

Managing the 21st Century Health Workforce: Shelf-Ready iHRIS 5 Global Digital Health Good

Two-Sentence Overview

iHRIS is the premier global digital health good for Ministries of Health to manage their health workforce. Digital Square can help promote iHRIS 5 upgrades in the 20 countries that have previous versions of iHRIS, and stimulate new countries to adopt iHRIS, with shelf-ready investments in:

- A technology demonstration that shows greater product information and documentation.
- A dashboard integration that enhances the Instant OpenHIE reference design.
- Automated testing that verifies quality assurance of iHRIS and its components.

High-Level Budget Summary

To be completed in the application finalization step.

Executive Summary

iHRIS is the premier open source human resources information system for ministries of health to manage their health workforces. It is a recognized global digital health good with deployments in more than 20 countries that manage over a million health worker records. IntraHealth International has invested in iHRIS since 2005, and we seek new Digital Square support to promote iHRIS 5 upgrades and stimulate new deployments with shelf readiness investments in three core work packages:

- Greater product information and documentation delivered via a highly functional technology demonstration that allows prospective users to appreciate the full functionality of iHRIS 5.0.
- Improved Kibana integration in iHRIS, and therefore improved ease of iHRIS installation and deployment, so that it becomes a transparent component of the Instant OpenHIE reference design.
- Automated integration and regression testing so that our software commits to Github are covered by verifiable quality assurance and testing, and iHRIS always functions as promised.

IntraHealth will leverage the global iHRIS Advisory Board, the greater iHRIS Community, and the OpenHIE Community to ensure these developments increase demand for iHRIS and ease of deployment in low- and middle-income countries.

Consortium Team

IntraHealth International is a global health NGO with a 40-year history in developing successful data tools and digital health applications for health workers and managers. We develop solutions that are open source, data-driven, sustainable, and collaborative. As a pioneer in the field of health workforce informatics, we're committed to using technology, information, and analytical approaches to support the people at the center of our health systems.

IntraHealth is the lead developer of iHRIS, the free, open source software, that helps countries around the world track and manage their health workforce data to improve access to services. Since 2005, IntraHealth has invested in iHRIS for countries to capture and maintain high-quality information for health workforce planning, management, regulation, and training. iHRIS is an established global digital health good that is used in more than 20 countries to manage over a million health worker records at a potential cost savings of over \$275 million when compared to commercial software.

iHRIS development will be led by the following IntraHealth staff and supported by a full range of health experts, project managers, and back-up software developers:

- [Luke Duncan](#), Digital Health Assistant Director, has over 20 years of experience in software development, including leading the development of iHRIS, the flagship human resources solution

for global health, and multiple data interoperability standards and reference designs to connect iHRIS, DHIS2, and OpenMRS.

- [Nobert Mijumbi](#), Regional Health Workforce Technologist, has 10 years of experience in software development, including supporting the customization and configuration of iHRIS and its nationwide deployment in both Uganda and Ethiopia.
- [Dana Acciavatti](#), Digital Health Senior Portfolio Manager, has 19 years of experience strengthening systems that support health workers, including leading project management for IntraHealth's portfolio of digital health projects and iHRIS in particular.

Background or Problem Statement

IntraHealth has invested in iHRIS since 2005, and by 2017, the system was at version 4.3. A key to its success is the ability to easily customize it, and users requested support for the increasingly popular FHIR standard. In 2018, IntraHealth started investing in the development of iHRIS 5.0, a complete update of the iHRIS front-end user interface and back-end architecture, including:

- Powerful new dashboards with Kibana visualizations
- Global data interoperability with FHIR standards for health information systems
- Beautiful new interfaces with a fast and responsive mobile design

This update, partially made possible by previous Digital Square funding, has increased interest in iHRIS to manage health records from national ministries of health, and directly led to new deployments in Ethiopia and Nepal, and anticipated national deployments in Namibia and South Africa:

- Ethiopia: Nationwide deployment of iHRIS by the FMOH that will see iHRIS tracking health staff at the woerda level.
- Nepal: Deployment of iHRIS at the MoHP to track qualified health staff and their deployments by pulling data directly from the 5 Nepal professional councils into one iHRIS system at a central level.
- Namibia: An anticipated deployment of iHRIS nationwide to manage health staff at the facility level.
- South Africa: A potential deployment of iHRIS by the DoH to serve as a HWR for all public health workers, pulling in records from multiple systems.

Digital Health Technologies

iHRIS is free, open source software, and a recognized digital health global good, that helps countries around the world track and manage their health workforce data to improve access to services. Countries use it to capture and maintain high-quality information for health workforce planning, management, regulation, and training.

iHRIS is built on a flexible framework that allows ministries of health, professional councils, and health service delivery organizations to adapt applications for a wide variety of uses. Developed in collaboration with national stakeholders beginning in 2005, with support from USAID, iHRIS is used in more than 20 countries to manage over a million health worker records at a potential cost savings of over \$275 million when compared to commercial software.

We offer open access to iHRIS through publishing the software, source code, and other resources at www.ihris.org and by supporting a global community of software developers and information technologists with an online forum and interactive discussions and training sessions. The community raises and resolves technical issues on its own; contributes code to iHRIS; provides tools, guidance, and case studies for the iHRIS Implementation Toolkit; and translates iHRIS applications into other languages.

iHRIS Version 5 is based on the popular and easy-to-use FHIR interoperability standard for health information systems. FHIR allows iHRIS to be connected to existing dashboard platforms, such as DHIS2, PowerBI, Tableau, for integrated real-time reporting. iHRIS 5 uses Elasticsearch and Kibana to visualize real-time iHRIS data in a powerful and flexible new dynamic dashboards with advanced analysis and visualizations that can be customized per role and per user.

iHRIS v5 also conforms to a variety of international standards for data exchange to ensure that data that might otherwise be siloed are accessible to all parts of a health system. We worked with an international standards organization, Integrating the Healthcare Enterprise, to develop a new global standard for exchanging health worker information. In addition, IntraHealth has collaborated in the Open Health Information Exchange (OpenHIE) initiative, including leading the development of a health worker registry that enables countries to link the various systems (including iHRIS) in their health information architecture.

Use Cases and User Stories

Below are three use cases, with further information provided in Table 1 to summarize the business value-add that is proposed.

Use Case 1: Demo Custom Data Import and Dashboards

An MOH Health Workforce Informatics Officer is planning an implementation of iHRIS. They need to access the demonstration platform at <https://v5-demo.ihris.org/>, import realistic data, and create reports and workforce analytics on training, qualifications, and performance. They will be able to upload realistic sample data, perform bulk imports, and export reporting and dashboard templates for use in their deployments. The implementation process will be more predictable and full-featured.

Use Case 2: Data Visualization Integration

A HR Information Systems Manager must roll-out a large production deployment of iHRIS and within a functional HIE. The process involves training users, demonstrating capabilities, and creating a configuration that can be completed on local servers and networks. They are able to use tested, flexible configuration options for deployment on local servers to fit their needs, including test, development, and production environments. They may choose to deploy on Kubernetes clusters.

Use Case 3: Automated Testing Scripts

A Software Developer must integrate a mission-critical system such as payroll with iHRIS. They must be confident they are using a standards-based, interoperable platform that is well-tested. iHRIS has fully open source code and a permissive license, technical documentation, and worked examples for comprehensive customization. The foundation is FHIR and the mCSD profile. They are able to visualize real-time iHRIS data in flexible and dynamic dashboards once linked to their system using Elasticsearch and Kibana with limited customization.

Table 1: Overview of User Stories and Features

Functional User Roles (As a...)	Responsibilities (I need to...)	Existing Features	Proposed Features
MOH Health Workforce Informatics Officer	MoH staff need to access the iHRIS system demonstration using realistic sample data to create reports and workforce analytics on training, qualifications, and performance.	Demonstration site. Basic sample data for one fictitious country.	Realistic sample data, bulk imports. Visualize real-time iHRIS data in flexible and dynamic dashboards. Export reporting and dashboard templates for use in other deployments.
HR Information Systems Manager	Demonstrate capability, train users, and create a configuration to deploy to production a HIE and iHRIS.	Basic Instant OpenHIE support. Installation on Linux, and containerization and docker-compose scripts with Docker.	Testable, flexible options for deployment on local servers. Adopt configuration-ready templates for Kubernetes.

Software Developer	Must integrate a mission-critical system like payroll to iHRIS. Be confident they are using a tested, standards-based, interoperable platform that is well-tested.	Open source code, documentation. Open standards are the foundation: FHIR and the mCSD profile.	Add security tests for dependencies, E2E test coverage.
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Objectives and Activities

Through the Digital Square E0 opportunity, we seek to invest in three work packages that will increase the level of maturity across the global goods maturity model, and therefore increase the shelf-readiness of iHRIS 5.0 software.

Work Package 1: A Highly Functional Technology Demonstration

Problem: Currently, the live demonstration of iHRIS technology at <https://v5-demo.ihris.org/> is still a nascent deployment. It lacks detailed workflows, sample data, and the ability of Ministry of Health staff to run scripted configurations and data sets to understand base use case functionality. The limited functionality results in a sub-optimal user experience that is hindering ministry adoption of iHRIS 5.0, which would bring with it much more functionality than previous iHRIS versions.

Objective: We seek to correct this with greater product information and documentation delivered via a highly functional technology demonstration that allows prospective users to run scripted configurations and data sets to see the full capacity and functionality of iHRIS 5.0 and spur its adoption by LMIC governments.

This includes:

- **Activity 1.1 Detailed Workflows:** Creating the ability of users to move through standard human resources workflows like hiring, assigning, transferring, and retiring health care workers using formal step-by-step processes modeled on processes from select countries.
- **Activity 1.2 Sample Data:** Populating iHRIS with realistic yet fake data to accurately simulate iHRIS functionality and reports without compromising personal data from actual health workers.
- **Activity 1.3 Data Import:** Allowing users to bulk import their own data into iHRIS for testing, where that data is only visible to that user and is automatically deleted on their departure.
- **Activity 1.4 Custom Reports:** Allowing users to create custom reports in the demo to explore either fake data or their custom data in ways that are specific to users' needs.

We will monitor our progress through testing by the iHRIS Advisory Council and evaluate our success with pre- and post-project technology demonstration system reviews from the greater iHRIS Community and the OHIE Community.

Work Package 2: Better, Faster Data Visualization Deployment

Problem: When we were developing iHRIS 5.0, we chose the Elasticsearch and Kibana open source applications to provide cutting-edge search and data visualization functionality. This has proven to be a wise choice for delivering industry-leading visual analysis for any FHIR-compliant data source connected to iHRIS. However, Kibana brings certain software compatibility complexities that can create frustrating errors in certain situations.

Objective: We seek to improve Kibana's integration in iHRIS, and therefore iHRIS' installation and deployment ease, so that it becomes a transparent and error-free tool for all users.

- 2.1. **Activity 2.1 Adding Kibana visualization in Instant OpenHIE for the health workforce:** Kibana was not included in the Instant OpenHIE workstream — it was not a component of iHRIS when that work package was conceptualized — and now needs to be added so that Instant OpenHIE will have a fully-functional iHRIS component.

We will monitor our progress through feedback from the OpenHIE Interlinked Registry community that is participating in Instant OpenHIE development.

Work Package 3: Automated Testing Scripts

Problem: Many global digital health goods suffer from a lack of automated testing of software code. New software code is rarely tested before it's added to larger systems and those systems are rarely tested in consistent ways that can identify errors before they become major issues.

Objective: We seek to invest in end-to-end documented testing strategy and testing framework so that commits to Github are covered by testing and can be verified before they are added to the core iHRIS software and show that core iHRIS software has quality assurance and testing, and always functions as promised.

1. Activity 3.1 Implement Testing: Develop written testing strategy and testing framework with automated end-to-end testing scripts using Travis, CircleCI or GitHub Actions on the core iHRIS software
2. Activity 3.2 Verify Coverage: Add visual cues on Github to show the current testing status of core code.

We will use the automated testing tool reports and the related Github visual cues to monitor our progress and allow for public evaluation of our success.

Community Feedback

On a bi-monthly basis we will engage with the Advisory Council who will provide high-level perspectives from different types of stakeholder organizations to guide software development and community engagement actions. On a monthly basis, we will interact with the Global Support Community to ensure that our approach satisfies our stakeholders in government, private sector, and civil society.

Next, we will engage with the OpenHIE community through regular meetings of the Architecture & Standards, Devops, those working on Instant OpenHIE, and including our leadership of the Health Worker Registry community. Our interactions will include presentations, demos, and direct feedback solicitation.

Schedule

The following is a high-level work plan.

Activity	Team Location Month	Month					
		[M]	[M]	[M]	[M]	[M]	[M]
		1	2	3	4	5	6

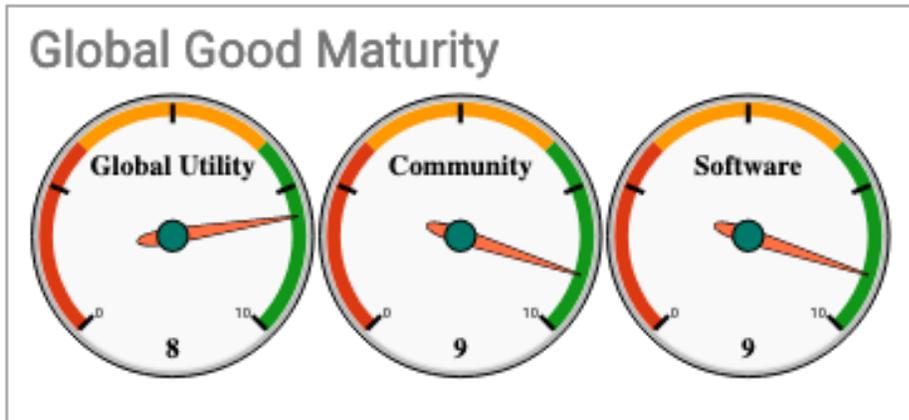
Activity 1.1 Detailed Workflows	IntraHealth (USA, Uganda)	X	X				
Activity 1.2 Sample Data	IntraHealth (USA, Uganda)	X	X	X			
Activity 1.3 Data Import	IntraHealth (USA, Uganda)		X	X			
Activity 1.4 Custom Reports	IntraHealth (USA, Uganda)		X	X			
Activity 2.1 Adding Kibana visualization	IntraHealth (USA, Uganda)			X	X		
Activity 3.1 Implement Testing	IntraHealth (USA, Uganda)				X	X	X
Activity 3.2 Verify Coverage	IntraHealth (USA, Uganda)				X	X	X

Deliverables

Through the Digital Square E0 opportunity, we will deliver on three work packages that will increase the shelf-readiness of iHRIS 5.0 software.

Package	Deliverables	Months
1	Highly functional technology demonstration experience that includes: <ul style="list-style-type: none"> 1.1. Detailed workflows of standard human resources work flows 1.2. Sample data populating iHRIS with realistic yet fake data 1.3. Data import ability for users to bulk import their own data into iHRIS for testing 1.4. Custom reports in the demo to explore either fake data or users' custom data 	1-3
2	Improved Kibana integration in iHRIS by: <ul style="list-style-type: none"> 2.1. Adding Kibana visualization in Instant OpenHIE for the health workforce 	3-4
3	Automated testing to verify iHRIS software components with: <ul style="list-style-type: none"> 3.1. Automated end-to-end testing testing scripts on the core iHRIS software 3.2. Visual cues on Github to show the current testing status of core code 	4-6

Global Good Maturity Model Assessment



Assessment link

<https://docs.google.com/spreadsheets/d/1lar2DR1zWZqHrsZED4UQTdcpu7ilgcrAj1msTI6E4so/edit?usp=sharing>