

Towards Standardized Patient Data Exchange: Integrating a FHIR Based API for the Open Medical Record System

Suranga N. Kasthurirathne^a, Burke Mamlin^{b,c}, Grahame Grieve^d, Paul Biondich^{b,c}

^a School of Informatics and Computing, Indiana University – Purdue University, Indianapolis, IN, USA, ^b Indiana University School of Medicine, Indianapolis, IN, USA, ^c Regenstrief Institute Inc., Indianapolis, IN, USA, ^d Health Intersections Pty. Ltd., AU

Abstract

Interoperability is essential to address limitations caused by the ad hoc implementation of clinical information systems and the distributed nature of modern medical care. The HL7 V2 and V3 standards have played a significant role in ensuring interoperability for healthcare. FHIR is a next generation standard created to address fundamental limitations in HL7 V2 and V3. FHIR is particularly relevant to OpenMRS, an Open Source Medical Record System widely used across emerging economies. FHIR has the potential to allow OpenMRS to move away from a bespoke, application specific API to a standards based API. We describe efforts to design and implement a FHIR based API for the OpenMRS platform. Lessons learned from this effort were used to define long term plans to transition from the legacy OpenMRS API to a FHIR based API that greatly reduces the learning curve for developers and helps enhance adherence to standards.

Keywords:

HL7; FHIR; Interoperability; Standards; Electronic Medical Records.

Introduction

Healthcare quality is enabled by the accessibility and effective use of clinical data. The specialized nature of medicine and the ad hoc implementation of clinical information systems have led to the fragmentation of health information and medical care [1]. These limitations spurred efforts to effectively exchange patient data between various stakeholders across the enterprise, and led to the development of HL7 V2 and V3 standards. The FHIR standard is a next generation standard framework introduced in response to limitations in HL7 V2 and V3 [2]. FHIR has much to offer OpenMRS, a mature Open Source EMR system that is widely used across resource limited settings [3]. This paper describes efforts to design and develop FHIR support for OpenMRS. We demonstrate the feasibility and value of adopting FHIR for OpenMRS and develop an architectural plan to transition from the legacy OpenMRS API to a FHIR specific API.

Methods

We leveraged OpenMRS's modular architecture to develop an add-on module to provide a FHIR based API for OpenMRS. The FHIR module integrates the HAPI FHIR API for modeling and populating FHIR resources. The module exposes a FHIR API that could be accessed internally via API calls, or externally using FHIR specific user requests. The FHIR API receives user requests and serves them by calling the domain specific legacy OpenMRS API.

Results

We developed a production worthy FHIR module that could be used to fulfill basic user requirements for exchanging clinical data. The initial version of the module supports the import / export of OpenMRS clinical data in the form of FHIR standards for person, patient, location, observation, allergy intolerance, condition and encounter resources. The module is able to import / export FHIR resources in either xml or json. The module can also manage changing versions of OpenMRS domain objects via a strategy pattern that populates FHIR resources based on the underlying version of the OpenMRS platform. Each FHIR resource complies with the latest FHIR specification, which stood at Draft Specification for Trial Use (DSTU) 2 at time of submission.

Discussion

We perceive that the FHIR API will be widely adopted as it is based on a hugely popular standard, and removes the need for system developers to learn the OpenMRS domain model. However, we anticipate that implementer uptake will be a slow process that will happen gradually overtime. The FHIR module will initially be installed in parallel with the existing domain specific API. However, we propose a way forward to gradually retire the legacy OpenMRS API in favor of the standardized FHIR API. These efforts represent proper separation of concerns between EMR developers and champions of interoperability, and enables better interoperability across a wider range of healthcare IT infrastructure.

References

- [1] Stange KC. The problem of fragmentation and the need for integrative solutions. *The Annals of Family Medicine*. 2009;7(2):100-3.
- [2] Bender D, Sartipi K, editors. HL7 FHIR: An Agile and RESTful approach to healthcare information exchange. *Computer-Based Medical Systems (CBMS)*, 2013 IEEE 26th International Symposium on; 2013: IEEE.
- [3] Seebregts CJ, Mamlin BW, Biondich PG, Fraser HS, Wolfe BA, Jazayeri D, et al. The OpenMRS implementers network. *International journal of medical informatics*. 2009;78(11):711-20.

Address for correspondence

S.N. Kasthurirathne, Indiana University School of Informatics and Computing, 535 W. Michigan Street, IT 475, Indianapolis, IN 46202, USA, (317)-278-4636, snkasthu@iupui.edu