

# Strengthening and Expanding HEARTH open source tool and community

Submitted by Christopher Seebregts (Jembi Health Systems) on January 18, 2018 - 11:21pm

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**Proposal Status: Awarded--Pending Funding**

## Executive Summary

The use of Health Information Exchanges (HIE) is growing in low resource settings as Ministries and Departments of Health move towards connected health systems that provide better care to beneficiaries. The improvements in health provider access to complete clinical data, patient linking across disparate systems and standardised terminology and registries enable not only better patient care but also more efficient operational reporting and cost reduction. One of the key challenges to data exchange is the complexity of the technology required to set up and manage data storage. HEARTH[i] is a standards-based health data store that brings together the functionality of multiple HIE registries, simplifying the architecture of a data exchange solution. The design and development of this software was driven by implementation needs to be able to rapidly store demographic and clinical patient level data from multiple existing systems, while ensuring that this data is linked to the correctly identified patient. Within the context of an HIE architecture such as the Open Health Information Exchange (OpenHIE)[ii] HEARTH serves the purpose both of a Client Registry (CR) and a Shared Health Record (SHR) component. It supports Fast Healthcare Interoperability Resources (FHIR), which is a draft, modern, developer-friendly base standard developed by Health Level Seven (HL7). The goals of this project are to (i) further develop HEARTH as a core component of the OpenHIE and a more user friendly alternative to existing Client Registry and Shared Health Record components; (ii) productionise it to make it more accessible to the growing number of implementers in Africa and other low resource countries, and; (iii) grow the community of practice to sure that HEARTH effectively addresses real world challenges and is more sustainable in the long term.

## Consortium team

The development of HEARTH has been led by Jembi Health Systems NPC (Jembi) and has been supported by an international community of practice which addresses the need for a SHR and CR solution for the OpenHIE initiative. 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 a number of African countries. It has contributed to many open source software development projects, including OpenMRS, OpenHIM and OpenHIE. Jembi has designed, developed and continues to maintain HEARTH. Jembi is registered, and headquartered in South Africa with country offices in Mozambique, Rwanda and Zambia.

## Project Description

The development of HEARTH has to date been driven by existing Jembi projects including:

- 1) A data warehouse with a web interface that will allow users (both health workers and patients) to capture and analyse pre-, peri- and postoperative anaesthesiology data. This enables the improvement of surgical outcomes through the availability of more comprehensive patient data.
- 2) An HIV routine case-based surveillance prototype application that eliminates the need for point in time surveys, reducing duplicate records and improving the accuracy of reporting monthly statistics. HEARTH's ability to match patient records means that health workers can more effectively monitor the HIV case movement and progress in a programme to which an individual patient is enrolled.

HEARTH is primarily intended for use as a person-centric longitudinal data store i.e. a Shared Health Record (SHR). As such, HEARTH acts as the SHR component within an OpenHIE architecture (below). HEARTH is used to store, manage and retrieve patient demographic and clinical information from multiple sources and consumers and so must also manage a patient's identity, effectively operating as a Client Registry (CR), removing the need for a separate component.

OpenHIE  
Component Layer



TS



CR



SHR



HMIS



FR



HWR

Interoperability  
Services Layer



External Systems



Mobile



Clinic



HMIS



Lab



Hospital

*Key: TS (Terminology Service); CR (Client Registry); SHR (Shared Health Record), HMIS (Health Management Information System); FR (Facility registry); HWR (Health Worker Registry); ILR (Inter-Linked Registry)*

HEARTH is designed as a FHIR server. FHIR is rapidly becoming the de-facto standard for health data exchange for patient information as it is easier and faster to use than older standards such as HL7 V2 and HL7 V3. The design decision to make use of the FHIR standard was that of ease of use and ease of adoption: it is a more modern technology that is quicker and simpler to implement while still retaining the advantages of standards-based data exchange.

While other FHIR servers do exist, HEARTH has been developed as a Free and Open Source (FOSS) tool, with a focus on ease of installation, configuration and integration into existing health systems.

In order to grow the community and productise HEARTH the key activities required are:

- 1) promoting HEARTH to a wider audience;
- 2) driving efforts to expand the community through a well-defined communication strategy;
- 3) leading the development of the HEARTH product roadmap and prioritisation of new features, driven by the needs of the community and real-world implementations and 4) providing technical support to the community.

A core, dedicated product team will lead the definition of business requirements and the technical design of the HEARTH product, producing software and documentation that is current, accessible and easy to use. This documentation will include versioned functional and technical specifications, developer and implementer guides and user manuals. This will be supplemented with training materials and tutorials delivered via an online portal. The improvement of the quality assurance and control and DevOps processes will further enhance the quality and robustness of the software and contribute to the long-term sustainability. HEARTH currently supports a number of IHE profiles (specifically

ATNA, MHD, PIXm and PDQm) that specify how healthcare information can be exchanged electronically. Participation in connections to certify HEARTH for these profiles will also provide assurance that the tool meets world-class standards.

## 1. Use Cases, User Stories and Activities

As electronic health information systems become more prevalent in Low to Middle Income Countries (LMIC) there is an increasing need to share information between systems, thus facilitating improved clinical care and reporting. This is further added to by the fact that in Africa many population groups are migratory as well as persons seeking health care at different facilities. All health systems generally follow a referral model from community health worker to clinic to hospital and many patients having eHealth providers seeing patients on this referral pathway who have chronic ailments which require a longitudinal view of their patient's health data. In addition to the requirement for health providers to view and contribute to a longitudinal health record, is the fact that there are multiple information systems servicing the needs and different aspects of patient care. There are mobile applications (MedicMobile, CommCare, OpenSRP etc) that may focus on limited field based follow ups, there are electronic medical record tools (such as OpenMRS and Bahmni) looking at the patient health record, there are laboratory systems (BLIS, OpenELIS etc) that curate laboratory test results for patients, pharmacy systems, appointment reminders and so on; all of these are curating a subset, and often duplicate set, of patient information which health care providers use to the benefit of their patients.

### Example use case for perioperative data.

HEARTH was developed out of the need to provide a national level patient-centric longitudinal data store for a perioperative information system. The system provides a portal for patients to be able to register and enter data prior to elective surgery which can then be used by anaesthetists to assess risk at an earlier stage, as well as to provide a research database for analysis. A key decision driving the development of this new tool was the use of the emerging FHIR standard.

Jembi identified the need for a need for a fit for purpose, centralised patient record technology that provides a longitudinal data record for clinical information about the patient that is accessible, and contributed to, by the disparate information systems making up the health information space of LMICs. This tools needs to allow standards based interfaces and data models to facilitate both semantic and syntactic interoperability. The technology needs to be deployable on a national scale to support ministry of health requirements for centralising and providing quality of care to their populations; as well as deployable within a subset of a project space (i.e in facility or as part of a smaller connected information system) to meet the needs of a smaller project and or other implementer needs to share data and have a patient record.

As a FHIR server HEARTH is able to server multiple functions to the implementers. The use cases that the Digital Square investment looks to curate include:

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FHIR is an evolving standard and as such multiple versions exist and will continue to emerge. Users of HEARTH should not be limited to a singular version of FHIR and not be able to leverage the latest data points and resources due to version restrictions within the tool.

Implementers should be able to upload / point to a FHIR version and resource definition package and HEARTH would be able to load and interpret the core resources and primary query functionality for the resources. This functionality aims to support the use cases where Implementers are also looking to expand the resources that HEARTH manages and allow for a more dynamic loading of resources into HEARTH.

As HEARTH already has a base version of resource matching it is poised to form the foundation of patient ID management. As such HEARTH will fulfil the need to have a FHIR Master Patient Index to support patient matching use-cases emerging from the implementations. HEARTH will review its patient (and general resource matching) functionalities and ensure that it is poised to better support the requirements of an MPI.

In addition to Patient Matching and lookup HEARTH will provide an app/UI that facilitates administrators to not only administer the linking and merging of Patients but also form the foundation for the curated (i.e. Human intervention workflow) process of unlinking and or splitting patients. This workflow and app will support the administrator reviewing any merged patient clinical encounters and create mechanisms to allocate them to a particular patient or void them.

A core feature of HEARTH that will continue to be strengthened is that it is an easy to implement a standards based patient centric longitudinal data store - a shared health record. As the implementation cases expand and the implementers community leverage the dynamic loading of resources, and HEARTH as an MPI, there is a need to provide visibility into the content of the FHIR server as well as ensure that the server is performing as expected and able to leverage 3rd party apps (such as those found on smarthhealthit.org as an example. This requires that HEARTH not only document and harden its system architecture but also focus efforts on standards compliance testing as well as identifying viable 3rd party plugins to meet implementation needs. Examples from existing projects include: Summary Patient Record View, Population Health Dashboard showing high level breakdown of population within HEARTH.

As a central tool that stores all health data HEARTH will need to provide aggregate data streams to existing HMIS tools such as DHIS. Leveraging existing data warehousing experience from other projects Jembi will introduce the beginnings of a data aggregation workflow to support the reporting of national indicators and other reporting needs.

## 2. Digital Health Technologies

As HEARTH is proving itself a useful tool to Jembi and other developer groups (IntraHealth included) the Digital Square project aims to address the needs of:

1. Productising HEARTH
2. Growing the community

### Productising HEARTH

The term “ productising ” refers to the process and activities that take a piece of software from just being code that has been developed and moves it through the phase of being a utility/tool and towards being seen as a product. A product is a software artefact that is clearly able to articulate its function, its features, its requirements and specifications as well as being able to justify that it meets its aforementioned statements – i.e. there are adequate tests and test cases for all aspects of testing (functional testing through to code testing etc). Health software being implemented in the contexts of low resource settings have a moral and ethical obligation to honour the trust that the implementing population puts in the software and ensure that it functions as requires and stated.

The work area in productising HEARTH include the formation of a sound product base that is inclusive of a defined and stated product/software roadmap that includes the prioritisation of new features and functionality. The new features and functionality should be driven by the needs of the community and real-world implementations. This will require constant curation and mapping of requests to the various aspects of product development and curation (i.e. Use case elaboration, technical specification, acceptance and quality assurance test cases, through to development and code testing etc). A core, dedicated product team will lead the definition of business requirements and the technical design of the HEARTH product, producing software and documentation that is current, accessible and easy to use. This team will aim to leverage community implementations and work closely with other technical teams to ensure that architectural decisions and requirements are highly aligned with use cases and implementations.

The project will also support the implementation of a DevOps and Open Source community development paradigm. This will outline how the emerging community can and is expected to contribute to the development of HEARTH, patterns to follow and how to obtain support and support each other in the development process. The DevOps will also see the improvement of the quality assurance and control. This will be done through the definition of test cases and also opening up the acceptance criteria and results as to provide a transparent approach for the community to know the quality and coverage of test case scenarios. A sound and well covering QA process will enhance the quality and

robustness of the software and contribute to the long-term sustainability.

The Digital Square investment will also support the core team in continuing to provide technical support to the community as it grows. The support will be in response to questions and queries raised through the communication channels as well as creating appropriate support materials/documentation. The HEARTH documentation will include versioned functional and technical specifications, developer and implementer guides and user manuals. The team will add to this set as set of training materials and tutorials delivered via an online portal to facilitate new users coming up to speed and being able to implement the tool.

HEARTH is designed as a FHIR server as FHIR is rapidly becoming the de-facto standard for health data exchange for patient information. HEARTH needs to provide developers and implementers with a tool that leverages more modern technologies and development patterns: it should be quicker and simpler to implement while still retaining the advantages of standards-based data exchange. In doing this HEARTH has implemented the following notable features:

### FHIR Resource curation

HEARTH allows users (implementers and developers) a fast, convenient way to curate FHIR resources in a fast and scalable software tool. HEARTH currently supports the DSTU2 version of FHIR, however, in the future multiple version support is planned. Resources with a high maturity and that don't have breaking changes between versions will still be compatible with STU3.

### Patient Matching (resource matching)

HEARTH has also implemented resource matching protocols and has included more focused functionality for patient matching by including configurable algorithms. This functionality allows HEARTH to function as a FHIR based master patient index. Our goal is to make these patient matching algorithms configurable via a user interface and to add features to manage linking,merging,unlinking and splitting of patients and their health records.

### Interoperability profiles (IHE)

HEARTH currently supports a number of IHE profiles (specifically mCSD, ATNA, MHD, PIXm and PDQm) that specify how healthcare information can be exchanged electronically and we hope to be able to test these profiles at an IHE connectathon for all compliance. To date it has IHE compliance for mCSD, mACM and ANTA.

### Data warehouse export

While in an early stage, Jembi has developed a base functionality that sees HEARTH stripping data from the document database and persisting it in a relational database format to allow easier data warehousing and queries. This functionality is focused on a particular use case but is projected to be expanded to be offered in a more general means.

As HEARTH's implementation needs grow future features and implementation based functionality will be added to the product roadmap. It is notable that while other FHIR servers do exist, HEARTH has been developed from the start as a Free and Open Source (FOSS) tool, with a focus on ease of installation, configuration and integration into existing health systems and to integrate with the OpenHIM ([www.openhim.org](http://www.openhim.org)) and fit within the OpenHIE ([www.ohie.org](http://www.ohie.org)) environments.

As an existing technology HEARTH is based on a MongoDB Node.JS stack and is designed to scale horizontally as required. It is licensed under a BSD 3-Clause license.

In achieving the outlined use cases and functionality HEARTH will build upon its standards based data store (FHIR) and enhance its RESTful API to support new workflows and functionality.

In many low resource settings developer and implementer teams need technologies and patterns that are simple, adaptable and ,most importantly, easily adoptable. In comparison to some other interoperability standards the FHIR models, engagement patterns and general use is

more aligned to what local teams are exposed to in other work environments. HEARTH is designed as a FHIR server because this is rapidly becoming the de-facto standard for health data modelling and data exchange as it is easier and faster to use than older standards such as HL7 V2 and HL7 V3. The design decision to make use of the FHIR standard was that of ease of use and ease of adoption: it is a more modern technology that is quicker and simpler to implement while still retaining the advantages of standards-based data exchange.

### 3. Community Feedback

Jembi has historically been a member of a number of open source communities and currently curates a range of open source health information systems products and tools and other artifacts. Included in this list are OpenHIM, investment and support for OpenMRS, Bahmni, HEARTH, OpenCRVS, BSIS and a range of other tools. Jembi, like other groups, has built a business model and a vision to impact the world through the appropriate and effective implementation of well functioning health systems. We need to ensure that products are fit for purpose, quality and impactful as well as reused by a range of persons and that there are a variety of implementations to better support the products' sustainability.

HEARTH forms the patient data store for a perioperative shared health record platform that enables anesthesiologist and surgeons to track, record data and follow up on patients on a national scale. It is linked to a data warehouse and has a web interface that will allow users (both health workers and patients) to capture and analyse pre-, peri- and postoperative anaesthesiology data. The entire project aims to improve surgical outcomes through the availability of more comprehensive patient data throughout the surgical process.

HEARTH has been setup to provide an HIV routine case-based surveillance prototype application that eliminates the need for point in time surveys, reducing duplicate records and improving the accuracy of reporting monthly statistics. HEARTH's ability to match patient records means that health workers can more effectively monitor the HIV case movement and progress in a programme to which an individual patient is enrolled.

HEARTH is primarily intended for use as a person-centric longitudinal data store i.e. a Shared Health Record (SHR). As such, HEARTH acts as the SHR component within an OpenHIE architecture (below). HEARTH is used to store, manage and retrieve patient demographic and clinical information from multiple sources and consumers and so must also manage a patient's identity, effectively operating as a Client Registry (CR), removing the need for a separate component.

A sustainable open source project and product requires a base of investment; this can be in the form of core teams that have adopted the tool / product as part of their service offering or have leveraged it in a way that is critical to them delivering a business need. In addition it can be gaining volunteer support for the tool and partnering / aligning with similar technologies to address a use case. As seen with many open source technologies, the more aligned it is to a viable business function (i.e. aligned to a need) the better support and adoption.

To this end the project will focus on appropriately promoting HEARTH to a wider audience; and driving efforts to expand the community through a well-defined communication strategy.

Promoting HEARTH is aligned with fostering adoption through making known the value proposition, the features and functionality of HEARTH to potential implementers and collaborators. Jembi has seen IntraHealth adopt HEARTH as a base for mCSD functionality and contribute this back to the core product, this illustrates the model we are pursuing - appropriate adoption of the tool that supports a business function. Advocating activities are done through:

- Participating in learning networks and community calls presenting the case and functionality of projects done.
- Identifying projects that are looking for functionality HEARTH provides and jointly architecting towards a solution (i.e. OpenMRS data exchange with a central repository etc)
- Participation in connectathon events that showcase the ability of the tool to meet industry standards and prove connection and exchange with other tools.

The results of these engagements and participation within Open Source forums will be curated through an appropriate communication strategy that will be positioned to meet the target audiences.

The aim of the digital health community for HEARTH is to use the knowledge and experience of those implementing HEARTH and similar technologies in low resource setting to develop system functional and nonfunctional requirements that are user driven. Activities used to bring together the community will include:

- A discussion list through which people can share questions and ideas via email
- A public Wiki which includes the roadmap for the ongoing development of HEARTH
- Hosting monthly community calls (this regularity may change based on participant feedback).

In addition to these activities Jembi will look for opportunities for face to face engagements including running these alongside other popular tech events such as the HELINA, OpenMRS and OpenHIE Implementers conferences and local and international connectathons.

Jembi has extensive experience of running and participating in global open source communities including, OpenMRS, OpenHIE, DHIS, Blood Safety Information System (BSIS) and Bahmni. This includes curating online discussions as well as coordinating and facilitating face-to-face workshops, hackathons and conferences (e.g. the 2010 OpenMRS Conference hosted by Jembi in Cape Town).

## 4. A self-assessment on the Global Good Maturity Model

See HEARTH assessment here:

<https://docs.google.com/spreadsheets/d/1Hwcb3oLde8yi4exFzshKVwwy9MdnLyOZC4dkwujPDMc/edit#gid=249752520>

Before Investment

### Global Good Maturity



## Global Good Maturity



### Global Utility

#### Country utilisation and country strategy

Advocacy and promotion of the HEARTH and strategic engagement with governments and international organisations is an ongoing activity undertaken by executive and senior management. HEARTH will continue to be presented within the international communities and made available to viable projects for consideration for adoption.

#### Digital Health Interventions

From the outset HEARTH is designed to be deployable within a low resource setting context. The goal of the investment is to further this applicability through productising the dynamic loading of FHIR resource definition and multi version of FHIR support. Extending the native ability to match resources HEARTH's extension to be focused at matching patient resources will go a long way to see HEARTH as a viable contender for review as a tool meeting the needs of a master patient index. The MPI functionality is the cornerstone of any longitudinal health record and a need that must be met for person centric data exchange.

#### Source Code Accessibility

The HEARTH code is already available at Github under an BSD-3 clause license. The documentation will be made publicly available under a Creative Commons licence when it is fully developed.

#### Funding and Revenue

HEARTH currently forms part of Jembi's open source tool offerings (along with the OpenHIM). HEARTH has been seed funded through implementation projects and as it becomes leveraged by other projects it will look to bolster core support from these projects. While incrementally growing its implementation base this funding isn't sufficient to allow Jembi to develop all the functionality being requested by the HEARTH community. Other funding streams are variable, so it can be challenging to allocate appropriate resources. The product leadership is engaged in developing a long term sustainability plan with the aim of sourcing additional funding, independent of implementation funding, to maintain and enhance the core product. This strategy includes diversifying the sources of donor funding and investigation of alternative funding models such as the A Social Licence (or Global-Good Licence) - a voluntary agreement by organisations/donors/governments and other groups that derive value from the tool, to pay a nominal annual licence fee to support core maintenance of the tool. Continued investment in enhanced features in HEARTH will aid in promoting further adoption, expanding the pool of users and guiding the direction of the future development of the tool and supporting long term sustainability by growing the community of users.

### Community Support



## Community Engagement and Governance

As a member of the OpenHIE Jembi can utilise this existing community to create and develop the community for HEARTH as there is considerable overlap with the needs of the various communities. Jembi also has many years of experience in convening and participating in open source communities such as OpenMRS, Bahmni and other tools. What is needed to drive this community forward is a dedicated community lead, which this grant would facilitate.

### Software roadmap and User documentation

This investment would allow for more time for a Product Manager to dedicate to managing the software roadmaps and product backlog and to work with the community members and internal projects to define and document new feature requests via a more formalised prioritisation process.

There is some draft documentation in the form of functional and technical specifications but this needs to be updated. Documentation for end users including manuals for users, installation and testing guides for implementers and guidelines for developers will be developed, enabling others to fully utilise this tool. This funding would allow for resources to dedicate time and effort to improving and maintaining this on an ongoing basis.

## Multilingual Support

As HEARTH is positioned as a backend registry service with a limited need for a user interface there is currently no support for a multilingual system and it has not been identified as a priority requirement at this stage.

## Software

### Technical documentation

There are already a limited set technical specifications and associated artifacts. These need to be consolidated, updated and maintained on an ongoing basis in order to be relevant and useful to architects and developers.

### Software productisation

The HEARTH will be made available as a packaged deployment solution and the supporting documentation will be improved further and will need to be maintained on an ongoing basis. Further improvements to transition from a partially automated to a fully automated continuous integration process will further strengthen the quality of the product.

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## 5. Workplan, Project Deliverables & Schedule

See draft [SCHEDULE](#) here that describes the planned high-level activities, timelines, deliverables and roles responsible for delivery.

<https://docs.google.com/spreadsheets/d/1V60sLEI7buFM1b0r3gU5e05g718XyK5iQyEfl9jdX0E/edit#gid=1591612357>

## Community Support

### Activities

The main product and community management activities planned are:

- Managing the shared community software roadmap effectively to ensure alignment of project needs and prioritising general requirements
- Managing the product backlog. Key features planned are
  1. MPI linking and unlinking
  2. A user interface
- Improving communication through the development of a communication strategy and plan as well as the production of supporting materials (e.g. use case examples)
- Ensuring that quality assurance and quality control processes are improved and incorporated into the contributor development process
- Making test plans and testing guidelines available to the community for use in validating the installation and setup of HEARTH
- Developing and refining the functional and technical specifications.
- Ensuring that the user and implementer documentation and training materials are up to date, easy to understand and practically focused. These will be made available online under a Creative Commons license.

### Deliverables

- A formalised feature and functionality prioritisation process agreed by the project leadership group and implemented within the community
- An updated software roadmap and product backlog
- An updated set of functional requirements specifications (including use cases and business & technical workflows) made available on Readthedocs and the wiki under a Creative Commons license.
- An updated and improved set of testing guidelines and test plans made available under a Creative Commons license.
- An improved and updated set of user documentation including user guides, installation guides, training materials and tutorials aimed at implementers and developers, publically available for each software release on Readthedocs under a Creative Commons license.

### Software Maturity

#### Activities

- To design, develop and document new features and to generalise existing features described above to make them more broadly applicable to the community
- To improve and expand the existing quality assurance and quality control processes further and fully integrate this within our current agile development and continuous integration process

#### Deliverables

- A version 2.0 release of HEARTH that includes a user interface that enables the user to see various views of the FHIR resources and to import new FHIR specifications.
- An updated set of technical specifications made available on Readthedocs under a Creative Commons license.
- Improvements to the Continuous Integration process to include automated performance testing for each release build to be

designed and implemented

## 6. Budget Narrative

Please see the detailed budget in Excel for the full breakdown:

[digital\\_square\\_budget\\_hearth\\_with\\_detail\\_narratives.xlsx](#)

Total Budget USD 359 798. This budget includes staff resourcing as follows:

The Executive Management team consists of:

- Executive Director - Chris Seebregts (10.4 days allocation) who provides overall strategic leadership and acts as principle investigator of the project. Provides leadership in business plan development and overall sustainability of the initiative as well as input into legal and regulatory aspects of the project and guidance in open source community development from experienced leadership. Oversight of Grant and participation in advisory activities.
- Director of Technology – Pierre Dane (10.4 days allocation). Contributes to the technical architectural design of the work streams, as well as providing leadership in supporting software development teams working on the project. Oversight on interoperability standards aspect of the work stream.
- Director of Corporate Services – Jonnea Smith (25.30 days allocation) The Director of Corporate Services manages the project's grants as well as financial and contract matters regarding the all programmes. This includes the management of the annual audits and ensuring compliancy to donor rules and regulations. Please see further data on the CSD team and the allocation of costs

The Corporate Services Division staff comprise a team of 11 with an average allocation of 25.30 days per person over the 12 month period.

The CSD team are responsible for Finance, Legal/risk and Compliance, ICT, Human Resources, Grant Administration, Country office administration management, Office admin, Procurement, Communications and auditing. **Please see calculation of overhead sheet on the Excel detailed budget spreadsheet for workings on % applied and calculation methodology.**

The Programme Management team consists of:

- Senior Program coordinator – Carl Fourie (26 days). Overall responsibility for the program, overseeing all activities, resourcing, budgeting, reporting, quality control and community management.
- Project Officer - (26 days). Supports the program manager with planning and activities management. Responsible for working with team on coordination of community calls and general communications. Provides general logistics, reporting and monitoring the day to day administration of Jembi.

Product Management, Community Management and Technical Development:

Responsibility for the three main areas of work are split between 1. The Technical Lead, 2. The Community Lead and 3. The Product Manager.

These three staff members will liaise closely but have a different focus:

- The Technical Lead – Ryan Crichton (91 days) has a background in health information exchange, interoperability and data exchange standards. Leads the technical strategy and is responsible for architecture documentation and technical specifications. Will set the technical direction for the development team and liaise with Product Manager and Community Lead to ensure the roadmap reflects the needs of all stakeholders. Contributes to the open source community discussions. Will translate user stories in the backlog into technical specifications and lead the development team as well as participate in the sprint work as a fulltime member of the sprint team.
- The Community Lead (65 days) is a Lead Developer with a background in Health Information Systems, data exchange and interoperability and public health systems knowledge. Will liaise with the Product Owner and Technical Lead to act as the HEARTH Community Manager. He will focus on engaging with the community, driving the discussions, responding to the mailing list and seeking out potential community members and assisting with on-boarding. He will also participate on various calls and represent the HEARTH community at meetings.

Responsible for the community roadmap and eliciting requirements and managing these throughout the change request process and also for managing developer community contributions to the code.

- The Product Manager – Linda Taylor (65 days) is responsible for the overall coordination and delivery of the activities including analysis, documentation, testing and validation and ensures that the HEARTH software is able to perform at an enterprise level and is ready for implementation. Responsible for the internal projects roadmap and aligning this with the community roadmap. Also responsible for ensuring all product and technical documentation is complete, relevant and up to date and that quality assurance activities are carried out.

The product team is made up as follows:

- Senior developer (226.20 days) and a Mid-level developer (226.20 days) Responsible for writing and testing software code and producing technical documentation
- Quality and Assurance Technician – To Be Hired (65 days) Responsible for defining and implementing quality assurance SOPs and oversight of all QA activities.
- Testing/QA Developer - To Be Hired (130 days) Works with the product manager to define test cases, performs functional testing and provide test reports.
- Senior Creative Technologist (39 days) - Responsible for user interface design and usability guidelines. Also provides graphic design for product documentation.
- Training and Implementation Support Officer – (39 days) Responsible for working with product manager to develop user manuals, implementer guides and training materials
- Software Development Manager – (18.2 days) Responsible for the overall management of the Engineering team, including Software Development Lifecycle and recruitment.

## References

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[i] <https://github.com/jembi/hearth>

[ii] [www.ohie.org](http://www.ohie.org)

**Supporting Documents:**  [HEARTH proposal in downloadable PDF format](#)