

# openEHR Clinical Modeling and Data Standardization

Xudong Lu<sup>a</sup>, Huilong Duan<sup>a</sup>, Ian McNicoll<sup>b</sup>, Heather Leslie<sup>c</sup>, Shinji Kobayashi<sup>d</sup>

<sup>a</sup> Zhejiang University, P.R.China

<sup>b</sup> OpenEHR Foundation, United Kingdom

<sup>c</sup> Ocean Informatics, Australia

<sup>d</sup> Kyoto University, Japan

## Abstract and Objective

*Clinical data Interoperability enables efficient communication among systems so as to reduce costs, improve quality of care and achieve meaningful use. In order to accomplish interoperability, adopting and/or developing data standards is the common method. Nevertheless, the coming of Big Data era brings challenges for data standard development due to rapidly increasing data sources which is difficult to be completely defined in the existing standards. OpenEHR clinical modeling, which defines the content and semantics of the clinical data through multi-layered methodology, is a promising approach and potential solution to meet this challenge and can be taken as a basis for data standard development.*

*This workshop aims to share the knowledge and experience around the topic of openEHR clinical modeling and data standardization, and further stimulate the possible international cooperation. The invited presenters include the key members from openEHR foundation, the researchers on data standards in China. The presentations will not only explain the approach of openEHR clinical modeling and localization, together with successful use cases internationally, but also introduce the specific cases in China, including the overview of data standardization in the country, the experience of openEHR clinical modeling and the planning of using openEHR approach in national projects. We will combine these into a deep discussion about the potentiality, feasibility, advantages and optimal strategies of data standard development with openEHR approach.*

*The intended audiences include standard researchers, software vendors, health care providers, domain experts, government administrators, policy makers and stakeholders who have interest in clinical modelling and data standards.*

### Keywords:

Interoperability, Data Standard, openEHR, Clinical Modeling, Localization

## Workshop description

Clinical data interoperability and data standards have been studied many years and exerted good influence on healthcare, including reducing cost and improving care quality. Clinical modelling is one of the approaches of data standard development. However, with the up-coming of the Big Data era, the explosion of clinical data content and volume as well as the continuous emerging of new clinical data sources bring new challenges into data standard and clinical modelling. OpenEHR clinical modelling is a potential solution to meet these challenges.

OpenEHR is an open standard specification that aims to facilitate interoperability of clinical information models in health informatics. The openEHR approach can adapt to evolving clinical knowledge by dual-level modelling that separates clinical knowledge from clinical information. OpenEHR clinical modelling can be accomplished by a bottom-up method, which supports conformance with insight of crowdsourcing work schema.

OpenEHR clinical modelling is being carried out all over the world. Some countries have already used openEHR clinical modelling artifacts into national level programs, such as UK, Australia, Japan and Brazil. These national level programs have accumulated experience on clinical modelling and data standardization which could be learned by other countries who is also planned to use openEHR.

Meanwhile, there are other countries like China that haven't used openEHR at national level, but have lots of experiences and lessons gained through several case studies and plans for broader utilization. The consideration and experience of localizing openEHR approaches in such countries would be very valuable to the researchers who have interest in openEHR.

This workshop aims to share the knowledge and experience around the topic of openEHR clinical modeling and data standardization, and further stimulate the possible international cooperation. Not only the approach of openEHR clinical modeling and localization will be explained, but the successful use cases will also be introduced. Furthermore, the standardization overview, the case study and the project planning of openEHR in China will also be introduced.

## Planned activities

The workshop will be further organized into three sessions.

The first session will focus on explaining the approach of openEHR clinical modeling and localization, together with successful use cases. Three key members from openEHR foundation will be invited to give the presentations around these topics to give the audiences the general view of the approach and the current situation worldwide.

The second session will focus on the specific cases in China. It will start with the introduction of clinical data standardization situation in China, and proceed with the experience of openEHR clinical modeling and the planning of using openEHR approach in national projects.

Each speaker is allocated 15 minutes for presentation.

Finally, an 15-minute discussion session to further engage the attendees in brainstorming and formulating answers to the key

research questions in openEHR modeling and data standardization.

### The sequence of presentation

#### 1. Dr. Heather Leslie. An overview of the openEHR approach to clinical modelling and governance

Introduction to the openEHR methodology for archetype development, peer review and governance. This will include the prioritization of grassroots clinician engagement, a Web 2.0 approach to collaboration and archetype validations and examples of how this methodology is being used to underpin successful international electronic health record projects.

#### 2. Dr. Shinji Kobayashi. Localisation of the openEHR

To utilize clinical standards that have been developed in other countries or parties, localization is necessary to adjust local conditions. The openEHR foundation has developed localization program for international outreach and support local activities. The openEHR foundation nominated three ambassadors to lead their local activities in 2016, and more communities have been working for local tasks. In this session, we introduce openEHR local achievements and discuss the missions.

#### 3. Dr. Ian McNicoll. An openEHR clinical phenotypes repository to support cancer and rare disease genomics.

As part of the Genomics England 100,000 Genomes project, an openEHR-based clinical data repository is being used to hold over 1500 patient clinical phenotypic data points from cancer and rare disease patients. Dr McNicoll will outline the approach adopted, the re-use of many international openEHR archetypes, and the challenges of aligning operational clinical data with reporting datasets. He will also give an overview of similar openEHR-based registries and other global openEHR projects.

#### 4. Prof. Huilong Duan. An overview of the openEHR modeling and system implementation in China

Since the first openEHR research conducted in China around 2010, many work has been done related to openEHR clinical modeling and system implementations. This presentation will firstly give an overview of existing clinical data standards in China, all the related researches and implementations in China. Then the considerations of how to utilize the openEHR approach to the clinical modeling and data standardization in China will also be introduced. As the openEHR ambassador in China, Prof. Duan will also explain the plan of using openEHR in the Chinese national project of "Precision Medicine Big Data Standardization" and also the other planned activities in the near future.

#### 5. Prof. Xudong Lu. A case study of using openEHR clinical modeling for a CDR implementation in China

As part of Chinese national 863 project "medical data integration and merging technologies and systems", and openEHR-based clinical data repository has been developed in a pilot hospital with over 2500 beds. The content of the data repository covers most clinical data in the hospital. The presentation will introduce the approach used to model all these data, not only covering the requirements from the hospital but also compliance with the national standards. The further openEHR modeling plan by Prof. Lu's team will also be introduced.

### The organization of the discussion session

The questions to discuss will include, but not limited to:

1. Which research / development activities are you currently undertaking / interested to explore in openEHR modeling?
2. What are the key relevant research questions in openEHR modeling/data standardization? How are they different

from the research questions for other modeling/standardization methods?

3. What challenges and opportunities are encountered as a result of the implementation of openEHR?
4. What are the prospects and possibilities for promoting openEHR in your country?

### Specific educational goals

The workshop will provide the attendees with the following valuable opportunities:

- A global understanding of the nature and scope of openEHR clinical modeling and data standardization, along with the major challenges;
- The ability to identify the key roles that researches can play in the area of data standardization;
- The opportunity to learn valuable experience from experts of their excellent works about openEHR/data standardization.
- Network opportunities with colleagues around the world.

### Expected Attendees

The intended participants are consumers, researchers, practitioners, software vendors, care providers and policy makers with interest for openEHR promotion, modeling and implementation or responsibility for standard design. If workshop is accepted, all presenters agree to be present at the conference.

Expected number of participants: 60

### Workshop speakers

#### Dr. Heather Leslie

Co-lead for the openEHR Foundation's Clinical Program and Chief Clinical Informatician at Ocean Health Systems. Since 2004 she has guided the evolution of 'the openEHR approach' to creation of clinical content for electronic health records using archetypes, including driving development of the online Clinical Knowledge Manager (CKM) tool. She has also provided clinical modelling/clinical knowledge governance consulting services and training to many international eHealth programs & organisations - including Norway's Nasjonal IKT, NHS England, Australian Digital Health Agency, Canada's Alberta Health Services and the Ministry of Health in Brazil.

#### Shinji Kobayashi

MD, PhD, Senior lecturer, Kyoto University, Kyoto, Japan. He is senior lecturer of the EHR research unit, Kyoto University, Co-chair of Non Profit Organization, Japan openEHR Association, The ambassador of openEHR in Japan.

#### Ian McNicoll

Co-Chair for the openEHR Foundation, Northampton, United Kingdom. He is a former Scottish GP, and has been involved in healthcare informatics for nearly 30 years, working with and promoting openEHR technologies for the last 8 years, currently as an independent consultant, working with a number of UK and international organizations and vendors. He is co-chair of the international not-for-profit openEHR Foundation which maintains and promotes the openEHR specifications and other standards.

#### Huilong Duan

Professor of Zhejiang University, China. OpenEHR ambassador in China. Chair of Chinese Medical Software Association, Co-Chair of Chinese Smart and Mobile Health Association.

He has led multiple Chinese national projects in medical informatics since 2006 which led to lots of achievements and had large influence in this area. Among those projects, the ongoing project “Precision Medicine Big Data Standardization” will be the one planned to use openEHR for standardization.

**Xudong Lu**

Professor of Zhejiang University, China. Visiting Research Professor of Technical University Eindhoven, the Netherlands. Prof. Lu organized and participated many openEHR promotion activities in China and his team conducted the study of openEHR clinical modeling and CDR implementation as part of national 863 project “medical data integration and merging technologies and systems”.