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

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), 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 61 repositories at GitHub related to openEHR at January 2015. 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 andopenEHR architectural overview and in the second,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 two-level modeling system, known as an ‘archetype-based system’ [6]. In archetype-based technology, technological implementation is clearly isolated from clinical concern, helping maintain future-proof semantic interoperability. In this workshop, we will overview this archetype-based technology.

* What is an archetype?.
* Why do archetypes help develop and maintain semantic interoperability?.
* How to implement archetype-based systems?
* What is the likely impact of the upcoming ADL(Archetype Definition Language) 2.0 and AOM(Archetype Object Model) 2.0.

2.2 Overview of each implementation project

****Renovation of regional healthcare inter-exchange system by openEHR technology (Shinji Kobayashi)****

We had developed an EHR system for regional health care over 12 years and published an XML based MML (Medical Markup Lanugage) standard to communicate within and between hospitals. This EHR system has involved more than 6,000 users in three regions in Japan, but the system had become difficult to maintain and to incorporate clinical updates. Therefore, we re-developed this EHR system using archetype technology and Ruby on Rails framework. XML messages were re-constructed by archetype models with the ability to update UI forms.

****Development of the Gestational Diabetes Registry in New Zealand (Koray Atalag)****

We have employed the openEHR standard which underpins our national interoperability reference architecture to represent the dataset and also to build the web-based registry system. Use of this rigorous methodology to tackle health information is expected to ensure semantic consistency of Registry data and maximise interoperability with other Sector projects. The development work has been facilitated by the ability to transform the dataset automatically into software code – ensuring clinical requirements accurately translated into technical terms.

****Clinical Knowledge Manager (Sebastian Garde)****

The Clinical Knowledge Manager (CKM) is a system for collaborative development, management, review and publishing of openEHR clinical knowledge resources. It enables the knowledge governance of openEHR archetypes, templates, terminology subsets, artefact release sets, as well as metadata relating to clinical models and related resources. CKM is used internationally by the openEHR foundation as well as in several national programmes.

**HANDI-HOPD - building apps around an openEHR platform (Ian McNicoll)**

HANDI-HOPD[7] is a demonstrator based on SMART, FHIR and openEHR APIs, designed to allow training and experimentation in an open-standards/vendor-neutral environment. It exposes a set of simple RESTful APIs which are easy to consume in modern languages/frameworks. HANDI-HOPD is being used as the basis of the NHS England Code4Health project which aims to give clinicians the skills and knowledge to allow them to participate more directly in design of their systems.

****Development of an openEHR-based Open Source EHR Platform and openEHR EMR frameworks(Pablo Pazos)****

Since 2009 we have developed several Clinical Information System projects based on openEHR. We started focusing on R&D, and are now reusing that experience (and code) to build a service oriented (REST and SOAP), open source, and general purpose EHR platform to help developers to create shared EHRs that will be standard-compliant from scratch. That platform will support many EMR applications and devices. We are also creating tools to help on the application development itself, providing frameworks, libraries and tools.

New archetype and template tools (Erik Sundvall)

An introduction to the new archetype and template tool project intended supporting new features in the archetyping formalism ADL/AOM 2.0 (previously called ADL 1.5). The open source project targets fundamental parts of a modular editing framework that can be extended for different user needs and different reference models (e.g. CIMI, ISO13606 and openEHR)

2.3 Workshop speakers

* KOBAYASHI, Shinji, MD, PhD - Kyoto University, Japan
* Pablo Pazos, Ingeniero en Computación, openEHR en español, CaboLabs, ACHISA
* Koray Atalag, MD, PhD, FACHI - University of Auckland, New Zealand
* Sebastian Garde, Dr. sc. hum., Dipl.-Inform. Med., FACHI - Ocean Informatics, London, UK
* Ian McNicoll, MBChB,MSc, HandiHealth CIC, UK
* Erik Sundvall, MSc, PhD, Linköping University and Region Östergötland, Sweden

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

[1] The openEHR Project. [accessed 2016/1/08]; Available from: http://www.openehr.org/.

[2] ISO 13606-1:2008 Health Informatics – Electronic health record communication – Part I: Reference model, (2008).

[3] Clinical information modeling initiative.[accessed 2015/1/11]; Available from: http://informatics.mayo.edu/CIMI/index.php/Main\_Page.

[4] Kobayashi S, Tatsukawa A. Ruby Implementation of the openEHR Specifications. Journal of Advanced Computational Intelligence and Intelligent Informatics. 2012;16(1):42-7.

[5] Pablo Pazos, Cabolab-EHR-server. [accessed 2015/1/11]; available from: https://github.com/ppazos/cabolabs-ehrserver

[6] Beale T. Archetypes: Constraint-based Domain Models for Futureproof Information Systems. OOPSLA 2002, workshop on behavioural semantics2002.

[7] Introducing HANDI Open Platform Demonstrator. [accessed 2015/1/12]; available from http://handi-hopd.org

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