

# The Model for Managing Real Media Contents in Terms of EHR

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**Abstract.** This paper presents modifications and improvements to the interface of a secure real media contents management model. The EHR(Electronic Health Record) service model is suitable for example a secure real media contents management & processing.

**Key Words:** Medical sensing information, EHR (Electronic Health Record), Security management, Real media contents

## 1. Introduction

In the era of the smart-phone, this device can be utilized as a mobile medical support device containing diverse sensors. The smart-phone certainly serves as a type of USN (Ubiquitous Sensor Network) through implanted chips and sensors in the living area, as well as in the human body gathering medical information. In order to realize a healthcare service, a digital network of medical information should be prepared. For a personalized medical service, a context-aware system using sensing needs to be implemented.

A context-aware based medical service model can be developed by referring to the EHR (Electronic Health Record) model. Using the EHR model, doctors and nurses can share the patients' medical information. However, networked health information has hazards of intentional leaking of personal information. It also may face the risk of trading, unauthorized viewing or copying of medical information.

This paper deals with using the specific health information of context-awareness and security. In particular, it views security needs that should be considered in the EHR service model and constructs models based on the MVC pattern about access rights and distributed management. It also studies the application of the security management of web based EHR services through the construction of a test-bed

utilizing the OpenEHR Tool, the major topic in this area, and examines the solution. Our involvement led to the emergence of OpenEHR as a new way of structuring, storing and managing patient data so that it can be shared and exchanged between different healthcare providers and other stakeholders in a safe and secure manner [1].

## **2. OpenEHR**

Ocean Informatics is an Australian health informatics company developing a comprehensive tool set for the construction of open interoperable systems for shared electronic health records. Ocean Informatics has partnered with University College London to establish the OpenEHR Foundation– a non-profit registered charity – to promote and support the open Electronic Health Record initiative, known as OpenEHR [1]. OpenEHR aims for the description of a personal requirements specification about the general requirements that are necessary to express and communicate EHR information. The requirements are divided into the solutions about the EHR information architecture, the model, and the terms. Also, it provides a reference base that an EHR system developer can validate during the EHR system construction process. Such a series of processes is done by cooperation with other sectors in the medical information area [2].

The EHR architecture is an information system that consists of components about health records. And HER communication based on archetype methodology has been developed by openEHR and CEN/ISO[3]. According to ISO 18308:2011(Health informatics-requirements for an electronic health record architecture), the EHR architecture is defined as "The generic structural components from which all EHRs are built, defined in terms of an information model"[4].

The EHR architecture should be expressed, depending on viewpoint, as a 4-level model consisting of a context model, a concept model, a logical model, and a physical model. It is also divided into business architecture, data architecture, application architecture and technical architecture, depending on the modeling objects of the EHR system. The international standardization organizations relating to the EHR architecture are the ISO, CEN, HL7, OpenEHR, etc. [5]

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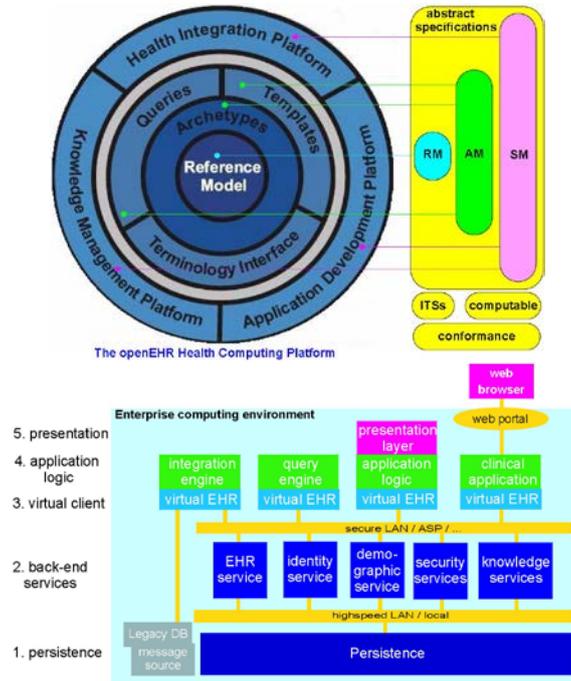


Fig. 1. openEHR Health computing Platform and System Architecture [6]

### 3. Security Management Model based on OpenEHR

This model is constructed based on OpenEHR. Fig. 6 shows the structure of the EHR security management model.

Explanation about the specifics is as follows. The EHR security management model extracts XML through the Archetype Editor provided by Ocean Informatics. When it is web-based, it is viewed in a web browser through an XML parser. Here, the information saved in database uses a Java based cipher primitive. The process above is developed based on the MVC pattern. Each cipher primitive applies the mechanism that is mentioned in the EHR security requirements.

- The explanation about each module of the model is as follows.
  
- Web Browser: It functions as the client that can be connected through a PC, laptop computer, smart-phone, etc.
  
- View: It parses the required query into an XML document and XSL. It prints the output to the web browsers of the medical staff and the patient.
  
- Controller: It requests Model to process the requested query from the client (patient or medical staff). It delivers the requested results to View.
  
- Archetype Editor: It adds or corrects Archetypes provided by OpenEHR. It writes an XML document.
  
- Model: It performs the encryption of data, decoding, secret sharing, etc. in the Security/Privacy Sub-component (Encryption/Decryption, Sign/Verify, Pseudonymization, AONSS, RBAC, PBDM) in order to apply cipher Primitives needed for the requested controller and the EHR service mentioned above.
  
- Context Engine: It combines the various attributes information of patient. It determines the limit and sharing level for patient information based on privacy sensitivity. Privacy sensitivity is processed by a weighted algorithm for the attributes of patient information. It uses a Privacy/Security mechanism based on the patient's attributes.
  
- Database: It is the physical database where the data is stored by the user's request. It stores the sensitive attribute information of a patient separately according to its importance.
  
- Each module can be mapped out easily and rapidly by Archetype Editor which follows international standards. In particular, it helps to realize a system, as shown in Fig. 7, which is optimized to contexts - aged care, medical specialist, large hospital, nursing, managing lab, social workers, health information location, local hospital, home, path lab - about medical information already contemplated in Fig. 6. Context Engine is helpful in making decisions on the method and protection level of privacy from scattered medical information databases.

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- During the process of implementing the system, it should be possible to share subtle medical data through a security-concerned mapping. Additionally, a realization of the context engine, i.e. sensing such context as patient and doctor from a smart-phone in real time, is needed. The smart-phone is a huge collection of sensors such as gravity sensing, accelerometer sensing, illumination sensing, near-sensing, and gyroscope sensing as apart from the GPS receiving location under the user's privacy and personal information agreement.

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