

Concept, Models and Implementations for Innovative Interoperable eHealth Solutions

Bernd Blobel¹ and Libor Seidl²

¹ Medical Faculty, University Hospital Regensburg, Germany

² HL7 Czech Republic, Prague, Czech Republic

Correspondence to:

Prof. Dr. habil. Bernd Blobel, FACMI, FACHI, FHL7

Medical Faculty, University of Regensburg

Address: c/o HL7 Deutschland e. V., An der Schanz 1, 50735 Köln

E-mail: bernd.blobel@klinik.uni-regensburg.de

EJBI 2015; 11(2):en1–en2

published: January 20, 2015

This Special Issue of the European Journal for Biomedical Informatics contains selected papers presented at the 15th International HL7 Interoperability Conference (IHIC 2015), 9-11 February 2015 in Prague, Czech Republic.

The International HL7 Interoperability Conference series has been inaugurated in 2000 by the Board of HL7 Germany and its unforgettable Chair and interoperability pioneer Joachim Dudeck. The first event in Dresden, Germany, was entitled "Advanced Healthcare Information Standards". Over the time, the scope of those conferences has been extended, meanwhile covering – as expressed in the motto of the this year's conference – concepts, models and practical implementations, but also testing and certification processes for innovative, interoperable eHealth solutions.

The concept of interoperability has dramatically changed since the establishment of the Health Level 7 standard for of open communication between hospital organizational units in 1987 in the United States of America. For standardized electronic data interchange (EDI), the data representation at the application level, the 7th level of the ISO Open Systems Interconnection stack, has been specified for information related to common events happening in hospital care and management processes [1]. The development was guided by the Marriam-Webster interoperability definition as the "ability of a system (as a weapons system) to use the parts or equipment of another system" [2], and thereafter enhanced towards the IEEE definition as the "ability of two or more systems or components to exchange information and to use the information that has been exchanged" [3]. Both definitions focus on communications between information and communication technology (ICT) systems. Impacted by the paradigm changes towards pervasive and ubiquitous health services based on personalized, preventive, predictive and participative medicine as well as technological innovations such a mobile technologies, micro- and nanotechnologies, cloud computing, big data and analytics, etc., we meanwhile define interoperability as motivation, willingness, interest, knowledge, ability and skills to cooperate for meeting

common business objectives. Simple EDI has been replaced by information exchange, nowadays followed by knowledge sharing. Such move requires that the consideration goes beyond ICT, including the real world business domains of manifold organizations and multiple disciplines as well as all possible actors such as persons, organizations, devices, applications, and components. Here, domain-specific terminologies/ontologies and their harmonization, but also business process modeling, management and optimization come into play [4, 5]. It is a challenge in open environments to guarantee the persistence of meaning throughout the entire development process from clinical models through their platform-independent informational representation, the computational aggregation and platform-specific implementation, thereby involving domain experts such as medical professionals, business people, informaticians and engineers.

This Special Issue tackles the entire spectrum including EHR systems as the core application in eHealth environments, interrelations between EHR systems and CDA repositories, CDA-based communication between services providers, the challenge of semantics keeping, implementation guidelines, conformance testing, certification for guaranteeing practical interoperability.

Conformance Section

In a proof-of-concept study, Philip Scott et al., members of The English Professional Records Standards Body (PRSB) for health and social care, reported about the development of a conformance methodology for clinically-defined medical record headings. The project aims at providing user-friendly semantic interoperability by enabling the mapping of outpatient letters to epSOS patient summaries. The conformance criteria have to be implementation-agnostic to allow the deployment of HL7 CDA documents, HL7 Fast Health Interoperability Resources (FHIR), IHE profiles or openEHR archetypes, using implementation technology specific artifacts and tests. A generic logical information model for out-

patient letters has been created, and a process for developing implementation-specific technical conformance criteria has been defined.

Boufahja et al. from the IHE Europe French Chapter analyzed the coverage of conformance of products and tools such as Trifolia Workbench, Model Driven Health Tools (MDHT), Eclipse Instance Editor (EIE), Art-Décor, the NIST Validation Tool, or the Gazelle ObjectsChecker Tool with requirements and specifications provided by the HL7 CDA R2 standard. The outcome of the different tools was quite different, and no tool met all requirements.

Integration of Different Domains

Barbara Franz and co-authors developed a practical solution for integrating different vital sign measurement devices into a patient monitoring system based on the HL7 FHIR approach. An Italian/Swiss group under the lead of Vittorio Meloni has provided an open-source library to create, parse, navigate and validate HL7 v2 compliant messages. Instead of Java or .NET, the Python programming language has been used to develop the HL7apy called library, which has been practically demonstrated and deployed in an open-source HIS. An important approach for realizing semantic interoperability is the separation of health data models defined by domain experts from technical implementations realized by IT specialists. Marten Smits et al. from the Netherland have implemented technology independent models (Detailed Clinical Models – DCMs) using CDA and FHIR. The equivalence of the outcome has been tested by transforming one technical implementation of a specific DCM into the other one, using XSLT. The authors could exemplify problems, so demonstrating that the existing DCMs are not fully technology-independent, so the resulting implementations are not necessarily fully compatible.

Business Process and System Continuance

A German group with Georg Heidenreich in the lead developed an implementation guide, combining specifications from different SDOs such as HL7, IHE and GS1 for an eSupply solution. Fernando Campos et al. from Argentina

presented an approach to guarantee contingency support by realizing an HL7 CDA R2 document repository fed by EHR systems, but also by ancillary information systems such as Laboratory IS, Radiology IS, Imaging, etc., in the case of an EHR system failure. In case of a total impact, a paper repository by printing the HL7 CDA R2 documents is automatically maintained.

One paper, under the lead of Ana Estelrich jointly prepared by the French Health Information Technology Standards developing organization Phast, the HL7 Foundation Europe and liSPA Milano, addresses intercontinental interoperability of patient summaries between the European Union and the USA by mapping semantic content and value sets of the epSOS Patient Summary with those of the US Continuity of Care Document. The contribution highlights a bunch of open problems to be solved especially within the Trillium Bridge project.

All the papers have been reviewed by two independent reviewers.

The Guest-Editors are indebted to thank all authors and reviewers for their excellent work. Unfortunately, not all authors took the opportunity for revising their work based in the valuable recommendation provided by the reviewers. Finally, the Guest-Editors thank HL7 International, HL7 Austria, HL7 Czech Republic, HL7 Germany, and HL7 Switzerland for the given logistical and financial support.

References

- [1] Health Level Seven International (HL7 International), www.hl7.org
- [2] Merriam-Webster Dictionary; 1977, <http://www.merriam-webster.com/dictionary/interoperability>
- [3] Institute of Electrical and Electronics Engineers. IEEE Standard Computer Dictionary: A Compilation of IEEE Standard Computer Glossaries. New York, NY: 1990.
- [4] Blobel B. Architectural Approach to eHealth for Enabling Paradigm Changes in Health. *Methods Inf Med.* 2010; 49(2): 123–134.
- [5] Blobel B. Standards and Solutions for Architecture Based, Ontology Driven and Individualized Pervasive Health. *Stud Health Technol Inform* 2012;177:147-157.