore, HL7 aimed from the beginning at the inclusion of provider organizations and endusers in the standards development process. For achieving multidisciplinary semantic interoperability in eHealth, bridging the gap between user domains and ICT is crucial. HL7 CEO Charles Jaffe will inform about “Bridging the Chasm for the clinical interoperability council”. Dipak Kalra discusses the same aspect from a European perspective.

A series of reports on the implementation of national eHealth solutions based on HL7 specifications and standards follows. Titles “Canadian Standards Collaborative – HL7 and more!”; Marc Koehn will cover the broad domain-focused collaboration processes established in Canada that reach beyond HL7 to cover IHTSDO, ISO, etc.
Micheal Tan presents the Dutch approach to a health telematics infrastructure in the Netherlands. Stefan Sabutsch will demonstrate how Austria combines HL7’s CDA and IHE services specification to implement the national EHR solution – the Elektronische Gesundheitsakte (ELGA).

Terminology and ontology issues are fundamental for achieving semantic interoperability. Stefan Schulz will report about HL7’s terminology efforts Vocab and Terminfo as well as about the collaboration with IHTSDO, thereby highlighting the relation of information models and terminologies.

Finally, presentations will be dedicated to the special field of lab communication and automation, where HL7 has provided basic work which has been used in the IHE Lab Framework. Here, the French experiences presented by Francois Macary have to be mentioned.

5. Conclusions

The eHealth/pHealth is connected to the challenge of mastering a multidisciplinary approach. Furthermore, advanced technical and methodological solutions have to be deployed. It is just HL7 which covers most of the different domains included such as medicine, public health, genomics, clinical studies, laboratory, administration, device communications, EHR/PHR and many others organized in HL7 Work Groups. Furthermore, the multidisciplinary approach is supported by a broad and close collaboration with other SDOs relevant for special domains. In that context, HL7 was pushing the establishment of the based on bilateral agreements with CEN and ISO. Starting as an SDO for creating messaging standards, HL7 meanwhile also considers service-orientation and much earlier already dedicated interoperability services such as CCOW.

eHealth and pHealth are ultimately getting global, requiring the reflection of specific need of countries, legislations and jurisdictions, nevertheless enabling global interoperability. Originally stated as US organization under accreditation by ANSI, HL7 soon expanded all over the world. The aforementioned aspects are brought forward and solved by the HL7 Affiliate Council combining HL7 basis organizations in more than 30 countries, appropriately and consistently profiling all HL7 artifacts and work products.

Terminology and ontology issues are fundamental for achieving semantic interoperability. HL7 was the first SDO in the field of health informatics creating and maintaining a controlled vocabulary. As a consequence, it actively supports the new IHTSDO, integrating its related projects such as Vocab and Terminfo.

Most of the HL7 material is publicly available at the HL7 Website (http://www.hl7.org) as well as at the Websites of the HL7 Affiliates.

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