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# Advancing Instant OpenHIE

## Two-Sentence Overview

The Instant OpenHIE project aims to reduce the costs and skills required for software developers to rapidly deploy an OpenHIE architecture for quicker initial solution testing and a starting point for faster production implementation and customisation. Instant OpenHIE provides a simple way for technical persons to install and see a complex system working against a real-world use case, allowing technical persons to illustrate how interoperability can work to solve health challenges and demonstrate how an interoperability architecture could be created using open-source tools and standards.

## High-Level Budget Summary

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| --- | --- | --- | --- | --- | --- | --- |
|  | **Work Package 1 - Community Support** | **Work Package 2 - Extending Instant OpenHIE** | **Work Package 3 - Architecture Revisions** | **Work Package 4 - Software Maturity** | **Work Package 3 - IOL Mediator Offerings** | **Total Cost (USD)** |
| **Total Project Costs** |  |  |  |  |  |  |

## Executive Summary

The Instant OpenHIE project aims to address the primary needs of (i) allowing implementers to engage with a preconfigured health information exchange solution and running tools (based on the architecture) and test their applicability and functionality with a real health context problem; and (ii) having a packaged reference version of the OpenHIE architecture that is comprised of a set of reference technologies and other appropriate tools that form the building blocks of the health information exchange that can be configured and extended to support particular use cases.

At maturity, Instant OpenHIE aims to provide portable, launchable versions of multiple OpenHIE components to facilitate:

* Demonstrable reference products that align with the OpenHIE Community's vision
* Rapid software development of mediators and point-of-service systems by making it possible to launch several applications together more easily.
* Reproducible, version-controlled infrastructure for user-contributed tests of the OpenHIE architecture profiles, workflows, and use cases.
* Production-ready containers and components that are deployable in any context.

The project consortium has partnered on the initial phase of the Instant OpenHIE project, which focused on the development of a core prototypical health information exchange using open standards and open-source software, centered on health workforce management and care services discovery along with a facility registry, as well as the development of an extensible conceptual and technical architecture that allows for new packages, components and apps to be added to the Instant OpenHIE offering.

The Digital Square investment will be used to support two areas of work:

* Supporting communities aligning their solutions to be part of the Instant OpenHIE project and initiative, improved contributor guidelines and tutorials, and architecture revisions to ensure ease of use in extending and deploying Instant OpenHIE.
* Advancing the features and maturity of Instant OpenHIE towards the objective of a ‘shelf ready’ solution.

## Consortium Team

Jembi Health Systems will lead and oversee the project, working with IntraHealth as a partner to deliver on the scope of work.

Jembi is an African non-profit company specialising in digital health and open source software development and implementation. Jembi has a successful track record developing and implementing open source software in the health sector, including in a number of African countries. It has contributed to many open-source software development projects and communities of practice, including OpenMRS, Bahmni, OpenHIM, HEARTH and OpenHIE. Jembi curates the reference technology for the interoperability layer of the OpenHIE - OpenHIM (www.openhim.org) - and other related shared health record reference technologies.

* Daniel Futerman, Senior Technical Program Manager, has over 10 years experience in digital health system architecture, software development and implementation, and currently leads Jembi's OpenHIE activities.
* Ryan Crichton, Lead Developer and Architect, has over 10 years experience in digital health and specialises in systems interoperability and systems design. Using insights from extensive experience working with communities of practice and other partners, he has developed numerous open-source applications in the health interoperability space, and was one of the core architects behind the OpenHIM tool.

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. IntraHealth develops solutions that are open source, data-driven, sustainable, and collaborative. As a pioneer in the field of health workforce informatics, IntraHealth is committed to using technology, information, and analytical approaches to support the people at the center of our health systems.

* Dr Richard Stanley, Senior Technical Advisor, manages product development for analytics and interoperability, in order to support the digital transformation of health systems. In technical leadership roles, he has worked in 30 countries and supported 80 over the course of his 25 year career. He also has 5 years of field experience in humanitarian settings. As the global lead for real-time information systems at UNICEF and innovation lead in Afghanistan, he led the first pilot for RapidPro. Richard holds a PhD in Politics from the University of Oxford and has published quantitative research on out-of-pocket payments for healthcare and the impacts of climate change on child survival.
* Luke Duncan, Digital Health Assistant Director, has over 20 years experience in software development, including leading the development of iHIRS, the flagship human resources solution for global health, and multiple data interoperability standards and reference designs to connect iHRIS, DHIS2, and OpenMRS.

## Background or Problem Statement

The Instant OpenHIE project aims to create a deployable version of the OpenHIE architecture that is preconfigured to work together and provide a demonstrable instantiation of the OpenHIE architecture. While the initial phase of the project focused on development of a core framework to allow new packages, components and apps to be added to the Instant OpenHIE offering, additional efforts are required to move towards being a shelf-ready global good, both in advancing the software maturity and strengthening community support to better enable adoption and use of Instant OpenHIE by the community at large.

## Digital Health Technologies

The project will leverage the OpenHIE architecture as the foundational architecture of the project and leverage selected workflows from the OpenHIE workflows. The project aims to build on the work done in the initial phase of the Instant OpenHIE project, which focused on the development of a core prototypical health information exchange using open standards and open-source software. It is envisioned that the Instant OpenHIE project will move through an evolutionary phase as the design and uptake evolve from the conceptual phase, focused on proving the concept and creating a demonstrable solution for teams to evaluate and showcase functionality, to the iterative growth phases of the projects, where the testing and expansion of technology options as well as use cases are the focus as well as strengthening the deployment strategies, to the mature phase.

Building out the Instant OpenHIE offering, we anticipate working with the following associated component technologies:

* OpenHIM (MPL v2 License) [<http://www.openhim.org>]
* HAPI FHIR (Apache Software License 2.0) [[https://hapifhir.io](https://hapifhir.io/)]
* OpenCR (MIT License) [[https://www.openclientregistry.org](https://www.openclientregistry.org/)]
* Support for priority use cases leveraging FHIR, such as the WHO Computable Care Guidelines, mADX and CQL.
* Based on other solutions chosen to align their solutions to be part of the Instant OpenHIE project, this list may be revised and updated to support other technologies and workflows.

## Use Cases and User Stories

The Instant OpenHIE project aims to address the primary needs of (i) allowing implementers to engage with a preconfigured HIE solution and running tools (based on the architecture) and test their applicability and functionality with a real health context problem; and (ii) having a packaged reference version of the OpenHIE architecture comprised of a set of the reference technologies and other appropriate tools that form the building blocks of the HIE to be configured for particular use cases.

**Overview of User Stories and Features**

|  |  |  |  |
| --- | --- | --- | --- |
| **Functional User Roles**  (As a… ) | **Responsibilities**  (I need to… ) | **Existing Features** | **Proposed Features** |
| **HIE Trainer** | Demonstrate and put into student’s hands a temporary HIE for hands-on learning. | Launch the Interoperability Layer, FHIR data store  Launch a CSD mediator, iHRIS, and Facility Reconciliation. | Additional use cases and workflows for patients.  Ability to step-through tasks and see progress. |
| **HIE Developer** | Create a mediator to transform data and connect my product to the OpenHIE architecture. Write E2E tests as the foundation for later conformance testing. | Launch an HIE to write code against that is pre-configured.  Run examples of features in the Gherkin language for standards. | Support patient-centric workflows including Client Registry and Shared Health Records,, and mediator services to support these workflows. |
| **HIE Systems Administrator** | Launch a test and development environment quickly on Kubernetes before going into production. | Launch an HIE in either Docker or Kubernetes. | Test additional use cases and workflows in a production environment. |

## Objectives and Activities

The main objective of this project is to expand and strengthen the Instant OpenHIE offering to enable the solution to solve new health challenges through the use of open source software and standards. This will be achieved through a set of activities across the areas of Community Support and advancing Software Maturity to both strengthen the Instant OpenHIE offering and enable alignment of other solutions to be part of the Instant OpenHIE project and initiative through a set of contributor guidelines & specifications, and active support to other solutions working towards alignment with the Instant OpenHIE project.

### Work package 1: Community Support

Under the Community Support work package, the consortium will work together to support the user community aligning their solutions to be part of the Instant OpenHIE project, assist with identifying potential use cases and package structures across these solutions to solve particular health challenges, and complete documentation and video tutorials on how to add use/add a package to Instant OpenHIE.

#### **Objective 1.1:** Support the Instant OpenHIE user community

##### *Activity 1.1.1:* Assist the community to align their solutions to be part of the Instant OpenHIE offerings.

##### *Activity 1.1.2:* Assist the community with identifying potential use cases to solve particular health challenges, and advise on package structures across these solutions.

#### **Objective 1.2:** Update Instant OpenHIE user documentation

##### *Activity 1.2.1:* Complete documentation and video tutorials on the Instant OpenHIE package structure and best practices on how to use/add a package to Instant OpenHIE.

### Work package 2: Extending Instant OpenHIE

Under the Extending Instant OpenHIE work package, the consortium will look at extending the Instant OpenHIE offering to support a new priority use case. The proposed use case centers on support for a clinical package to support patient-centred workflows within Instant OpenHIE, including integration of a Client Registry component, extending the FHIR server capabilities to support longitudinal patient data workflows (i.e. SHR workflows), and mediator services to support these workflows. Based on other solutions chosen to align their solutions to be part of the Instant OpenHIE project, this use case may be revised and updated to support new opportunities and workflows.

#### **Objective 2.1:** Extend the Instant OpenHIE offering to include support for new use cases, workflows and technologies

##### Activity 2.1.1: Finalise use case and set of component technologies.

##### *Activity 2.1.*2*:* Develop containerisation and deployment strategies for new component technologies.

##### *Activity 2.1.*3*:* Develop workflow and configuration scripts & mediators to support core workflows for chosen use case.

##### Activity 2.1.4: Develop component instantiation and integration scripts along with test cases to extend test harness.

##### Activity 2.1.5: Deploy changes to Instant OpenHIE demo instance.

##### Activity 2.1.6: Update user and technical architecture documentation to include instantiation of new use case.

### Work package 3: Architecture Revisions

Under the Architecture Revisions work package, the consrtium will work to refine the Instant OpenHIE architecture as necessary, to ensure using instant OpenHIE is as easy as possible for others to extend and deploy, help expand the capabilities of Instant OpenHIE to allow 3rd party packages to be added by the user at will, and develop template scripts to help others bootstrap their solutions.

#### Objective 3.1: Refine and update the Instant OpenHIE architecture

##### Activity 3.1.1: Core architecture and packaging refinements to ensure Instant OpenHIE is easy to extend and deploy.

##### Activity 3.1.2: Expand capabilities of Instant OpenHIE to allow 3rd party packages to be added by users.

##### Activity 3.1.3: Develop template scripts to help users bootstrap their solutions.

### Work package 4: Software Maturity

Under the Software Maturity work package, the consortium will look to further develop the command line app and web user interface (UI) to easily plug in packages, view logs and see the services that are running. In addition, there will be a focus on more clearly describing the testing framework and requirements for testing when contributing to, and using, Instant OpenHIE.

#### Objective 4.1: Update, extend and improve the Instant OpenHIE frontend/user interface components

##### Activity 4.1.1: Update the command line app and web UI to easily plug in packages, view logs and see services that are running.

#### Objective 4.2: Update, extend and improve the Instant OpenHIE test framework and test harness

##### Activity 4.2.1: Define and describe the requirements for testing when contributing to, and using, Instant OpenHIE.

##### Activity 4.2.1: Update the Instant OpenHIE test harness architecture and capabilities to support improved test framework enhancements.

### Work package 5: IOL Mediator Offerings

Under the IOL Mediator Offerings work package, Jembi will look to integrate and package a set of OpenHIM mediators into Instant OpenHIE, including, for example, the OpenHIM mapping mediator, file queue mediator and other standards-based mediators. The aim of this is to extend the capabilities of the Instant OpenHIE offering (e.g. to allow for asynchronous message processing or out-the-box support for data exchange standards), while also providing a starting point for developing data exchange logic for those aligning their solutions with Instant OpenHIE and looking to support new workflows and use cases. The mapping mediator serves as a general service that supports development of validation, transformation and orchestration of messages for non-technical users, allowing for simple and quick development of workflows and business logic.

#### Objective 5.1: Integrate OpenHIM mediators into Instant OpenHIE to extend capabilities of Instant OpenHIE and make it easier for users to develop business logic/services to support new workflows and use cases.

##### Activity 5.1.1: Add support for, and integrate, the OpenHIM Mapping Mediator into Instant OpenHIE to provide a general service that supports development of validation, transformation and orchestration of messages when building out new workflows and data exchange services within Instant OpenHIE.

##### Activity 5.1.1: Add support for, and integrate, other selected OpenHIM Mapping Mediators into the Instant OpenHIE framework (e.g. File Queue mediator to support asynchronous message processing).

## Community Feedback

Jembi will lead on the coordination of consortium efforts, chairing & minuting check-in calls and community engagement efforts.

The consortium will engage with the OpenHIE community (namely the architecture and component technology communities, and the devops community) for input, feedback and review of the architecture and HIE instantiation, and to ensure alignment with the Instant OpenHIE project. The team will leverage the OpenHIE devops community to support the work direction and ideas that are being used. This will include relevant updates on monthly community calls, presentations and demos of the interim and final solutions developed, and community support and discussions with other groups leveraging and contributing to the Instant OpenHIE initiative.

## Schedule

The following is a high-level work plan.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Activity** | **Team**  **Location**  **Month/ Quarter** | **Quarter** | | | |
| Q | Q | Q | Q |
| 1 | 2 | 3 | 4 |
| ***WP1: Community Support*** | |  | | | |
| Assist the community to align their solutions to be part of the Instant OpenHIE offerings. | Jembi, South Africa; IntraHealth, USA | x | x | x | x |
| Assist the community with identifying potential use cases to solve particular health challenges, and advise on package structures across these solutions. | Jembi, South Africa; IntraHealth, USA | x | x |  |  |
| ***WP2: Extending Instant OpenHIE*** | |  | | | |
| Finalise use case and set of component technologies | Jembi, South Africa; IntraHealth, USA | x |  |  |  |
| Develop containerisation and deployment strategies for new component technologies | Jembi, South Africa; IntraHealth, USA | x | x |  |  |
| Develop workflow and configuration scripts & mediators to support core workflows for chosen use case. | Jembi, South Africa; IntraHealth, USA |  | x | x |  |
| Develop component instantiation and integration scripts along with test cases to extend test harness. | Jembi, South Africa; IntraHealth, USA |  | x | x |  |
| Deploy changes to Instant OpenHIE demo instance. | Jembi, South Africa |  |  |  | x |
| Update user and technical architecture documentation to include instantiation of new use case. | Jembi, South Africa; IntraHealth, USA |  |  |  | x |
| ***WP3: Architecture Revisions*** | |  | | | |
| Core architecture and packaging refinements to ensure Instant OpenHIE is easy to extend and deploy. | Jembi, South Africa; IntraHealth, USA | x | x | x | x |
| Expand capabilities of Instant OpenHIE to allow 3rd party packages to be added by users. | Jembi, South Africa; IntraHealth, USA |  | x |  |  |
| Develop template scripts to help users bootstrap their solutions. | Jembi, South Africa; IntraHealth, USA |  | x |  |  |
| ***WP4: Software Maturity*** | |  | | | |
| Update the command line app and web UI to easily plug in packages, view logs and see services that are running. | Jembi, South Africa; IntraHealth, USA |  | x | x |  |
| Define and describe the requirements for testing when contributing to, and using, Instant OpenHIE. | Jembi, South Africa; IntraHealth, USA |  | x | x |  |
| Update the Instant OpenHIE test harness architecture and capabilities to support improved test framework enhancements. | Jembi, South Africa; IntraHealth, USA |  | x | x |  |
| ***WP5: IOL Mediator Offerings*** | |  | | | |
| Add support for, and integrate, the OpenHIM Mapping Mediator into Instant OpenHIE to provide a general service that supports development of validation, transformation and orchestration of messages when building out new workflows and data exchange services within Instant OpenHIE. | Jembi, South Africa |  |  | x |  |
| Add support for, and integrate, other selected OpenHIM Mapping Mediators into the Instant OpenHIE framework (e.g. File Queue mediator to support asynchronous message processing). | Jembi, South Africa |  |  | x | x |

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## Deliverables

Jembi and IntraHealth will jointly address the project activities, allocating work to each group as appropriate.

|  |  |
| --- | --- |
| **Deliverables** | **Timeframe** |
| Ongoing support to the user community aligning their solutions to be part of the Instant OpenHIE project. | Month 1 - 12 |
| Ongoing architecture revisions to ensure ease of use in extending and deploying Instant OpenHIE. | Month 1 - 12 |
| Updated documentation and tutorials on how to add a package to Instant OpenHIE. | Month 1 - 2 |
| Confirm priority use case and package structures, based on clinical use case, or in support of other solutions aligning their solutions to be part of the Instant OpenHIE project. | Month 1 - 2 |
| Extend Instant OpenHIE offering (apps, packages, workflows and test scripts) to support priority use case. | Month 3-12 |
| Template scripts to help others bootstrap their project. | Month 3 - 4 |
| Expanded capabilities to allow 3rd party packages to be added by a user to Instant OpenHIE. | Month 5 - 6 |
| Updated terminal and/or web UI features (easily plug in packages, view logs, monitor running services). | Month 6 - 9 |
| Updated testing framework and test harness cater for new packages and use cases | Month 6 - 9 |
| Integrate OpenHIM mediators into Instant OpenHIE | Month 7 - 12 |

## Global Good Maturity Model Assessment

[Instant OpenHIE Assessment](https://docs.google.com/spreadsheets/d/1LBFoIHGKhW05W0XDqYtCgkm9D9MT0Ic2as84hHBmZWs/edit#gid=249752520)

