Towards Archetype-based Semantic Interoperability of the EHR

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Abstract. This workshop presents latest research and development on improving semantic interoperability of EHR using \textit{openEHR} archetypes. It will introduce an archetype-based platform-independent testing framework that can validate archetype implementations and help ensure quality and interoperability of EHR. Challenges for integrating archetype and terminology will be discussed and a candidate \textit{openEHR} language for expressing terminological value sets will be presented. Analysis of requirements on archetype libraries and maintenance will be discussed and archetype library software will be demonstrated. Finally, advanced archetype-based data sharing using clinically meaningful scenarios will be demonstrated.

The style of the workshop will be a mix of theoretical discussions and practical examples. It will start with brief introduction of \textit{openEHR} architecture overview followed by presentations on specific topics related to archetype-based semantic interoperability.

The workshop will be presented by leading experts in \textit{openEHR} archetype and semantic interoperability. It will draw on their extensive experience from \textit{openEHR} archetype research and implementation work.

Intended audiences of this workshop are health informatics researchers, as well as developers and health IT strategy makers who are interested in EHR semantic interoperability and would like to keep updated with the latest development on archetypes. Previous knowledge about \textit{openEHR} archetype can be helpful but is not required.

Keywords. EHR, Archetype, Terminology, \textit{openEHR}, Semantic Interoperability, Quality management, Knowledge-based systems, EPR-CPR-EMR, Standards, Terminology-vocabulary, Computerised Medical Record Systems

1. Workshop Content

The workshop will cover the following topics as follows.
1.1. Overview of the openEHR Architecture

A brief introduction of the openEHR health computing platform will be provided and the four-level semantic architecture will be explained. Advantages of the openEHR architecture will be discussed.

1.2. Archetype-based Data Sharing

Archetype based data sharing between two EHR production systems will be demonstrated. The aim is not only to view the exchanged data but also utilized the archetype semantics of the data. The scenarios will include applying local decision support rules on received data for e.g. drug interactions and warnings. Challenges and pitfalls of archetype-base data sharing will be discussed.

1.3. Archetype Terminology Integration

To achieve semantic interoperability, integration between archetypes and terminology is required. The demarcation of what is best expressed in archetypes and what in terminologies will continue to evolve. In the meantime it is necessary to easily express and manage value sets in different terminologies to provide the values for data points in archetypes. Maintenance and validation processes will be described. A candidate openEHR language for expressing these sets which provide a browseable subset of SNOMED will be presented and software demonstrated.

1.4. Archetype Testing

Archetype testing is a means of validating archetype implementations thus help ensures quality of EHRs and improve semantic interoperability. An archetype-based platform-independent testing framework will be introduced. Good strategies for selecting representative test fixtures and test cases will be explained. The Java implementation of the testing framework will be demonstrated.

1.5. Archetype libraries and maintenance

Maintaining the coherence of archetype libraries which are evolving and being translated into multiple languages is another requirement for use of archetypes. Many thousands of templates and clinical process software will be written on the basis of these archetypes requiring a careful, transparent and clinically led authoring process as well as managed releases. Translation into other languages must be able to proceed in parallel with these developments. Further, referential updates of templates must be managed with evolving archetypes. Analysis and discussion of these requirements will presented and archetype library software will be demonstrated.
2. Workshop Planning

The workshop will start with a brief introduction of the openEHR architecture. Then more specific in-depth topics will be presented. Finally, software demonstration based on production healthcare systems will be provided.

The intended audience is health informatics researchers, as well as healthcare system developers, national semantic interoperability advisors who are interested in more recent development in advanced research and development of openEHR.

After the workshop, the audience will have an overview of openEHR architecture and a picture of latest development on archetype-based semantic interoperability.

3. Presenters

**Thomas Beale**, CTO, Ocean Informatics, Australia; Chair, Architecture Review Board, the openEHR Foundation.

Since 1998, Tom has worked on EHR architectures and archetypes, and participated in international standards work (OMG HDTF, HL7, CEN TC/251). He is one of the founders of the openEHR Foundation, and designed the archetype formalism (ADL) and object model (AOM), now a CEN standard and soon an ISO standard. He has published a number of papers in health informatics (see publications pages on this site) and community informatics. He has also presented widely on EHRs, e-Health and archetypes.

**Rong Chen**, Chief Medical Informatics Architect, Cambio Healthcare Systems; Project lead, the openEHR Reference Java Implementation

Rong has been implementing openEHR since 2004 and contributed to a number of openEHR design specifications. He is the author of the openEHR Java Implementation Technology Specification. He is doing research on semantic interoperability of EHR and published several openEHR related research papers.

**Sebastian Garde**, Knowledge Management Architect, Ocean Informatics; Project lead, the openEHR Archetype Repository

Sebastian has been implementing openEHR archetype tooling since 2005 and contributed to the Archetype Editor in C# and Java. He has researched and published widely on the Knowledge Management requirements for archetypes. He is the lead developer of the openEHR Archetype Repository.