OpenBoxes Shelf Readiness Project

Making OpenBoxes Shelf Ready through Push Button Deployment and Onboarding Wizardry

Overview

OpenBoxes is an open source logistics management information system designed to meet the supply-chain management demands of public health systems. The system is used to manage supplies and medications for healthcare facilities and disaster relief efforts. A major gap identified in the shelf-readiness of OpenBoxes is user-friendly deployment and configuration of the software. Partners In Health (PIH) proposes to leverage its decade of experience with OpenBoxes implementation, development, and project management to lead the OpenBoxes Shelf Readiness Project. Our goal is to create a user-friendly installation and setup package that is available online and makes implementation independently manageable by a non-technical audience so that the software is more easily deployable by users who need it.

High-Level Budget Summary

	Work Package 1 Push Button Deployment	**Work Package 2 Configuration Wizard**	**Work Package 3 Improved Documentation**	**Total Cost (USD)**
Total Project Costs	-	-	-	-

Executive Summary

Since its initial design in 2010, OpenBoxes has been implemented by 5 global health organizations across 8 countries. While the OpenBoxes team receives regular inquiries from organizations interested in using the software, the complex procedures required to deploy and configure that application create a barrier to adoption for many potential users. In order to achieve our goal to provide free, high-quality LMIS software to anyone who needs it, the next step toward making OpenBoxes shelf-ready must be a user-friendly installation and configuration package.

The OpenBoxes Shelf Readiness Project team, led by Partners In Health (PIH) in collaboration with OpenBoxes and SolDevelo, will create a simple, easy to use installation and setup package that will be available online to all users. Investments from Digital Square will be used to fund the project management, business analysis, development, testing, and implementation activities of the OpenBoxes Shelf Readiness Project, including identifying gaps in the current onboarding process, researching new technologies, and defining and implementing solutions. PIH has extensive experience implementing and using OpenBoxes across multiple countries and settings and is uniquely suited to lead a project focused on increasing the ease of deployment and implementation of the software.

Thus, PIH will identify users within its network and other implementing organizations to analyze and document pain points as these users work through the current configuration process.

Concurrently, the OpenBoxes lead developer and developers from SolDevelo will research technologies to enable a push-button installation process. From those pain points and suggestions, the project team will design a configuration package, develop the package using an agile framework with regular QA and UAT, and test the solution with users at PIH's care delivery sites.

The final installation and configuration package will be designed to achieve three goals:

1) Ease of installation: Push button installation for non-technical users, easier deployment of new instances for developers, and an installation package for Instant OpenHIE
2) Ease of configuration: Wizards to help users manage the most important aspects of the initial set up process
3) Availability of documentation: Configuration documentation for both technical and non-technical users, including in app tutorials for complex functions

Throughout this process, the implementation team will engage with the OpenHIE community to ensure that any solution deployed is compatible with OpenHIE architecture.

Consortium Team

Partners In Health (Prime)

Partners In Health (PIH), the prime organization for this project, is an international health organization relentlessly committed to improving the health of the poor through public sector partnerships in 11 countries. PIH's unique position of working at community, health center, hospital, and national levels for 33 years has enabled us to see the practical needs of health management at each of these levels, and to develop and implement strategies that respond to all of these needs.

In 2010, informed by involvement with OpenMRS, PIH began funding the creation and support of OpenBoxes. PIH has since implemented the system at its care-delivery sites in Haiti, Malawi, Rwanda, Sierra Leone, and Liberia and has provided technical assistance for other implementing organizations in Madagascar and the Dominican Republic, with an implementation in progress in Dominica. PIH proposes to leverage this experience and lessons learned from implementations in various settings to lead the OpenBoxes Shelf Readiness Project and manage its financial, administrative, and business analysis components.

Key Staff

Kelsey Nagel, OpenBoxes Project Manager: Ms. Nagel led her first implementation of OpenBoxes of Malawi in 2014. Under the leadership of Ms Greenspan, she collaborated on the development of a new version of OpenBoxes in 2018, and led the rollout of this new version in Liberia, Rwanda, and Malawi. For the last year, Ms. Nagel has functioned as the product manager for all PIH-funded development of OpenBoxes. She will lead this project for PIH.

Jesse Greenspan, Director of Supply Chain: Ms. Greenspan was a project manager on the initial development of OpenBoxes, and led its first implementation in Haiti. She has been a leader of the PIH OpenBoxes support team for 8 years, during which time she has implemented the software in Sierra Leone and Madagascar. In her current role, Ms. Greenspan oversees PIH strategy for OpenBoxes. Ms. Greenspan will provide oversight and support to Ms. Nagel as she manages the project.

OpenBoxes (Supporting)

Partners In Health will partner with OpenBoxes to improve the installation and onboarding processes for new software implementations. Justin Miranda, the creator and lead developer of OpenBoxes, will oversee development and tool selection, ensuring that all improvements integrate seamlessly with existing functionality. Justin will function as lead developer and scrum master for the project, supervising other developers from SolDevelo.

Key Staff

Justin Miranda, Lead Developer: Mr. Miranda has over 20 years of experience developing enterprise software, including 15 years as a lead developer for two open-source projects (OpenMRS and OpenBoxes).

SolDevelo (Supporting)

SolDevelo is an IT outsourcing and consulting firm that has worked on several open source HMIS solutions. SolDevelo worked with PIH and Justin Miranda to develop a new version of OpenBoxes that was finished in 2018, and has been a key contributor to OpenBoxes ever since. SolDevelo will provide both developer support and quality assurance testing for the project.

Background or Problem Statement

OpenBoxes has transformed the supply chain activities of implementing organizations by providing user-friendly workflows, data visibility, and tools for data-informed decisions. The OpenBoxes team fields frequent inquiries from interested groups and is supporting several organizations considering implementations. Using the Global Goods Maturity Model, OpenBoxes scores a medium for software productization. While the software can be, and has been, implemented without the support of the core development team, it is not practical for most users. Installation and configuration are manual, time-consuming processes that require technical expertise. Installation instructions only exist for Ubuntu and configuration documentation is limited. To facilitate OpenBoxes' alignment with OpenHIE standards and its wider use as a shelf ready LMIS solution, the software's deployment and configuration process must be improved.

While this will be managed as a discrete project, it is aligned with ongoing work being performed by this consortium. Over the next 6-12 months, the OpenBoxes consortium will be working to dramatically improve our user and developer documentation in preparation for an implementation in Dominica. The outcome of those documentation improvements will be an updated user manual, administrator manual, and enhanced developer documentation. These new documents will be available to all of the current OpenBoxes community, to help them manage and build upon their instances of OpenBoxes. However, it will not address initial installation and configuration of the software, which is a major barrier to adoption. This project will build on the documentation already available to build a software and documentation package specifically focused on initial installation and configuration.

Work on this project will be done virtually, with partners in the US and Poland collaborating on software development from their homes or offices. User acceptance testing will be completed in Liberia and Rwanda by PIH employees based there, with the project manager and lead developer in the US participating via video conferencing technology.

Digital Health Technologies

As part of this project, we are planning to adopt recommendations from common DevOps best practices, the OpenHIE architecture as well as the Instant OpenHIE guidelines in order to eliminate vendor lock-in and make it easier for both technical and non-technical users to deploy self-hosted instances of OpenBoxes.

As a first step we are looking to implement a push button deployment mechanism for non-technical users that will provide the foundation for containerization and orchestration of services required by OpenBoxes. This will require us to publish container images for OpenBoxes and its dependencies (in cases where we need custom images) to a public repository (like DockerHub) and provision IaaS and PaaS services and/or containers for images, as well as any other services for cross-cutting concerns like logging, load balancing, monitoring, backup, and authentication.

As a final step, we would also like to create an Instant OpenHIE extension package to allow technical users to deploy OpenBoxes as a reference implementation for the Logistics Management Information System (LMIS) component of the Business Domain Services layer of the OpenHIE architecture. In addition to providing LMIS features, Openboxes has a flexible product and location data model that supports standards such as GS1 GTIN, GLN, and GCP as well as UNSPSC classifications. This makes OpenBoxes an ideal candidate to become a reference implementation for the OpenHIE architecture's master data registry for products (Product Registry) and facilities (Facility Registry) as well.

Use Cases and User Stories

WP1 Push Button Deployment

Technical Users
- As a new developer I want to clone the OpenBoxes GitHub repository, create a new feature branch and execute a docker command on my laptop so that I can start development of a new feature.
- As a product owner I want to spin up an OpenBoxes instance using a container image that includes changes from a feature branch so that I can test the feature.

Non-technical Users

- As a software evaluator I want to click a button on the OpenBoxes GitHub repository that triggers a new deployment to a hosting platform of my choice so that I can demonstrate the software to my stakeholders.

WP2 New User Onboarding

Setup Wizard(s)
- As a superuser I want to be guided through setup to configure the system and install demo data so that I can quickly evaluate the software by seeing examples of how the system was designed to work.
- As a superuser I want to be able to delete demo data and start with a clean database so that I can start adding my own data.

- As a superuser I want to be guided through configuration of my first storage facility (e.g. name, organization, logo, location group, supported activities, bin locations, inventory, inventory levels) so that I can start tracking my inventory.

Data Import and Synchronization
- As a superuser I want to import medicines from a Product Registry data source (e.g. WHO essential med lists).
- As a superuser I want to import categories from a Product Classification data source (e.g. UNSPSC).

WP3 Improve Documentation

Inline documentation and embedded tutorial videos
- As a user I want to be able to pull up a help sidebar that provides contextual video tutorials and documentation for the page that I'm on.
- As a user I want to watch a video tutorial that provides (e.g. product naming convention, create users and assign roles, create locations and location groups).

Installation documentation
- As a system administrator I want to be able to view documentation that will allow me to migrate from local on-premise to the cloud (as per OpenHIE guidelines).
- As a system administrator I want to be able to view docs for installing OpenBoxes in the cloud through the installation wizard.
- As a system administrator I want to be able to view docs for setting up the server (email, currency, system-wide logo etc).

Implementation documentation
- As a superuser I want to be able to view documentation that walks me through all of the steps to configure OpenBoxes for my specific use case.

Developer documentation
- As a developer I want to be able to view and test the REST API through an OpenAPI (Swagger) interface.

Objectives and Activities

The objective for this project will be to allow a non-technical user to install and configure OpenBoxes in the most intuitive way possible. In order to achieve that goal, the project team will conduct the below activities, organized into three work packages.

Work Package 1: Push Button Deployment

Objective 1.1: Create a user-friendly installation experience for technical and non-technical users.
    Activity 1.1.1: Evaluate and adopt technologies to build, publish, and deploy a production-ready container of OpenBoxes and its dependencies conveniently from the command line
    Activity 1.1.2: Evaluate and adopt technologies to orchestrate resource provisioning within a cloud provider
    Activity 1.1.3: Add a "Deploy To" button to the OpenBoxes README on GitHub that will use a deployment service to automate deployment of resources into the user's account.
    Activity 1.1.4 Create Instant OpenHIE package that acts as a wrapper around
    Activity 1.1.5: User acceptance testing

Work Package 2: Configuration Wizard

Objective 2.1: Create a wizard for setting up new depot locations

Activity 2.1.1: Interview and observe users as they set up a new depot location and import inventory

Activity 2.1.2: Define user stories with acceptance criteria

Activity 2.1.3: Implement an initial solution

Activity 2.1.4: Test solution with users at multiple levels of technical skills and in multiple countries

Activity 2.1.5: Deploy to production

Objective 2.2: Create a wizard for importing products and categories from external sources

Activity 2.2.1 Create a data source for WHO essential medicines that mimics external product registries

Activity 2.2.2 Create a data source for UNSPSC categories that mimics external product registries

Activity 2.2.3 Build interface to consume product data from data source and translate to our data model

Activity 2.2.4 Build wizard to allow user to sync local product data from data source

Activity 2.2.5 User acceptance testing and adjustments

Activity 2.2.6 Deploy to production

Objective 2.3: Create a wizard for loading and unloading demo data

Activity 2.3.1 Create a data source for demo data

Activity 2.3.2 Create Liquibase migrations for loading data into database

Activity 2.3.3 Create Liquibase migrations for unloading data from database

Activity 2.3.4 Build UI to allow user to trigger loading / unloading demo data

Activity 2.3.5 User acceptance testing and adjustments

Activity 2.3.6 Deploy to production

Work Package 3: Improved Documentation

Objective 3.1: Develop external configuration documentation

Activity 3.1.1: Write draft documentation

Activity 3.1.2: User acceptance testing

Activity 3.1.3: Incorporate feedback and publish

Objective 3.2 Develop user configuration documentation

Activity 3.2.1: Write draft documentation

Activity 3.2.2: User acceptance testing

Activity 3.2.3: Incorporate feedback and publish

Objective 3.3 Add in-app video tutorials

Activity 3.3.1: Implement a self-service support sidebar that can be accessed on all pages

Activity 3.3.2: Survey users on video tutorials they would most like to see

Activity 3.3.3: Create new videos for top 3 responses that don't already exist

Activity 3.3.4: Add videos to sidebar on relevant pages

Activity 3.3.5: User acceptance testing

Activity 3.3.6: Deploy to production

Objective 3.4: Document REST API using OpenAPI 3.0 specification

Activity 3.4.1: Evaluate libraries available to auto-generate OpenAPI configuration

Activity 3.4.2: Automate generation of OpenAPI configuration

Activity 3.4.3: Generate client library based on OpenAPI definition

Activity 3.4.4: Deploy to demo server using swagger-ui and demo data profile

Community Feedback

The OpenBoxes community consists primarily of implementation organizations, which includes stakeholders, users, and developers. In addition, there is a not insignificant number of users and developers of the community that are not easy to engage with. They clone the source code or download releases and otherwise navigate their own way to evaluating, adopting, and managing a self-hosted version of OpenBoxes. We generally only hear from these users if they have a question or if something goes wrong. Without the tools we're proposing in this project, I imagine that a lot of these users fall through the cracks and end up walking away from OpenBoxes in search of software that is easier to install and customize. It is therefore critical to the success of OpenBoxes to make sure that these users have a satisfying user experience while deploying and configuring their own instance, as well as discovering self-service support through our documentation and tutorials.

In order to engage the entire community we've set up the following tools to disseminate important announcements, solicit feedback, and manage our development workload.

- Roadmap https://openboxes.com/roadmap/
- Discussions https://discuss.openboxes.com/
- Issues https://github.com/openboxes/openboxes/issues
- Releases https://github.com/openboxes/openboxes/releases

We have published an announcement to our discussion forum that spells out the objectives of the Shelf Readiness project and solicits feedback from users.
https://discuss.openboxes.com/t/push-button-deployment-new-user-onboarding/227

We are planning to send a more formal invitation to our implementing organizations and hope that other users from the community will join the discussion as well. We will keep users informed of decisions about the project as well as new releases related to this project through the Announcements section of the Discussion Forum. We will provide opportunities for testing / QA new features through our continuous integration platform. In addition, we will also update the Roadmap to reflect the work items we plan to complete as part of the Shelf Readiness project.

In the longer term we are also looking to collaborate with the OpenHIE community as well as specific open-source partners like OpenMRS, OpenLMIS and DHIS2 to investigate opportunities for integration as well as developing and/or adopting data standards to ensure interoperability between all of these systems. Our vision is to integrate systems like OpenBoxes (warehouse) with OpenMRS (dispensing), OpenLMIS (program management and replenishment), and DHIS2 (reporting). For example, OpenBoxes could handle inventory management at the warehouse level (i.e. from receipt of a sea container to fulfilling requisitions made by a pharmacy), OpenLMIS could generate replenishment orders from health programs and facilities that could be fulfilled by OpenBoxes, and OpenMRS could manage dispensing transactions at the patient level. All of these systems would report to DHIS2 which would allow us to reconcile inventory transactions across multiple levels of the healthcare supply chain reducing waste as well providing more accurate forecasts for purchasing.

We are very eager to discuss opportunities for interoperability as well as the underlying technologies used to provide message translation and transformation (e.g. OpenHIM Mediators and Mirth Connect) between these systems.

Schedule

Activity	Team Location	Quarter		
		[Q] 1	[Q] 2	[Q] 3
1.1 Create a user-friendly installation experience for technical and non-technical users				
1.1.1 Evaluate and adopt technologies to make it easy to deploy a production-ready version of OpenBoxes conveniently from the command line	OpenBoxes & SolDevelo	X		
1.1.2 Evaluate and adopt technologies to automate the creation of infrastructure resources like VMs, databases, etc	OpenBoxes & SolDevelo	X		
1.1.3 *Add a "Deploy To" button to the OpenBoxes README on GitHub that will use each provider's deployment service to automate deployment of resources into the user's account.*	OpenBoxes	X		
1.1.4 User acceptance testing	PIH, Rwanda	X		
2.1: Create a wizard for setting up new depot locations				
2.1.1: Interview and observe users as they set up a new depot location and import inventory	PIH, USA and Liberia	X		
2.1.2 Define user stories with acceptance criteria	PIH, USA	X		
2.1.3: Implement an initial solution	OpenBoxes, USA & SolDevelo, Poland	X		
2.1.4: Test solution with users at multiple levels of technical skills and in multiple countries	PIH, USA, Liberia, Haiti, Rwanda	X		
2.1.5: Deploy final solution	OpenBoxes, USA	X		
2.2: Create a wizard for importing products from external sources				
2.2.1 Create a data source for WHO essential medicines that mimics external product registries	OpenBoxes, USA	X		
2.2.2 Create a data source for UNSPSC categories that mimics external product registries	OpenBoxes, USA	X		
2.2.3 Build interface to consume product data from data source and translate to our data model	OpenBoxes, USA	X		
2.2.4 Build wizard to allow user to sync local product data from data source	SolDevelo, Poland	X		

Task	Org, Location			
2.2.5 User acceptance testing and adjustments	PIH, USA	X		
2.2.6 Deploy to production	OpenBoxes, USA	X		
2.3: Create a wizard for loading and unloading demo data				
2.3.1 Create a data source for demo data	OpenBoxes & PIH, USA		X	
2.3.2 Create Liquibase migrations for loading data into database	OpenBoxes, USA			X
2.3.3 Create Liquibase migrations for unloading data from database	OpenBoxes, USA			X
2.3.4 Build UI to allow user to trigger loading / unloading demo data	SolDevelo, Poland			X
2.3.5 user acceptance testing and adjustments	PIH, Liberia			X
2.3.6 deploy to production	OpenBoxes, USA			X
3.1: Develop external configuration documentation				
3.1.1 Write draft documentation	OpenBoxes, USA			X
3.1.2 user acceptance testing	SolDevelo, Poland			X
3.1.3 Incorporate feedback and publish	OpenBoxes, USA			X
3.2 Develop user configuration documentation				
3.2.1 Write draft documentation	PIH, USA			X
3.2.2 user acceptance testing	PIH, Liberia			X
3.2.3 Incorporate feedback and publish	PIH, USA			X
3.3 Add in-app video tutorials				
3.3.1: Implement a help sidebar that can be accessed on all pages	OpenBoxes, USA and SolDevelo, Poland		X	
3.3.2 Survey users on video tutorials they would most like to see	PIH, Virtual		X	
3.3.3: Create new videos for top 3 responses that don't already exist	PIH, USA		X	
3.3.4: Add videos to sidebar on relevant pages	SolDevelo, Poland			X
3.3.5: User acceptance testing	PIH, Rwanda			X

3.3.6: Deploy to production	OpenBoxes, USA			X
3.4: Document REST API using OpenAPI 3.0 specification				
3.4.1: Evaluate libraries available to generate OpenAPI configuration	OpenBoxes, USA		X	
3.4.2: Automate generation of OpenAPI configuration	OpenBoxes, USA		X	
3.4.3: Generate client library based on OpenAPI definition	OpenBoxes, USA		X	
3.4.4: Deploy to demo server using swagger-ui and demo data profile	OpenBoxes, USA		X	

Deliverables

Deliverable	Quarter Due
1.1.3 Infrastructure as Code artifacts required to implement push button deployment from GitHub	Q1
1.1.4 Instant OpenHIE package to install OpenBoxes as a Business Service that implements LMIS functionality of OpenHIE architecture	Q1
2.1 Configuration wizard for location creation	Q1
2.2 Configuration wizard for external product import	Q1
2.3 Configuration wizard for loading and unloading demo data	Q3
3.1.3 Final external configuration documentation package in English	Q3
3.2.3 Final user configuration documentation package in English	Q3
3.3.3 Three new tutorial videos created and posted to openboxes.com	Q2
3.3.6 Help sidebar with tutorials available on at least 10 pages	Q3
3.4.3 REST API client library released to GitHub	Q2
3.4.4 Swagger UI to explore OpenBoxes REST API	Q2

Global Good Maturity Model Assessment

https://docs.google.com/spreadsheets/d/1d5jdKRs_br0SvyJ4M51AvcsOUgm2wWUmNfbM-0KVrR0/edit#gid=249752520

Source Code

https://github.com/openboxes/openboxes

Digital Health Atlas

The following projects have been registered in the Digital Health Atlas:
Malawi: https://digitalhealthatlas.org/en/-/projects/1004/published
Haiti: https://digitalhealthatlas.org/en/-/projects/1001/published