The openEHR Developers' workshop

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Abstract

*The openEHR project is well-known as a set of specifications to build future-proof and semantically interoperable electronic health record systems and is related to the family of ISO 13606 standards. This workshop will discuss implementations of the openEHR specifications with the following contents.*

## Learning objectives

* *Develop a background understanding of openEHR and archetypes and their relevance to assuring semantic interoperability between EHR systems.*
* *Explain the role of the openEHR project in supporting the mix of role, process and technology change required by modern healthcare.*
* Highlight openEHR implementation technologies used by differing development communities.
* Inform the current state of the art of the openEHR specifications
* Contrast current software engineering technologies around the openEHR implementations.
* Raise awareness of upcoming ADL 2.0 and AOM 2.0 specifications.

## Expected outcomes

* Further understanding of the openEHR specification and its implementation technologies
* Evaluation the conformance to the specifications and more features of each technology.
* Sharing experience and passion with speakers and participants.

Keywords:

openEHR, archetype, open-source software, clinical standard, interoperability

Workshop description

1 General Topics

The openEHR project[1]  is well known as a development source for the ISO 13606 standards[2]. These standards are considered the technology basis of clinical information models which enable the interoperability for electronic healthcare applications in clinical information modeling initiative (CIMI, now an HL7 WG), the worldwide collaboration[3]. Moreover, upcoming ADL/AOM 2.0 is expected to integrate existing openEHR template and archetypes technology. A number of projects have been implementing the openEHR specifications with various approaches. Development projects related to openEHR are spreading worldwide. For example, there are 101 repositories at GitHub related to openEHR at January 2017. The core reference implementation of the openEHR specifications has been implemented using Eiffel. Java and C# reference implementations are well established morwe rectly augmented with Ruby and Grails reference implementation projects[4,5]. These core implementations are provided as open-source software. This momentum provides evidence that the openEHR specification is becoming widely accepted and gaining worldwide interest. Based on this steady international growth, we wish to take this opportunity to introduce these specifications to a wider audience and explain their features. Even though these projects are still ongoing and have not yet completed their missions, developers, whether they are involved in openEHR or not, will benefit from the sharing of experiences and  discussions about the implementation of the openEHR specifications.

2 The workshop structure and arguments

This workshop will be consist of two broad components/ In the first part of the workshop we intend to give an openEHR architectural overview and in the second, each speaker will give a brief presentation of their project.

2.1 The openEHR architecture overview

The core technology of openEHR specification features a multi-level modeling system, often referred to as ‘archetype-based systems’ [6]. In this archetype-based technology, technical implementation is separated from the continuously updated detailed clinical modeling concerns in a way that makes it easier for implementers to maintain semantic intra- or interoperability. In this workshop introduction, we will overview:

* The openEHR reference model (RM) and the Archetype Model (AM) and associated specification documentations etc.
* Standardized approaches to clinical querying (AQL), REST-interfaces and Clinical Decision Support rules (GDL)
* The mix of people, process and technology; how using archetypes, templates, AQL and GDL etc. a as a basis in EHR systems enables agility in adapting to changing clinical needs and reduces maintenance time.
* Options on the spectrum between semantic intraoperability and interoperability. (By intraoperability we here refer to the possibility to align internal clinical EHR datamodels across organizational boundaries and inside systems from different vendors - and thus easily share both data and share the workload of model authoring and maintenance.)
* A quick overview of different existing (previously published/available/discussed) approaches to implementing openEHR; persistence solutions, APIs, programming languages, open source core reference implementations (in e.g. Java, C#, Ruby, Eiffel)
* Comparing steps needed to implement archetype-based systems from scratch versus using/integrating existing openEHR based components and APIs
* A quick overview of where in the world openEHR is used.

2.2. Overview of each session

2.2.1. A review of FLOSS implementations of openEHR specifications(Shinji Kobayashi)

The openEHR project has been published EHR specifications and core library under open source software license. This artefacts are recognised as an ideal EHR specification and they became a basis of ISO 13606 standards. There are some EHR products that implemented openEHR specifications with faithful conformance and adopted to many organisations. Because the products have diversity on usage and implementation, fair evaluation for them are not applicable with standardised metrics.

In this session, we will review FLOSS implementations of openEHR for the developers' reference to implement openEHR specifications.

2.2.2. A CDR Implementation based on openEHR ARM persistence method(Xudong Lu)

One of the main obstacles to the wide adoption of openEHR in CDR implementation in hospital is that there is no practical persistence method described in the openEHR specifications. In this presentation, an archetype relational mapping (ARM) persistence method for CDR has been proposed, which was based on a set of rules designed for mapping the archetypes & templates to data tables of the relational database. The comparison between the generated ARM database, the conventional database of the hospital and the Node+Path database has been conducted, while the ARM database achieves better performance. The implemented CDR based on this method has been used in real clinical site for over two years. The current situation and the future plan of this effort will also be introduced.

2.2.3. EtherCIS: a pragmatic openEHR CDR(Christian Chevalley)

Many openEHR backend CDRs are based on various non mainstream technologies, from experimental to plain exotic. Although these works are important to lead the path to future production systems, with EtherCIS , we have resolutely decided to adhere to best- practice observed in current Data Center environments to ease its adoption. EtherCIS is an open source, multi-tiers application server based on a modern open source database engine: PostgreSQL. The presented approach may be of value for other openEHR implementations using, but not limited to, other well-known DB engines such as Oracle 12 or Intersystems Cache.

We will demonstrate some of the benefits of deploying an openEHR CDR using a mainstream database engine in real-life environments.  The aspects covered encompass: insertion in existing environment, leveraging from other users' experiences, development cycle: the beauty of OO SQL  (and some not so easy bits), security and privacy, operating concepts and adaptability to unforeseen business needs.

* 1. Workshop speakers
* KOBAYASHI, Shinji, MD, PhD - Kyoto University, Japan
* McNicoll, Ian, MSc, MBChB - UCL CHIME, openEHR, London, UK
* Lu, Xudong,Professor of Medical Informatics in Biomedical Engineering Department of Zhejiang University, China.
* Chevalley, Christian, Founder and Technical Director, ADOC Software, Bangkok, Thailand

3 Specific Educational Goals

The educational goal of this workshop is not only to learn openEHR technology, but the implementation technology approaches required to support standardized clinical models for semantic interoperability.

## 4 Expected Attendees

Expected attendees of this workshop are mainly developers who are interested in openEHR archetype technology, implementation of clinical models or open-source software projects in medical domain. Prior knowledge of openEHR specification/technology is helpful, but not required.

Because the workshop will present the state-of-the-art of implementation technologies in health care, attendees can learn the cutting edge of EHR system and software technology.

References

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