

Open Client Registry

Final Deliverables

Project Overview

With support from the United States Agency for International Development (USAID), through MEASURE Evaluation, IntraHealth International developed a prototypical client registry (CR) informed by stakeholders in Uganda, including the Ministry of Health (MOH) and the Central Public Health Laboratory (CPHL), as well as technical teams at the United States Centers for Disease Control and Prevention (CDC) and USAID. OpenCR is an open source and standards-based client registry. A client registry facilitates the exchange of patient information between disparate systems and holds patient identifiers and a subset of patient demographic information. It is a necessary tool for public health to help manage patients, monitor outcomes, and conduct case-based surveillance. This document provides an overview of the project and the deliverables.

The Client Registry developed under this scope of work includes the following functionalities:

- Maintains a central registry of patients and their demographics
- Assigns and looks up unique identifiers (UIDs) in the health domain with open source and open standards-based components
- Offers a user interface for seeing matches, breaking linked records, and viewing history of events for auditing and matching evaluations
- Can accept connections from diverse point of service (POS) client systems, such as an electronic medical record (EMR) system, that conform to the specifications for transactions and data structures in fast healthcare interoperability resources (FHIR)

- Includes a module to connect an instance of OpenMRS (1.x or 2.x) to the CR, submit records, and request a UID
- Configurable for diverse decision rules for matching patient records
- Includes both deterministic and probabilistic matching and incorporates 25 algorithm variations
- Includes an Elasticsearch plugin that allows for adding additional algorithms and supports entity resolution
- Offers a high level of patient safety and privacy
- Offers generic applicability for outside of Uganda, so that it is digital health global good

Uganda Use Case—Tracking of HIV Viral Load

The Uganda Central Public Health Laboratory (CPHL) maintains the Viral Load (VL) Laboratory Information Management System (LIMS), which contains records of every viral load test conducted within the country. Patient results are not linked together in the LIMS, so one patient could have multiple results stored within the system. Use cases were collaboratively identified and OpenCR development was driven by CPHL requirements. It has been successfully deployed on local servers and features have been tested in country. A virtual workshop was conducted with local stakeholders (travel prevented by COVID-19) with overviews on health information sharing, client registries, and record linkage, as well as sessions on integration with Uganda's health information exchange (HIE) architecture, and technical deep dives into configuring algorithms, administration, maintenance, and troubleshooting.

Deliverables

The following table contains a list of project deliverables and the links where they can be found.

<p><u>Source Code Repository</u></p>	<p>The GitHub repository holds the source code for the OpenCR service. Code is up to date as of April 24, 2020. All updates are timestamped.</p> <p>Main repository: https://github.com/intrahealth/client-registry</p> <p>Plugin: https://github.com/intrahealth/similarity-scoring</p>
<p><u>Online Technical Documentation</u></p>	<p>Online Technical Documentation includes a detailed overview section with background information, use cases, architecture, and overviews of matching process, UIDs, and algorithms, among others. The User Manual and Developer Manual are also available here. Documentation is up to date as of April 24, 2020. All pages are timestamped.</p>
<p><u>Issue Tracker</u></p>	<p>GitHub also houses the Issue Tracker, where others can report issues/bugs and track progress. All known issues are included in the tracker as of April 24, 2020. All issues and progress are timestamped in GitHub.</p>
<p><u>Uganda Client Registry Technical Specifications</u></p>	<p>The Technical Specifications document was developed in December 2019 and provides an overview of the workflows and functionality of OpenCR, as well as architectural components that led the development.</p>
<p><u>Virtual Workshop Materials</u></p>	<p>Workshop materials include the presentations and recordings from the virtual workshop held March 25–26, 2020 with 35 participants from Uganda CPHL, METS, ClinicMaster, USAID/Uganda, CDC Uganda, CDC Atlanta, and the MOH.</p>
<p><u>Jupyter notebook</u></p>	<p>The Jupyter notebook, completed in March 2020, demonstrates probabilistic record linkage in the CR versus the R RecordLinkage package. The code describes the step-by-step process to link data in R's RecordLinkage package and check results against the same data set after being linked by OpenCR.</p>
<p><u>Assessment of existing open source client registries</u></p>	<p>The initial assessment, completed in November 2019, compares existing client registries against a set of criteria and was used to develop the initial set of requirements.</p>
<p><u>Literature Review of Patient Matching Algorithms and Deduplication Techniques</u></p>	<p>This document, completed in October 2019, reviews the state-of-the-art matching algorithms and deduplication techniques used in patient linkage/client registries.</p>