Expanding the Bahmni Hospital System as a FOSS Project

Proposal Status: Awarded--Fully Funded

Executive summary

Bahmni is an easy to use, complete, open source Hospital Information System (HIS) and Electronic Medical Record (EMR) that has been built in the Global South to meet the needs of low resource environments. Bahmni is a distribution of the OpenMRS medical record platform, with a user interface built from the ground up. It also supports Odoo (formerly OpenERP), OpenELIS, and dcm4chee, providing an integrated robust solution that manages patient information in a flexible fashion through the care cycle, including registration, various points-of-care, investigations, lab orders and results management, PACS and billing. Bahmni believes in "not reinventing the wheel" and leverages existing open source products which are best of the breed for those functions. Bahmni is built in a modular fashion, enabling relevant components of Bahmni to be chosen and integrated based on need.

To date, Bahmni has more than 30 implementations in over 20 countries, and several new implementations have started in the last year. Bahmni fills an important gap in the global health IT space, as it is designed to be intuitive and simple to use at the point of care, requiring minimal support. Bahmni is easy to deploy and implement, does not require custom software development to be usable. This combination of functionality and limited need for technical implementation support has led to the rapid adoption of Bahmni in many countries and an ever-growing interest in Bahmni. Currently, the governments of Bangladesh and Bhutan are in discussion to scale Bahmni nationally to all of their public sector hospitals, and Tanzania is preparing for a similar scale-up.

Bahmni's software and user base is mature, but its FOSS community is newly-formed, and still dependent on grant funding. Bahmni coalition partners are growing their business models around the product, but the current level of contributions they can make to shared activities is not enough to satisfy Bahmni's stakeholders. This funding proposal will further consolidate and expand our core FOSS activities, giving coalition partners room to grow their Bahmni work, which provides long-run resourcing to our shared efforts.

Consortium team: the Bahmni Coalition

ThoughtWorks started the Bahmni project in January 2013, and in January 2018 it transferred full ownership over the Bahmni product and initiative to the newly-formed Bahmni Coalition, turning it into a fully FOSS project. The Bahmni Coalition includes 15 organizations , including the original owner ThoughtWorks. The Bahmni Coalition reflects implementers, developers, end consumers, and enablers that have signed an MOU to work together to establish and execute a common roadmap for Bahmni, to jointly resource the Bahmni project, and to coordinate enhancing the Bahmni product. The elected Governing Committee meets regularly and is committed to efficient and effective decision making. At the current time, the Bahmni Coalition is not an incorporated legal entity; fiscal sponsorship is available through OpenMRS Inc.

The project proposed here would be subcontracted to Bahmni Coalition members. As an illustration, in 2017 we received a grant from DIAL to aid our FOSS transition, which successfully funded work done by a team of community developers sourced from IntelliSOFT, LeapFrog Technology, Mekom Solutions, and ThoughtWorks.

Project Description

Bahmni seeks to build upon the initial success of its recent FOSS transition. A critical mass of complementary organisations have committed to the establishment and support of the consortium. While the FOSS transition has been successful to date, the Bahmni community still faces challenges in effectively managing a collaborative, community-driven approach to software development, project management, and strategic planning at the scale to which we aspire. This proposal seeks to build upon the initial success of this transition and historical lessons learned by further improving the efficiency and effectiveness of our processes, as well as our ability to make functional and technical enhancements to the Bahmni product.

Work Package 1: Enabling and Growing the Bahmni Community

First, we propose to strengthen interactions within the Bahmni Coalition, and with external stakeholders and audiences.

Our product roadmap is at the center of Bahmni coalition interactions. Our proposed Community Manager position will lead our roadmap-setting process, while making improvements to our existing process . Particularly she will increase communications with coalition members and external stakeholders about their upcoming timelines and development efforts, so we can set a shared roadmap that is more responsive to stakeholder needs, and more efficient in integrating work from implementations projects.

We will also increase our external communications through our website and social media, leveraging a communications specialist to define a communications plan relevant to our coalition model.

Work Package 2: Core Activities to Support Efficient Community FOSS Development

In this work package we propose to resource a small core development team that will enable and increase efficiency of work from the larger set of Bahmni developers and implementers associated with individual projects.

This small team would be responsible for introducing new developers to the codebase, reviewing code contributions, expanding documentation, and managing new releases of the Bahmni software.

This team would help to generalize features originally developed for individual implementations, and incorporate them into the shared product, resulting in increased functionality and impact for all Bahmni users.

Finally this team would make some foundational improvements to Bahmni's packaging (such as adding official support for Docker), and its release process (simplifying the current processes), that can only be done centrally and not in the context of a single implementation project.

Work Package 3: Implementing the Shared Roadmap

We have an ongoing process that will define a new product roadmap reflective of the needs of the broad Bahmni community. The first version of the shared roadmap will be published by the end of April, but with our current resourcing we will address only a small fraction of the enhancements requested by our community.

By expanding our development team, we will deliver a larger part of this shared roadmap within the next year, resulting in improved support for clinical care as well as documented lessons learned that can be shared throughout the ecosystem.

The shared roadmap is still being defined and prioritized by the community, but three likely top items are Full Internationalization Support, a Hub & Spoke Synchronization model, and a Flattened Analytics Database.

Use Cases, User Stories, and Activities

We propose to carry out activities in two broad categories: Community Enabling (WP1), and Software Development (WP2 and WP3).

Enabling and Growing the Bahmni Community

Over the past 9 months we have successfully built a coalition of organizations who collaborate loosely to set the Bahmni project and product direction. Our activities during this next year will focus on (a) strengthening the interactions between these coalition members, (b) identifying and onboarding new coalition members, and (c) expanding our interactions with the larger community of stakeholders beyond the Bahmni coalition. This foundational work is critical to improving our delivery cycle of Global Goods for others to use.

A. Strengthening interactions between coalition members

Shared Roadmap

We bootstrapped our community roadmap-setting process with a simplistic approach of having partners share wish lists of changes they want to

see in the Bahmni product, and making shared "gut feel" judgments on our Product Architecture Team calls.

As we move forward, we will develop a more sophisticated process, leveraging a Community Manager and Technical Project Manager to determine the actual work that partners have scheduled based on their upcoming projects. Aligning this resourced work with our Bahmni product releases will lead to more feature-rich releases, and faster turnaround for partners who want to see their changes incorporated into the core product.

Individual Partner Roadmaps

Beyond the shared roadmap, individual coalition members have their own tactical roadmaps based on shorter-term project needs. We will develop and implement a process for Bahmni coalition members to share their medium-term roadmaps, and with the support of the Community Manager we will identify opportunities for direct collaborations between coalition members with related upcoming needs.

Jointly Pursuing Opportunities

Our collaborative effort is young, but we have already seen the first examples of Bahmni coalition members self-organizing to jointly bid on RFPs. With a Community Manager we will be better able to support these pursuits, and make them easier to set up. We will define standard approaches and communication templates, for organizations looking to subcontract within the coalition. We will generate some common wording and collateral that can be used in pursuits and proposals to show the strength of our broad coalition, even if only one or two members apply.

Shared QA Process

The Community Manager will coordinate all coalition members to participate in a shared QA process leading up to our product releases. This will mainly entail increased communications, and schedule alignment.

B. Identifying and Onboarding new coalition members

The coalition membership is made up of organizations that ThoughtWorks had contact with during its original ownership of Bahmni. Since forming the coalition, we have received inquiries from other organizations interested in joining.

With a dedicated community manager, we will be able to respond to these contacts, develop principles and processes to help evaluate their interest, and determine which relationships will benefit Bahmni's goals.

We would standardize the communications and processes that take an organization from its initial expression of interest, to its engagement as an open-source contributor, to growing its investment in the Bahmni product and becoming a member of the Bahmni Coalition.

C. Expanding our interactions with the larger community of stakeholders

Website and Social Media

We desire to increase our engagement, and roadmap and technical transparency with the larger community, and believe that we can do this with additional social media tools. For several years, Bahmni had dedicated support from Product Managers and a Communications team, which allowed it to develop a frequently-visited website (http://bahmni.org) with good search-engine ranking, an active Twitter account (@BahmniOrg), and a blog full of technical and programmatic content (https://medium.com/bahmni-blog). We propose to leverage a communications specialist, shared with other Global Goods projects, to develop a communications strategy that can be efficiently carried out in small amounts of donated time from individual coalition members.

Meeting Representation

The Bahmni product has generated increasing interest, and the Bahmni Coalition approach is a novel success story in this space (building a new

FOSS coalition around a mature product, under fiscal sponsorship from a mature FOSS community). We also face current challenges due to lack of understanding of the current Bahmni arrangement, and fears about its future trajectory after ThoughtWorks gave up sole ownership.

We propose to send representatives of the Bahmni Coalition to present and network at relevant meetings (such as the Global Digital Health Forum and the OpenMRS Implementers Meeting), both to seek out more potential users and collaborators, and to better communicate how our community functions.

Software Development

We propose to resource a core software development team that will perform two sorts of activities: core activities that support efficient community FOSS development, and centralized work on the shared roadmap.

Work Package 2: Core Activities to Support Efficient Community FOSS Development

The Bahmni community has a small core development team that focuses on our shared priorities and roadmap, and a much larger set of developers working for coalition partners on their implementation projects. Our success depends on leveraging the small core team to carry out activities that enable larger contributions from that broader FOSS community.

Dedicated Time for Standard FOSS Activities

Open Source development requires certain basic activities to happen; a dedicated core team ensures that they happen faster. Our core team will help new developers understand the codebase and troubleshoot new versions of dev tools. They will review code submissions, and get them onto QA environments for testing.

Generalizing Features Developed for Individual Implementations

The larger group of implementation-focused developers invariably works on tight timelines and their enhancements to the Bahmni product are driven by particular implementation needs. This results in many interesting new features being built for individual hospitals that are difficult or expensive to merge back into the shared product. A critical core team activity is to improve this process, so that the core product can evolve faster and share more innovations coming from on-the-ground projects.

Whenever possible, the core team will provide up-front design assistance and design review for product enhancements that are planned by implementation projects. The core team views these developments with a broader product lens, and can provide input that improves the long-term design of features, makes them applicable to more use cases, and lowers the eventual cost of merging those changes into the shared product.

In addition, when one partner has built a specific feature that the rest of the coalition wants to see generalized and merged to the core product, the core team will help with the code changes and merging, thus lowering the effort required by individual projects to share their work.

Two recent examples show us how our process can be improved. (1) An OT Scheduling feature was built for one hospital; it received effective review from the core team (after the fact), and is on track to be incorporated into the core product, though this would have been more efficient if it could have been reviewed up front. (2) The same hospital enhanced our Inpatient Bed Management features, but in this case the core team was too busy to engage at the right time, and the work to merge that feature has languished.

Expand user, implementer and technical documentation in a timely manner

As required by a ready-to-use HMIS solution, Bahmni has a good set of documentation (see Implementer's Guide , Feature Guide , User Guide ,

Developer's Guide) originally written by a larger ThoughtWorks core team. While this documentation is far better than average for FOSS projects, it still has gaps and needs to be maintained and expanded as the product evolves. It is impossible to count solely on coalition partner teams to do this centralized documentation, so maintaining documentation is a key activity of the core developer team. We propose to add 0.15 FTE of a technical writer to our team, ideally shared with other related Global Goods projects, to augment the documentation work done by our core developer team. (This FTE fraction would be increased in WP3.)

Packaging and Deployment Improvements

Bahmni only officially supports CentOS. There is no limitation in the product itself, but the original ThoughtWorks developers only invested in releasing and supporting builds for a single platform. The proposed core team will refactor our packaging and deployment so that we can officially release artifacts for other platforms (most likely Docker and Ubuntu/Debian, though this will depend on user research).

Releases and Managing Infrastructure

Each release of the product requires a significant amount of DevOps effort (such as setting up build pipelines, QA and Demo machines), and packaging and testing efforts. All of this will be carried out by the core dev team.

The core team will also spend time over the next year simplifying our release and Continuous Delivery processes to improve automation, and lower the manual effort required in subsequent releases.

Researching bug reports

An important activity carried out by the core team is to research bug reports that come in via our community channels. Often these bugs are ultimately fixed by non-core developers, but being able to have dedicated core devs quickly triage and respond to the initial reports maintains trust in the Bahmni product.

Work Package 3: Centralized Work on the Shared Roadmap

The activities in WP2 are the minimum central efforts required for Bahmni's FOSS community to function efficiently, but they lead to very slow progress on our shared roadmap. We aspire to do more than this minimum.

We present an additional work package that would increase our impact by making faster progress towards addressing the large backlog of product enhancements that implementations and users constantly request.

The Bahmni community is actively setting the next year's roadmap (supported by initial Global Goods funding), so the exact prioritization may change up until things are finalized in April, but here we list thre items we know to be high in the shared priority list.

Full Internationalization Support

Bahmni is localizable (using the Transifex tool) and has been successfully configured to run in many different languages, but it does not support full internationalization across the entire product stack, and it has limitations while supporting multiple languages in a single installation.

Over the course of the next year we propose to address this, which includes Supporting Right-to-Left languages, using the default locale for configuration, and filling localization gaps in some newer Bahmni features.

Hub & Spoke Synchronization

Frequently, implementers would like to deploy multiple Bahmni servers and have them synchronize data in a network, and we have carried out a detailed tech analysis of how to build this feature. The Bahmni team shared this design with SolDevelo who is using it as the starting point for OpenMRS Sync 2.0 (see their Digital Square proposal). We expect to leverage the output of that work as the basis of an equivalent Bahmni feature.

Flattened Analytics Database

While Bahmni does support some pre-created or "canned" reports, end users are not able to create customized reports and the underlying OpenMRS transactional data model is not conducive to advanced analysis. A process that creates and periodically updates a flattened analytical database extracted from Bahmni will allow users to use off the shelf tools for custom reports and analyses, and maximise the use of their data.

Digital Health Technologies

Bahmni's fundamental approach is to combine and enhance existing open source products into a single solution.

OpenMRS for electronic medical records and patient management

OpenERP for inventory, billing, financial accounting

DICOM and **PACS**

OpenELIS for laboratory management

Figure 1: Bahmni out of the box components

- Bahmni's EMR combines an OpenMRS backend with a custom JavaScript based front end. It is built using Java, MySQL, Hibernate, Spring, REST API, AngularJS, React.

- Bahmni's ERP solution is based on OpenERP v7 which is based on Python, PostgreSQL and XML HTTP API.

- Bahmni's LIMS is based on OpenELIS Global which uses Java, JSP, PostgreSQL, Hibernate, HTTP API.

- Bahmni's PACS solution is based on Oviyam and dcm4che.

These subsystems are integrated in a lightweight way, using Atom Feeds and the underlying systems' HTTP and REST based APIs. Bahmni's support for standards depends on its upstream dependencies.

- OpenMRS provides support for the HL7 version 2 and FHIR standards, and supports concept dictionaries mapped to ICD10, SNOMED, LOINC, and other terminologies. Bahmni plans to revamp its concept dictionary management to be based on the Open Concept Lab once OpenMRS-OCL integration is more mature, and is investing in this integration where possible.

- OpenELIS is a free open-source laboratory information system (LIS) designed to act as a "software and business process framework for the robust functioning of public health laboratories."[ref]

- Odoo (formerly OpenERP) is one of the leading open source enterprise resource planning systems. Out of the box Bahmni leverages it to handle patient billing and drug inventory management, but it supports hundreds of plugins that can extend Bahmni to cover standard processes like HR management and accounting.

- Dcm4chee is an Image Manager/Image Archive according to IHE and supports the DICOM standard.

While Bahmni as a product is packaged and ships out of the box with the above components, it enables interoperability with other systems through the implementation of further Atom Feeds or by expanding its current API.

One of the big picture goals of an hospital management system is to become one of the multiple nodes of an Health Information Exchange (HIE) where actionable health data can be shared across systems and locations. In the OpenHIE model, Bahmni is intended to function as an External System , running instances at many hospitals or clinics, all of which are integrated via the HIE. Bahmni itself is not intended to serve as

a national-level Shared Health Record or Master Patient Index (and has only been tested at the scale of hundreds of thousands of patients per instance) but to become an in-facility patient-level data feed for HIE components.

In Bangladesh for example, Bahmni serves as the Reference Client Application to demonstrate integration with the SharedHealth HIE. Bahmni instances running at multiple levels of the health system alongside other patient-level systems, all share data via this HIE, primarily using FHIR, as shown in this diagram:
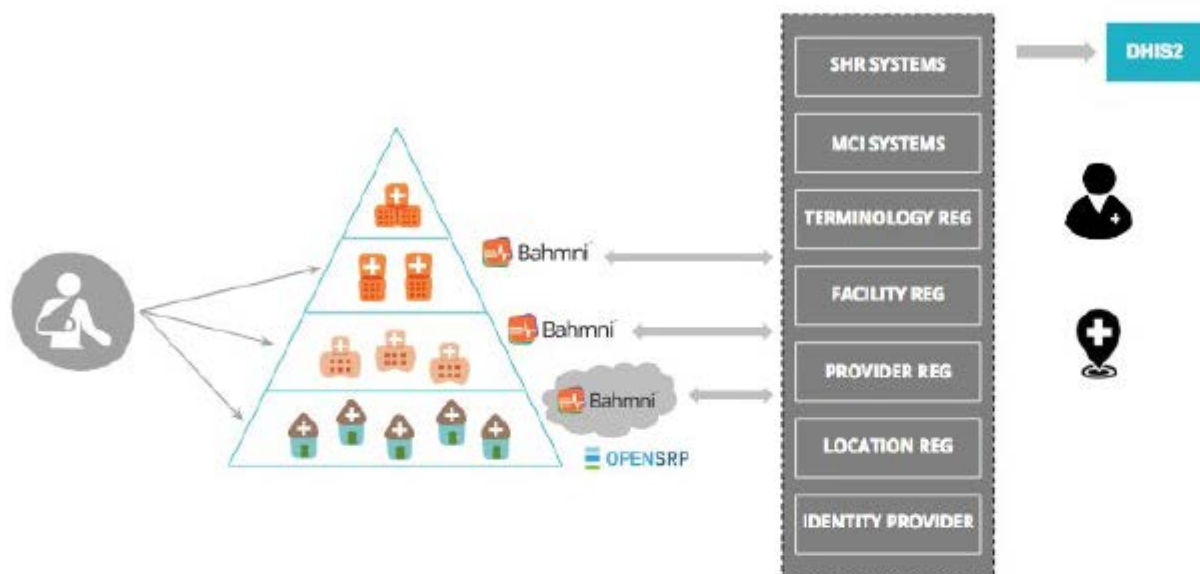
Figure 2: The Bangladesh HIE

This figure also indicates how Bahmni interacts with other Global Goods (OpenSRP and DHIS2) in a specific country's context. But further, Bahmni by design (1) utilizes multiple digital health technologies and (2) enables expansion to further digital health technologies. The Bahmni Coalition is naturally predisposed and open to engaging in roadmap collaborations with groups and consortiums with overlapping scopes and interoperability potential. We already have direct interactions with six other proposed global goods:

- Strengthening OpenMRS
  OpenMRS is the core backend component of Bahmni EMR, and synergies between the two communities are very strong. We comment on each other's design discussions, and Bahmni frequently builds OpenMRS platform features and leads releases.
- OpenMRS Sync 2.0 module development, implementations and maintenance
  As mentioned in our Software Development Activities section, Bahmni contributed to the design of OpenMRS Sync 2.0, and we intend to leverage it in the Hub & Spoke feature our own roadmap (wiki and trello). We will continue to attend its project showcases and provide feedback.

- Strengthening OCL Governance, Community and Features in Preparation for User Growth
  We have collaborated with OCL on specific plans to leverage OCL in Bahmni, and one of Bahmni's architects is leading discussions on OpenMRS-OCL integration that will support all three projects.

- Packaging OpenSRP for scale and community-driven national adoption
  OpenMRS is used as the EMR backend for both Bahmni and OpenSRP, and there have been successful Bahmni-OpenSRP integrations, most notably in Bangladesh in the context of vaccination and in Pakistan where the endTB project is working to integrate OpenSRP with Bahmni for daily treatment monitoring of patients with complicated MDR-TB. OpenSRP could eventually become the mobile platform of choice for implementations requiring field-level systems around their Bahmni-based

facilities (as an upscale alternative to Bahmni Connect).

- OpenLMIS Advocacy and Community Engagement
  As OpenLMIS matures and expands we expect to see facilities that want to use Bahmni for local stock management, but integrate this with OpenLMIS for requisitions and reports. We have had past design discussions with the OpenLMIS tech team to inform how their microservice architecture would support this, and hope to eventually collaborate on a real-world use case.

- Building an Open Source LIS Technologies Community of Practice
  Bahmni uses a fork of OpenELIS Global, since that community was not responsive when we started in 2013. If this proposal leads to more vibrant collaborations around Open Source LIS, that could let us converge with the main branch of an active LIS project.

Community Feedback

Bahmni is organized as a collaboration between organizations with a shared interest in extending the core product, and ensuring it is sufficiently resourced. This coalition is made up of a diverse set of organisations across the globe, and its Governing Committee is charged with representing the broader Bahmni community.

Bahmni uses the knowledge and experience of its coalition members and other implementing organisations to develop a community-driven roadmap. These organizations all have interests in multiple global health technologies and a self-interest in ensuring that Bahmni (as an EMR and HIS) is aligned with other global & digital health projects and technologies. In the Digital Health Technologies section we list existing interactions with other applicants to Notice B.

Bahmni will primarily engage with the broader digital health community through its coalition members, who participate in a range of related projects, and regularly attend global and regional digital health meetings. Weekly and bi-weekly community calls have been put in place to ensure open, active engagement across a range of topics, including product architecture, roadmap prioritisation, core team development, inbound contact management, and other community announcements. In addition, Bahmni actively maintains an extensive product wiki, discussion forum and online chat/messaging service for input and feedback from the broader digital health community.

Bahmni will also use its relationship with OpenMRS, acting as Bahmni's fiscal sponsor, to strengthen community engagement measures, leveraging an existing, mature community, and the support of established technical infrastructure, relationships, meetings, and well-aligned technical, implementer, and end-user groups and communities.

Finally, Bahmni will look for opportunities for direct engagement and growing the community through external-facing community management activities such as social media, participating in student internship programs, attendance at events like the Global Digital Health Forum, OpenMRS implementers meeting, and other regional and international connect-athons and conferences.

Global Good Maturity Model Self-Assessment

See Bahmni self-assessment   .

Global Good Maturity
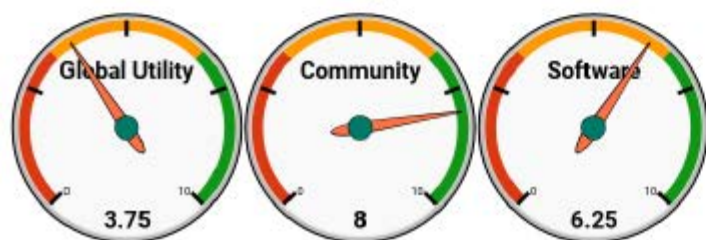

Global Utility — 3.75

Community — 8

Software — 6.25

Figure 3: Bahmni's Global Good Maturity

Workplan

Staffing

Work Package 1

- 0.5 FTE Project Lead (donated in-kind)
- 0.5 FTE Community Manager
- 2 months of a Communications Specialist

Work Package 2

- 0.4 FTE Software Architect (donated in kind)
- 0.3 FTE Tech Lead
- 0.5 FTE Business Analyst (donated in kind)
- 2.0 FTE Developer
- 0.15 FTE Technical Writer

Work Package 2 & 3 combined

- 0.4 FTE Software Architect (donated in kind)
- 1.0 FTE Tech Lead
- 0.5 FTE Technical Project Manager
- 1.0 FTE Business Analyst
- 5.0 FTE Developer
- 0.4 FTE Technical Writer

Comparison with Current Team Size

Over the last 6 months we have had a 4.25 FTE core dev team (0.25 FTE Tech Lead, 2 FTE senior, and 2 FTE junior), assembled from Global Goods grant funding from DIAL and PATH and in-kind contributions from coalition partners. Work Package 2 includes a truly minimal dev team, smaller than our current one. Work Packages 2 and 3 together give a larger dev team than our current state, which would allow us to deliver more significant features.

Plan

Responsible	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
	Work Package 1: Enabling and Growing the Bahmni Community											
Communications specialist	Develop communications strategy											
Communications specialist		Implement communications strategy										
Project Lead		Identify and onboard new coalition members										
Community Manager	Develop standard processes for subcontracting											
Community Manager				Strengthen interactions between coalition members								
Community Manager	Manage community calls and communications											
Community Manager	Roadmap review											
Community Manager			Ongoing communication with coalition members									
Community Manager							Roadmap review					
Community Manager									Ongoing communication with coalition members			
	Work Package 2: Core Activities to Support Efficient Community FOSS Development											
Technical Writer	Expand user, implementer and technical documentation											
Software Architect	Manage product architecture calls											
Technical Lead	Generalize features developed for individual implementations											
Technical Lead	Incorporate community contributions into core product											
Technical Lead	Ongoing FOSS activities: - Onboard new developers - Review and merge code submissions - Research new dev. tools - Research bug reports											
Technical Lead			Packaging and deployment improvements									
Technical Lead						Software release & continuous delivery improvements						
	Work Package 3: Centralized Work on Product Enhancements											
Technical Project Manager	Manage product roadmap and backlog											
Technical Project Manager	Align resourced work with product roadmap											
Technical Lead	Full Internationalization support											
Technical Lead				Hub and Spoke synchronization								
Technical Lead									Flattened analytics database			

(Or, see the plan   as a spreadsheet   .)

Metrics

Work Package 1:

1. Roadmap published, with clear public feedback mechanisms
2. Website views and Twitter engagements
3. Development of standard process for evaluating and onboarding new Bahmni coalition members

Work Package 2:

1. Design support and review provided for at least 6 features
2. At least 3 implementation-developed features integrated into the shared product
3. Bahmni officially supports Docker deployments
4. Three product releases carried out in 12 months
5. Establishing an SOP for product release that will be published and include best practices for the global HIT EHR community

Work Package 3:

1. Delivery of 3 significant product enhancements identified in the roadmap

Budget Narrative

Bahmni Coalition

Co-resourcing and In-Kind Contributions

The Bahmni Coalition is composed of organizations committed to investing in the Bahmni initiative, many of whom are co-resourcing this project plan. In some cases member organizations fully staff roles via in-kind contributions (for example ThoughtWorks is providing Project Lead and Software Architect roles, and Samanvay and Satvix are providing Business Analyst time). In other cases, organizations can fill developer roles at deeply discounted rates, as long as some funding is available (for example two of our current full-time developers are sourced via grant funding at a 50% discount).

This project's budget reflects both of these in the "In-kind contribution" column, which indicates the extent to which roles are completely provided or discounted by one of the Coalition partners. The "DS Cost" columns indicate the part of the proposed project plan that we are asking Digital Square to fund, which will enable coalition members to make these contingent contributions.

Coalition and Subcontracting (total costs)

Bahmni will not directly employ any staff, but rather subcontract to organizations in the coalition to fill the project roles. Thus our budget numbers already indicate the total cost for these roles, with benefits, overhead, etc, already built into the hourly/monthly rates.

Indirect

Our indirect rate for carrying out Bahmni activities via OpenMRS Inc's fiscal sponsorship is 12%. This is included in the detailed budget.

Work Packages

We divide our proposal into three work packages. Together, work packages 1 and 2 represent the baseline activities that we must carry out to maintain Bahmni as an effective FOSS collaboration. Work package 3 represents sourcing a larger development team which would achieve our product goals faster.

Work Package 1: Enabling and Growing the Bahmni Community
Total Direct Costs: $58,708
In-Kind Contributions and Discounts from Coalition: $175,392

Roles

Project Lead - 0.5 FTE - Darius Jazayeri, donated by ThoughtWorks
This role is responsible for leading overall coalition activities, helping to set strategies (e.g. communication strategy), and developing standard processes (e.g. for joint pursuits between coalition members).

Community Manager - 0.5 FTE - Christine Gichuki, provided at discounted rate by IntelliSOFT

This role is responsible for supporting communications within the Bahmni coalition (managing coalition calls, getting regular updates from coalition members) and outside the coalition (managing twitter, communicating with potential new coalition members). This role also manages our twice-yearly roadmap process, and helps share individual partner roadmaps to look for synergies.

Communications Specialist - 1.0 FTE for 2 months

This role would lead Bahmni in developing a communications strategy, and if possible help to carry out the strategy. This role should be shared with other Global Goods projects, and the exact configuration would depend on future negotiations via Digital Square. (One effective arrangement could be 1 month of intensive time early on, with <1 day per week of follow up in later months.)

Travel

This covers three international trips to represent Bahmni at meetings and conferences (the Global Digital Health Forum, the OpenMRS Implementers Meeting, and one other). Primarily this covers airfare, and assumes that coalition organizations will pay for the bulk of lodging and expenses.

Work Package 2: Core Activities to Support Efficient Community FOSS Development
Total Direct Costs: $117,648
In-Kind Contributions and Discounts from Coalition: $219,300

This is the cost to co-resource a truly minimal core development team, which allows FOSS processes to happen efficiently by securing dedicated time for necessary tasks that otherwise become bottlenecks.

This team's shared responsibilities include researching bug reports, providing design support to implementation teams as they plan features to be shared in the future, reviewing and merging code contributions, and performing the logistics of product releases. Responsibilities above the shared ones are listed below for individual roles.

Software Architects - 0.4 FTE - Angshuman Sarkar and Darius Jazayeri, donated by ThoughtWorks

These roles are responsible to lead regular Product Architecture Team calls, and provide high-level advising and design to individual developers and teams.

Tech Lead - 0.3 FTE - Dimitri Renault, provided at discounted rate by Mekom Solutions

This role loosely manages the other developer roles, and does a larger amount of code and design reviews.

Business Analyst - 0.5 FTE - Arjun Khandelwal, Pankaj Kanchankar, others, donated by coalition members

These roles interface with clients and end-users in cases where their input is needed to write tickets for developers. Since WP2 includes a limited scope of new work, we can analyze it with contributed effort from coalition members.

Senior Dev - 1.0 FTE - provided at a discounted rate by coalition member TBD
Junior Dev - 1.0 FTE - provided at a discounted rate by coalition member TBD

These roles will perform the shared tasks listed above for the majority of their time, and do feature development with the remainder.

Technical Writer - 0.15 FTE

This role will lead documentation activities, with help from the developers. The role should be shared with other Global Goods projects.

Work Package 3: Centralized Work on Product Enhancements
Total Direct Cost: $272,448
In-Kind Contributions and Discounts from Coalition: $132,096

These roles, when combined with the roles in Work Package 2, give us a core dev team capable of making more progress towards our shared roadmap.

Tech Lead - 0.7 FTE
On top of WP2 this would allow us to staff a full-time Tech Lead

Technical Project Manager - 0.5 FTE - provided at a discounted rate by coalition member TBD
This role would manage the increased amount of work across WP2 and WP3

Business Analyst - 0.5 FTE
To carry out the larger scope of WP3, donated BA time from coalition members won't be sufficient; we need this dedicated BA time to do requirements analysis and prepare work for developers.

Senior Dev - 1.0 FTE
Junior Dev - 2.0 FTE
These roles would carry out some of the shared activities listed in WP2. Together all 5 developers would work on developing product enhancements from our shared roadmap.

Technical Writer - 0.25 FTE
With the increased scope of WP3 we would need more time from a technical writer: 2 days/week across WP2 and WP3. The role should still be shared with other Global Goods projects.

Supporting Documents:
Excel version of maturity model self assessment (downloaded from the google sheet linked in the proposal)