Advanced Interoperability of Health Information Systems – Principles, Standards and Solutions

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Abstract. Organizational, methodological and technological paradigm changes in health systems lead to highly distributed, cross-organizational, regional or even international care settings including many different stakeholders from multiple policy domains and integrating human actors, devices, applications or components. Such environments establish huge interoperability challenges. This workshop introduces different interoperability definitions connected to different interoperability levels regarding what those levels require for being shared such as data, aggregated data (messages, documents), data semantics, services, business domain concepts, common knowledge, or attitudes. For the different interoperability paradigms, principles, standards and solutions will be highlighted. The workshop is a joint activity of the EFMI Working Groups “Electronic Health Records” as well as “Security, Safety and Ethics” and HL7, who is an Institutional Member of EFMI.

Keywords. Health information systems, interoperability, interoperability levels, standards

Introduction

The ongoing organizational, methodological and technological paradigm changes in health and social care lead to highly distributed health care settings, the involvement of different stakeholders from different organizational, regional, national or even international policy domains, representing multiple disciplines, the inclusion of technical actors such as mobile devices, bio- and nano-technological implants and new

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types of services. In such heterogeneous environment, simple approaches to interoperability such as technical connectivity and data exchange are not sufficient any more. The different knowledge and skills of the actors, language and underlying ontologies used to represent them require the harmonization of knowledge, skills, terminologies and ontologies to enable advanced communication and cooperation. In that context, all actors involved due to technological paradigm changes such as persons, organizations, devices, applications, components or even single objects must be considered and supported to run the business process for meeting the business objectives. That way, health informatics turns towards a universal mediator and moderator service.

1. **Aim of the discussion**

The objective of the workshop is to introduce the different interoperability definitions and types such as technical, structural, semantic and service interoperability. International standards and publicly available specifications are presented and explained to manage the terminology and ontology problem of communication and cooperation in healthcare, to preserve semantics in EHR systems and to design and implement advanced interoperability resources using appropriate tooling. The audience will be educated and guided in navigating through the standards jungle for mastering interoperability comprehensively.

2. **Speakers involved (alphabetically)**

The following speakers, strongly engaged in the standardization of health informatics interoperability at ISO, CEN, HL7, IHTSDO, IHE, etc., are involved:

- Bernd Blobel, PhD, FACMI, FACHI, FHL7, Professor, Medical Faculty, University of Regensburg, Germany; Chair of EFMI WGs SSE and EHR
- Kai Heitmann, MD, FHL7; Heitmann Consulting, Huerth, Germany
- Dipak Kalra, MD, PhD, Professor; President, Eurorec Institute, Gent, Belgium; Director, openEHR Foundation; Vice-Chair of the EFMI WG EHR
- Diego M. López, PhD, Professor, Telematics Engineering Research Group, University of Cauca, Popayan, Colombia
- Alexander Mense, Dipl.-Ing., Professor, University of Applied Sciences Technikum Wien, Austria
- Frank Oemig, PhD, FHL7; Agfa Healthcare GmbH, Bonn, Germany
- Pekka Ruotsalainen, Adjunct Professor, Research Professor Em., University of Tampere, Finland, Vice-Chair of EFMI WG SSE, Co-Chair IMIA SiHiS
- Stefan Schulz, MD, Professor, Head, Institute for Medical Informatics, Statistics and Documentation, Medical University of Graz, Austria

3. **Contribution from each speaker**

During the workshop, impacts of health systems paradigms, changing political targets and business models, and ICT innovations on interoperability among all the types of
actors are presented reflecting the perspective of different countries and regions, but also international viewpoints. Competing standards, models, and tools, but also their harmonization will be discussed. The workshop is moderated by Bernd Blobel.

- Introduction: Interoperability challenges and types for health and social services resulting from organizational and methodological paradigm changes as well as ICT innovations (Bernd Blobel)
- How to meet security, privacy, safety and trust challenges in international interoperability settings (Pekka Ruotsalainen)
- Electronic Health Record approaches as core component of health interoperability environments (Dipak Kalra)
- Definition of CDA Templates using Art-Decor (Kai Heitmann)
- Design of interoperability resources using FHIR (Alexander Mense)
- The language problem – terminology and ontology management for interoperability (Stefan Schulz)
- Conformance statements and certification for practical interoperability (Frank Oemig)
- Interoperability challenges in developing countries (Diego M. López)
- Combining the results: Architecture-centric, ontology-based, policy-driven approaches to advanced and trustworthy interoperability (Bernd Blobel)
- Discussion
- Conclusions (Pekka Ruotsalainen, Dipak Kalra)

4. Expected results

The workshop creates understanding of interoperability challenges established by the new healthcare and health environment, service model and ICT-technology. Beside the technological and data-related interoperability issues, the workshop addresses the importance of knowledge representation and sharing as well as terminology and ontology aspects of cooperation. The discussion especially highlights the importance of standardization of principles and methods for designing, specifying, implementing and testing interoperability solutions including the definition of conformance statements and certifications processes. Finally, specific challenges developing countries are faced with are addressed.

References