2.1 Technical Application

Building the openIMIS community of developers for the next phase of growth

Two-Sentence Overview

The goal of this project is to strengthen and grow the developers community for openIMIS. In line with the open source vision for the tool, Bluesquare is looking to support current and new partners to continue developing the new platform in line with the established architecture.

High-Level Budget Summary

Budget Category	**Work Package 1 -** Migration of the Beneficiary Enrollment Workflow to the modular platform	**Work Package 2 -** Interoperability with Product Registry	**Work Package 3 -** Configurable Workflow Engine	**Total Cost (USD)**
Total Project Costs	**$355,052**	**$124,499**	**$63,512**	**$543,062.09**

Executive Summary

The openIMIS community is looking to prepare for its next phase of growth, modularisation and maturity. This response will focus primarily on the workstream A and B - the modular migration of Core openIMIS and the Nepal Feature Request. Bluesquare will provide the required coordination, development and technical expertise to realise the next phase of the modular development and feature extension. With this guarantee of support, we expect the proposed, existing and new, partners to feel comfortable playing an active role in developing features and modules independently.

Through this project, we hope to ensure continuity in the community and continue development in line with the agreed upon roadmap. In the spirit of the open source community, we wish to open development work to additional teams which we believe will be key to bring openIMIS to scale. It will help ensure the tool is more sustainable and help absorb and share the workload when it is needed.

Thanks to our central role in developing the architecture we have a very clear understanding of the current status of the tool, and we are used to working with and coaching other technical partners towards a common goal. In an attempt to share our knowledge of the opportunities and associated challenges Bluesquare proposes to support interested potential partners who are looking to contribute to the further development of the tool in the next phase. We also provided an overview of our current sense of the scope required by module and item requested in this call for proposals.

Consortium Team

Bluesquare is a Belgian data company founded in 2012, focused on digital health in emerging economies around the globe. We have proven experience in designing and leading IT products in use in the UHC

sector. Currently Bluesquare manages the architecture development of the openIMIS tool and would bring this experience to bear for the next phase of development. Thanks to our multidisciplinary team including developers, product managers, public health experts and data scientists we are also able to contribute to the broader community discussions.

For this project Bluesquare proposes to support the next phase of development, serving as a resource for other teams and partners towards successful development.

VillageReach has agreed to partner with Bluesquare on Work Package 2 focused on integration with a product registry. VillageReach brings deep expertise in supply chain as creators of PCMT and as long-time leaders in the OpenLMIS community. They have actively participated in OpenHIE, including co-chairing the OpenHIE Supply Chain Sub-community. VillageReach is an endorser of the Principles for Digital Development. They proactively support open standards, interoperability, global standards, and open source. They have a track record of effective software development that is agile, transparent, and community-driven along with a rich history of helping advance global goods to support global health and development.

VillageReach would lead any needed software development on the PCMT side. VillageReach would contribute to establishing the interoperability requirements as well as documenting the working interoperability so that it can be adopted for production use by any implementers and countries.

For Work Package 1 Bluesquare has been in discussion with a potential subcontractor to support the development work required to make the implementation realisable in production in Tanzania.

Background or Problem Statement

The openIMIS tool and community is the midst of a major transformation from a monolithic to a modular structure that allows individual countries to tailor it to meet their needs. We provide a detailed description of the current status of the development work in the analysis document we shared on the openIMIS wiki. It is important to stress that while the community has made great strides in developing the next version of openIMIS over the course of the current contract period, the goal of modular structure will remain less than half way done at the end of the contracting period as per the contract specification. To maintain a compelling offer for new countries and current users, and to make the best use of the openIMIS tool, completing the scope will remain the activity that will bring the most value to both existing users and possible prospects.

Since the requested elements in this proposal cover a broad span and the available budget is too limited to cover all the needs, we have consolidated the work packages to leverage the work currently ongoing as best we could. Regardless, since the current budget provided is not enough to address all of the items requested in the scope provided, even without considering the need to finish the current work, we see a real risk in that rather than selecting the best items, we dabble in each of them without bringing any to a quality result.

So to move towards this next phase, there will be a number of critical decisions that will need to be made if we wish to keep the tool usable by the current implementers while creating the modules that are required to effectively expand its use in other countries and regions. The community will need to be empowered to choose the areas of focus.

In addition, there are two specific areas we believe need to be carefully mapped out as they are entirely new scopes of work.

The first is the formal sector. In our original technical proposal we suggested addressing this as a prototype. In the interim, and based on the understanding that this will be the central focus of another

offer we have refocused our offer without including the formal sector in the scope. Again, we feel this will only further disperse limited resources.

The second is the AI component which we advise to be reviewed to ensure we understand the real business needs (fraud detection). In our experience, answering this need for fraud detection can be tackled in multiple ways and AI is not always the best fit solution. We also do not include a work package focused on this request.

Bluesquare stays open to discuss with the openIMIS community on a role as outlined below, but we think that without this clarity on the state of the software and the lack of adequate funding for the current project's ambition, going forward remains risky if clear choices are not made in time. Balancing these differing needs will require timely decision making and additional development resources from the broader community.

Digital Health Technologies

Digital Health Tools

openIMIS is an open-source software tool for the digitalisation and efficient management of health financing workflows. Currently being used to manage health protection schemes in Nepal and Tanzania, openIMIS offers seamless connections between beneficiaries, health service providers and payers. Without licensing fees! More information on the tool are available here.

PCMT (Product Catalog Management Tool) is a reusable, open source global good that allows organizations to publish and manage one or more product catalogs including product information and master data management. PCMT supports common product identifiers such as GS1, interoperability, mappings between different product catalog mappings and data governance workflows in order to reduce the burden of product catalog management. PCMT helps enable interoperability and end-to-end visibility to help solve pain points for country and global-level health supply chains.

Use Cases and User Stories

Currently openIMIS is in use in two contexts: Nepal and Tanzania. A key priority will be to ensure these two current cases run smoothly and effectively. In addition, we provide the use case for the potential additional country needs. How to ensure the openIMIS tool is modularized to meet the needs of a broader case.

Nepal - In Nepal, the openIMIS roll-out is already well underway using the legacy platform. Currently it is being used to support the Health Insurance Board in accomplishing their efforts. The status of the roll-out is currently in 36 of the 77 districts. The program is structured as a single scheme for all, specifically it is family based. Addressing this particularity while maintaining the envisaged modularity will require a clear delimitation of the functionalities required from the modular version of openIMIS.

Tanzania - The original openIMIS (2012) roll-out took place in Tanzania to support the Community Health Funds operated by the President Office Regional Administration and Local Government. The scope of the deployment includes an online and offline component supported also by mobile devices. It is currently implemented in 3 regions (23 districts) with the ambition to grow to all 26 regions. For this case to be effectively supported by the openIMIS community a number of additional components will need to be modularized to ensure they are able to manage their program effectively.

There are additional planned roll-outs but their level of deployment remains limited (Cameroon, DRC, Tchad and others). However, it is good to note that the case study of the new countries also requires a clear look at making the tool fully modular in order to more effectively 'mix and match' elements to meet local needs.

Specifically as regards the integration of openIMIS and PCMT (Product Catalog Management Tool), the use case would be that these two tools can interoperate so that product master data management is streamlined. A System Administrator/Catalog Manager will want to update their product list in one location and have the ability for those changes to feed to other systems in the health information ecosystem, so that systems can all get updated product lists using common identifiers to aid interoperability. For an End User in openIMIS, we would want to provide up-to-date products (items) and services available to track from clinical encounters through insurance claim management so that claims can be processed efficiently.

Objectives and Activities

Bluesquare proposes to support the openIMIS community by leveraging our experience in the current architectural rework to help bring direction and support all teams of developers to help accelerate the development. Bluesquare would ensure alignment to the general vision and the community agreed upon needs for the development work to be completed.

We would manage this in an agile way, supporting with our own software development capabilities and building a stronger community of developers for openIMIS. We include below the various work packages we think are required and provide a first division between one default work package and two additional packages to help support a first prioritisation to realise the use cases described above.

In addition, and in response to the potential work that will be awarded for workstream C we would support the dialogue required with the current instances thanks to the help of local partners (both current openIMIS community members and new local teams that we are already beginning to identify).

Suggested Default Work Package

Work package 1: Migration of the Beneficiary Enrollment

The “Beneficiary Enrollment” as a set of business processes to manage insurees, families and their policies requires features from several modules: Persons & Families, Policies and Contributions.

This first work package is primarily dedicated to migrate these three modules from the legacy openIMIS to the new modular architecture.

Provided that Work Package 3 (Configurable Workflow Engine) is selected and realized, the activities within the migrated Beneficiary Enrollment could then be coordinated via the Workflow Engine.

Each module will be migrated according to the same methodology:

Objective 1.1: Onboarding of the software development team

Activity 1.1.1: Software team onboarding

The main focus of this activity will to dedicate a set amount of time to ensure that regardless of the elements to be migrated, the teams are updated as to the openIMIS landscape.

Objective 2: Migration of (1.2) Persons and Families / (1.3) Policies / (1.4) Contributions

Activity 1.x.1: Evaluation of the scope of work

Starting from openIMIS user guide, clearly identify the screens, backend procedures (services, batches,...) and necessary reports to be migrated.

Identify any Nepali specificities that need to be integrated (via contributions/events principles).

Activity 1.x.2: Screen mockups

Develop screen mockups to migrate existing to Material standard (sandboxing from https://material-ui.com/).

Activity 1.x.3: Development - iterations

In two (or more) short (2-3 weeks) iterations:

Frontend module development

The current frontend module (openimis-fe-insuree_js / openimis-fe-policy_js) only contains what was strictly necessary to implement the claim module (InsureePicker,...) and needs to be extended to provide the overviews, search/edition pages,....
Note: since contributions were not involved in claim processing, the corresponding module has not been bootstrapped.

Backend module development

The current backend modules (openimis-be-insuree_py, openimis-be-policy_py, openimis-be-contribution_py) only contain what was strictly necessary for the claim module and the FHIR API, so it needs to be extended to provide all business logic (validations,...), participate in the event-driven approach enabled by the new architecture,...

Activity 1.x.4: Testing/validation

A test plan will be written, following chosen standards and the module will be deployed for testing on a test platform based on openIMIS demo environment.

Activity 1.x.5: Technical documentation of migrated module

Finally, technical documentation of the frontend module will be provided, describing the foreseen contribution points, the published components, the events published and consumed on redux middleware and the registered contributions to other modules.

A similar documentation will be provided for the backend module, with published django signals,...

Objective 1.5: Migration of Beneficiary Enrollment Workflow

This objective is optional and requires the Workflow Engine (work package 3) to be in place. One reference workflow will be designed and configured into the Workflow Engine and serve as a reference for any country-specific adaptation.

Activity 1.5.1: Design of the workflow

Starting from the available features (and dependencies), identify the required flexibility and/or additional (side) tasks to be accomplished. Model the enrollment workflow context required and conditional routings.

Activity 1.5.2: Configuration of the workflow

Within the selected workflow engine, configure the Beneficiary Enrollment process (context instantiation and routings).

Activity 1.5.3: Testing of the workflow

Deploy the configured workflow on a test platform to allow users to simulate real cases and fine tune the configured reference process.

Objective 1.6: Production ready launch

Bluesquare plans to provide a small pool of days to support the production launch in the Tanzania and Nepali context.

It is important to note that much of the development work required for this work package will be shared with a subcontractor in Tanzania. Bluesquare sees this as a perfect opportunity to ensure the usability of the production environment.

Two Additional Optional Work Packages to be decided by Community Decision

While work package 1 can be further broken down and scope/budget reduced, Bluesquare clearly set work package 1 on high priority, as it would better consolidating the undertaken investment on the new architecture.

In addition, we draw your attention to the decision to no longer include the work package for interoperability with OpenCRVS. After discussions with Jembi regarding the interoperability with openIMIS it was determined that this integration does not fit with the immediate future roadmap of OpenCRVS. Other client registry alternatives (such as OpenEMPI or Hearth) have been considered and would be better suited for the purpose of an insuree master data store. The link between openIMIS and the client registry would be using modern IHE profiles for patient management (PIXm, PDQm, PRIM). This option was not possible to further explore under the tight timelines of this offer.

We have also removed the communication platform work package from our offer as we believe this component would be more suited once the workflow engine in place (cfr. Work Package 3).

Work package 2: Interoperability with Product Registry

The objective of this work package is to delegate the administration of medical items & services (hereafter called 'products') to PCMT: an open source Product Registry tool.

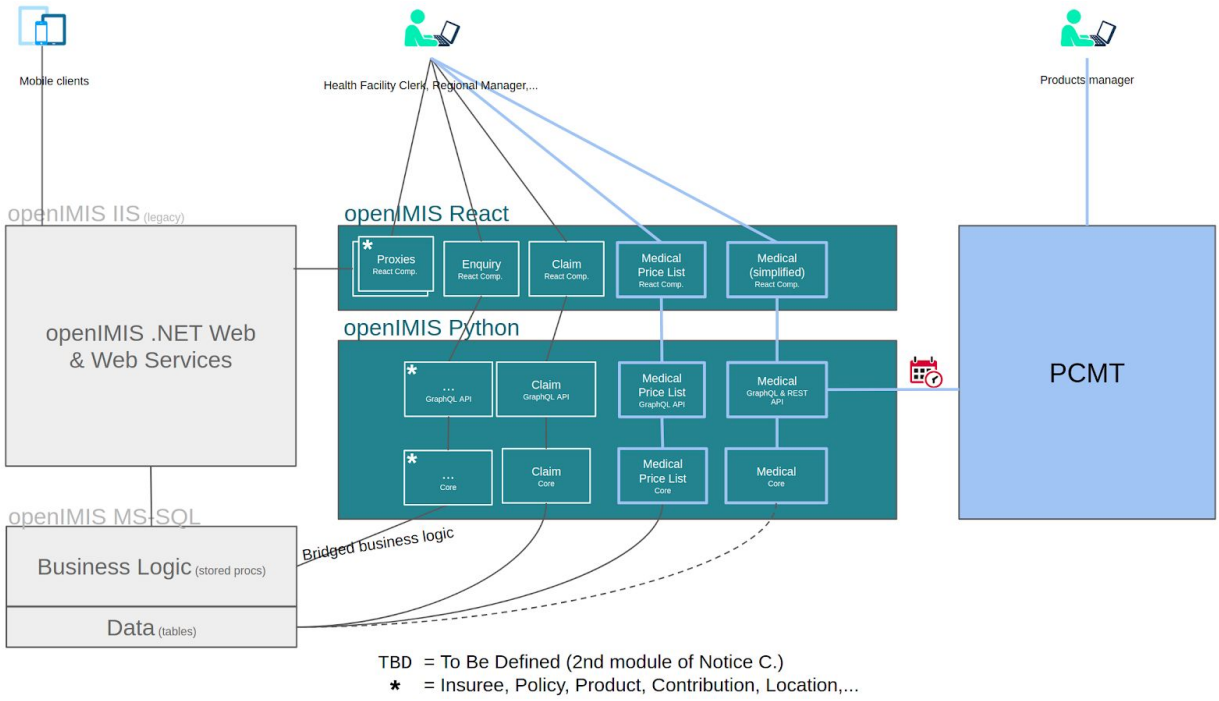
The consortium team is composed of VillageReach members (for the PCMT part of the integration) and Bluesquare (for the openIMIS part of the integration).

Products are not changed/updated very often. We will therefore implement a "data only" integration: there won't be any openIMIS screen directly connected to PCMT API and (peer to peer) synchronization will be triggered at scheduled intervals, in the background. Features for a more advanced integration are documented in the 'out of scope' section included below.

The project will start with a gap analysis, where we will ensure complete alignment on exchanged data (and formats) and identify all necessary technical connectors to be put in place. At the end of the gap analysis, the provided workload estimates will be reassessed to ensure that the project can be accomplished within allocated budget.

Work will then be split into PCMT and openIMIS teams scopes, and implementation planning will be refined to ensure a coherent delivery.

Integration testing and global solution documentation will be elaborated in a 4th phase.



In Scope

PCMT will be the master for all products information (and administration features), including the reference price. It will cover the current openIMIS Medical Services and Medical Items features and enable more advanced product management organisation.

openIMIS will be the slave for all products information. Products administration screens in openIMIS will only provide consultation (search, selection,...) features, allowing user verify what has been synchronized from PCMT tool.

As target of the product-related data, openIMIS will have to implement:

- re-synchronization processes (product de-duplication,...)
- id mapping (1 to 1, with the PCMT identifier as the primary identifier) for products (and/or product types,...)

Today openIMIS doesn't support multiple locations (languages) for the medical services and items. Along with the PCMT integration, we will enable support for multiple locations (languages) for the Services and Items.

The Medical Service Price Lists and Medical Item Price Lists (allowing price overruling at region/district or health facility) will remain in the scope of openIMIS but will be migrated from legacy (.NET) stack to the new (react/python) architecture.

The openIMIS django (default) administration console will allow system administrators to (only) see (unformatted) incoming data (messages) from PCMT and whether it has been fully processed or not.

Out of scope

Advanced integration features and cross-system user journey are not implemented in the scope of this work package. They are however kept in mind to ensure further enhancements are possible in the future:

- use of a third party mediator (like OpenHIE Interoperability Layer), with capability to transform (reformat) data, throttle load, monitor, replay errors,...
- cross-system user journeys, where (openIMIS) user could preview/cherry-pick incoming changes from PCMT,...

The relative price index mechanism is fully under the claim management module and won't be impacted by the PCMT integration.

Objective 2.1: Gap Analysis

Activity 2.1.1: Analyse the ability for PCMT to cover the needs of openIMIS

Activity 2.1.2: Map out any potential gaps which will require additional development

Objective 2.2: Configure and Connect PCMT

Activity 2.2.1: Configuration/adapt the Product Registry to fit to openIMIS needs

Activity 2.2.2: Create the technical connector of PCMT

Objective 2.3: openIMIS Adaptations

Activity 2.3.1: openIMIS backend adaptations

- Technical connector
- Medical Items and Services management migration to new architecture and adaptations
- Price lists management features migration to new architecture
- Multi-location support
- Additional (background) features generated by the integration: id mappings (incl. 'coded' values like product types,...), product/price re-sync processes,...

Activity 2.3.2 openIMIS frontend adaptations

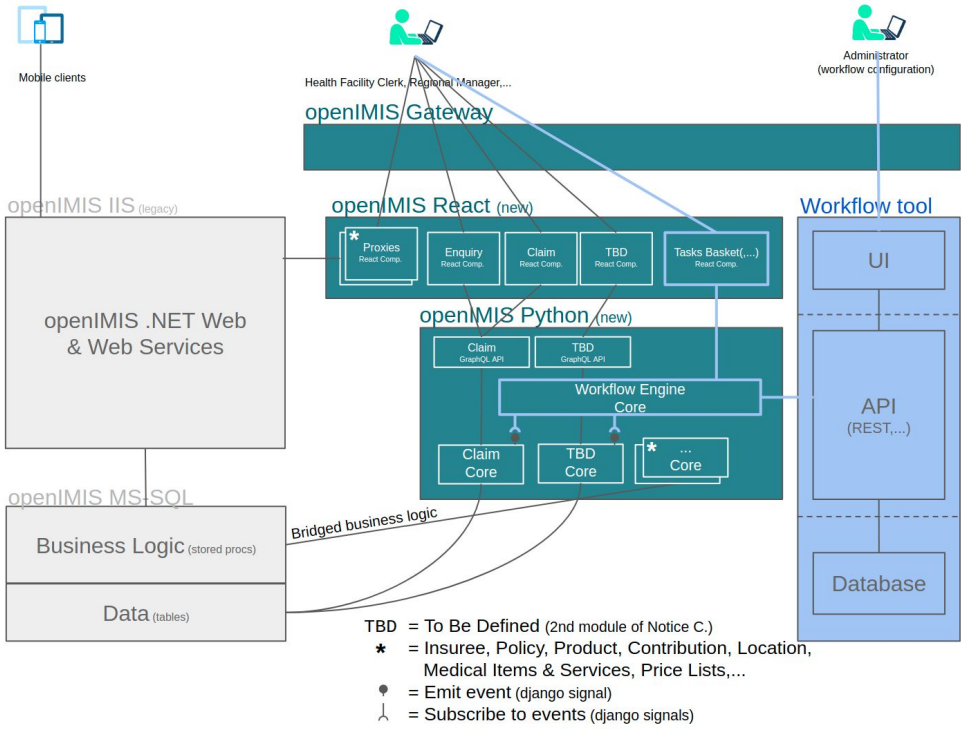
- Medical Items and Service management port to new architecture, with simplification (readonly)
- Price lists management features port from legacy to new architecture

Objective 2.4: Testing and documentation

Activity 2.4.1: Ensure the viability of the interoperability with a live case.

Activity 2.4.2: Technical documentation of delivered components (backend and frontend)

Work package 3: Configurable Workflow engine



Note: we underline the prioritisation of the workflow to keep in mind the needs requested by the Nepal and Tanzania instances in priority.

Objective 3.1: Select Workflow Management tool

Activity 3.1.1: List ('must have' / 'nice to have') features expected to be taken in charge by Workflow Management tool

Activity 3.1.2: Select 2-3 open source tool candidates and perform gap analysis, leading to tool selection

Objective 3.2: Plug workflow engine into new openIMIS platform

Activity 3.2.1: Enable workflow engine for (module) contributions (workflow design/configuration)

Activity 3.2.2: Enable workflow engine for event triggering (workflow context instantiation and workflow instance triggering)

Objective 3.3: openIMIS UI module for Workflow Engine

Activity 3.3.1: Develop generic components to integrate Workflow Engine into users' work environment (task baskets, 'follow the link' actions,...)

Activity 3.3.2: Apply the workflow Engine for one specific use case (Beneficiary Enrollment, Communication Platform,...) (to be selected by the community)

Community Feedback

This project will interact with the broader community in several ways.

1. Identifying the activity with highest impact and priority.

2. Updating the wiki page accordingly.
3. Bringing in new teams of developers to support the development work required.
4. Participation in the weekly developer calls to ensure alignment.
5. Outsourcing to partners in the community when relevant and possible.

To monitor results we propose to continue to work with weekly developers calls and monthly community sessions to discuss and monitor progress, re-evaluate priorities and keep each other informed of major developments between work streams. Since this process currently works well we see no reason to change the functioning.

Schedule

As we propose to work in an agile manner each step will be part of an iterative process. It will be adapted based on user needs and realities.

Activity	Team Location Month/Quarter	Month					
		1	2	3	4	5	6
Work package 1: Migration of the Beneficiary Enrollment Workflow to the modular platform							
Migration of Persons and Families	Bluesquare and/or Additional Partner						
Migration of Policies	Bluesquare and/or Additional Partner						
Migration of Contributions	Bluesquare and/or Additional Partner						
Migration of Beneficiary Enrollment Workflow (requires work package 6)	Bluesquare and/or Additional Partner						
Work package 2: Interoperability with Product Registry							
Gap Analysis for the Product Registry	Bluesquare and VillageReach						
Configure and Connect the Product Registry	Bluesquare and VillageReach						
openIMIS Adaptations	Bluesquare						
Test the Product Registry	Bluesquare and VillageReach						
Work package 3: Configurable Workflow Engine							

Select workflow management tool	Bluesquare						
Plug workflow engine into new openIMIS platform	Bluesquare						
openIMIS UI module for workflow engine	Bluesquare						

Deliverables

Depending on the work packages selected the deliverables and their month due will be subject to additional review and input from the broader community.

Deliverable	Month Due
Work package 1: Migration of the Beneficiary Enrollment Workflow to the modular platform	
Complete migration of persons and families	M4
Complete migration of policies	M5
Complete migration of contributions	M5
Complete migration of beneficiary enrollment workflow	Dependent on other work packages
OPTIONAL	
Work package 2: Interoperability with Product Registry	
Product Registry interoperability is set up	M5 (if work package is selected)
Work package 3: Configurable Workflow Engine	
Complete configurable workflow engine is set up	M5 (if work package is selected)

Global Good Maturity Model Assessment

openIMIS Global Good Maturity Model Assessment is available here. It is periodically updated by the community.