Strengthening the Open Civil Registration and Vital Statistics (OpenCRVS) System

Submitted by Christopher Seebregts (Jembi Health Systems) on January 18, 2018 - 10:57pm
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Executive Summary

Open Civil Registration and Vital Statistics (OpenCRVS) is an open source system supporting the digitisation of common processes for civil registration and vital statistics (CRVS), particularly those found in low resource countries. Globally, almost half of the world's children, most of them in Africa, are unregistered as well as 38 million of 56 million (two-thirds) annual deaths[i]. Being unregistered, a child is invisible in the eyes of the law and hence is vulnerable to many forms of abuse and neglect impacting on health status. Sustainable Development Goal (SDG) 16 (Promote just, peaceful and inclusive societies) includes the goal: "By 2030, provide legal identity for all, including birth registration." CRVS also provides critical information for monitoring of other SDGs[ii]. From a health perspective, CRVS is a necessary prerequisite to accessing health services and also provides fundamental information for the estimation of many health indicators. The Conference of Ministers Responsible for CRVS in Africa, held in Nouakchott in December 2017 resulted in a formal declaration[iii] which included: "...*Encourages* the Economic Commission for Africa, as the secretariat of APAI-CRVS (Africa Programme on Accelerated Improvement of Civil Registration and Vital Statistics), to lead the development of common information communication technology assets to support effective civil registration and vital statistics systems across Africa, ensuring the highest standards of data protection and confidentiality of personal data, in order to promote interoperability among civil registration, health and identity management systems, and having the flexibility to meet the needs of all African countries."

Digitisation of CRVS systems is an important approach to address the issues of poor birth and death registration, extend registration coverage, simplify administrative processes and share data between systems. However, there is a lack of affordable and effective CRVS systems in low resource environments. An open source, standards-based and interoperable CRVS system will have a significant impact on birth and death registration in low resource settings by increasing the reach and efficiency of CRVS systems as well as integrating CRVS processes, such as birth registration with health services, such as immunization.

OpenCRVS is a partnership between Plan International and Jembi Health Systems with a number of other collaborators. To date, the project has documented requirements and business processes in a number of countries in Africa and Asia and developed a prototype application that is currently at the low level in terms of the Digital Square Global Good Maturity Model. This proposal will supplement other funding streams and allow for the expansion of the software capabilities of the OpenCRVS project to a full low to medium level and implementation-ready status. The focus of this proposal is the development of two prioritised interoperability use cases. When coupled with the current implementation plans (separately funded), over the envisaged project period (12 months), the expected outcome will be to have an initial version of OpenCRVS working in two low resource countries in Africa and Asia, potentially Bangladesh and Mozambique[iv].

The OpenCRVS project was recently shortlisted by the Centre for High Impact Philanthropy as one of eleven 'best bets with greatest potential for impact'[v].

Consortium team

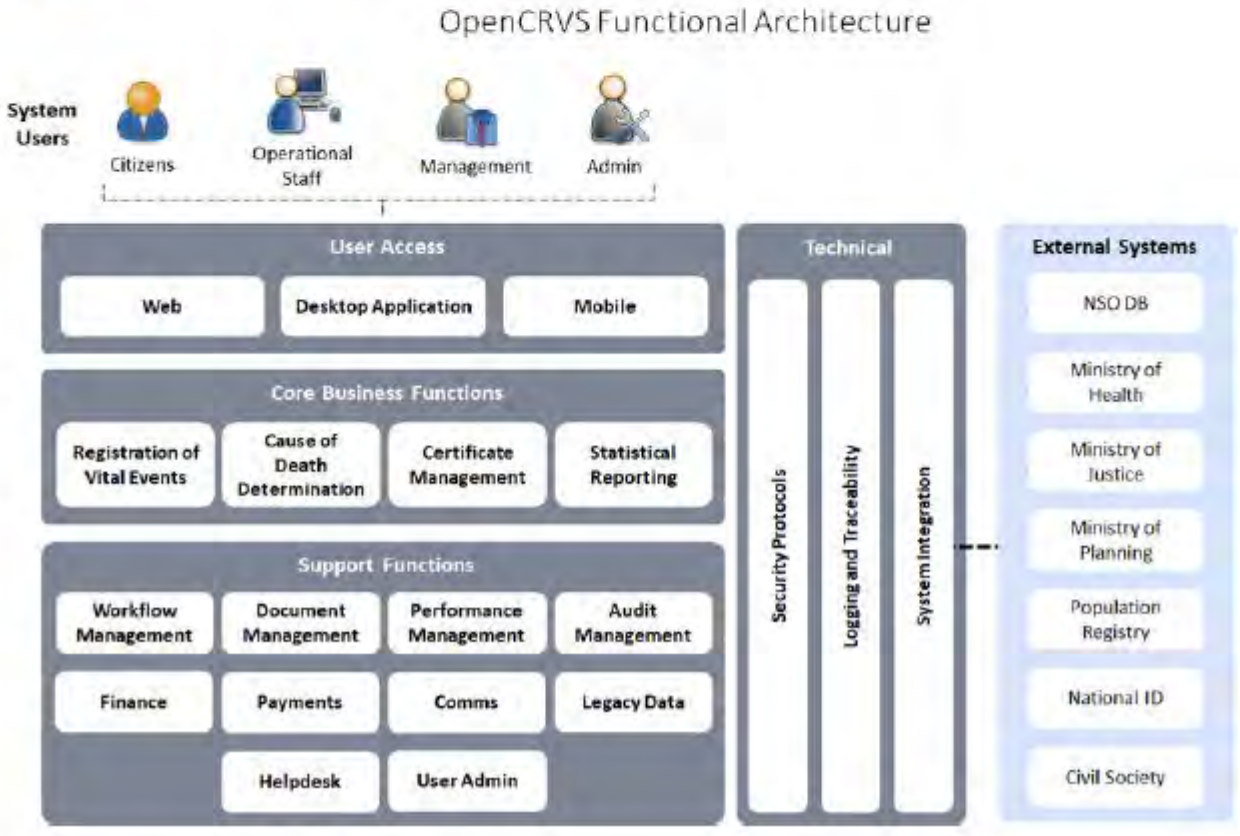
The OpenCRVS project was initiated by Plan International and developed in collaboration with Jembi Health Systems NPC as a project of APAI-CRVS[vi] (APAI-CRVS).

Plan International is a global child rights organisation with an established track record in birth registration systems and CRVS digitisation. Under the *Count Every Child* campaign, Plan International helped register 40 million children and influenced changes in legislation for rights-based birth registration in 10 countries. Plan is a core member of APAI-CRVS, with the mandate to lead CRVS system strengthening efforts across Africa and coordinate the support provided by development partners. Having worked in birth registration for almost 20 years, Plan recognises the urgent need to "do things differently" and innovate in the area of CRVS. Its recent publication "Innovations in Birth Registration"[vii]explains more about the need to challenge traditional orthodoxies and change the dialogue in CRVS circles.

Jembi is an African non-profit company specializing 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 project, including OpenMRS, OpenHIM and OpenHIE.

Plan and Jembi have a history of successful collaboration, including the *CRVS Digitisation Guidebook*[viii], an online resource that provides step-by-step guidance for countries to plan, analyze, design, and implement digitized systems and automated processes for CRVS. Edward Duffus, Head of Birth Registration and Innovation for Plan International and Chris Seebregts, CEO of Jembi will serve as the organizational management leads.

Project Description



There is significant existing investment in OpenCRVS, including:

- Prototype back-end functionality has been developed based on the Open Health Information Exchange (OpenHIE) architecture and reference components.
- Business process modeling of the birth and death registration processes has been conducted in 20 African and Asian countries by the Data for Health project. This has resulted in a valuable set of documentation describing the general workflows, operational and informational needs of the participating countries, which has been used to create a set of priority common requirements for OpenCRVS.
- A design has been developed for dedicated front end functionality specific for CRVS workflows based on a flexible micro-services architecture interfacing with the HIE.

A working prototype has been developed to demonstrate how OpenCRVS can:

1. Manage the civil registration process from the point of a live birth notification through to the production of the child's birth certificate
2. Provide a management dashboard to monitor performance of Civil Registration staff against key performance indicators
3. Utilise data from existing healthcare applications to feed directly into the civil registration process (such as birth notification data submitted by immunisation healthcare workers in the field via a mobile app). This feature shows the value of an open, interoperable architectural design based on OpenHIE principles and adaptation of health data exchange standards for the CR domain.

Using an agile development methodology allows us to continuously design, developand test with civil registrars, citizens and other users to ensure that the system meets their needs and delivers value in short, iterative time cycles. The OpenCRVS prototype has been demonstrated at various meetings, including the ESCAP Regional Steering Group meeting for CRVS in Asia Pacific in Bangkok in Oct 2017[ix] and at the African Conference of Ministers responsible for Civil Registration in Nouakchott in December 2017, with positive feedback received from many countries.

This proposal will provide an organisational home for the core OpenCRVS software and community, independent of country-implementations, where the product can be managed according to best practice guidelines on a sustainable basis. This work includes:

- Centralised management of the OpenCRVS product roadmap
- Adoption and adaptation of existing health data and interoperability standards for CRVS concepts and work processes. This will have the advantage of reusing existing work from the health sector and tightly integrating CRVS and health business processes, extending to full interoperability, in future.
- Further development of new features and elaboration of the CRVS workflows and architecture patterns for OpenHIE.
- Further development of the OpenCRVS micro-services functionality
- Further development of a generalised set of documented functional requirements and technical system specifications.
- Development of a set of Quality Assurance and Quality Control artifacts, including test plans, test cases and general test guidelines.
- Development of a set of user manuals and implementation guides, including installation, operations and system monitoring guides.
- All OpenCRVS product documentation to be produced under a Creative Commons license for adaption and re-use.

Use Cases, User Stories and Activities

Civil registration provides data on life itself, and for governments it provides the sole continuous source of population data for evidence-based policy and decision-making. However, despite the obligations of governments to register all vital events, including birth, death, marriage, divorce and adoption, levels of civil registration across the developing world remain critically low. 44% of countries worldwide do not not have comprehensive birth and death registration. Globally, it is estimated that 290 million children, most of them in Africa, do not have a birth

certificate. Two thirds (38 million of 56 million) annual deaths are not registered.

Without a birth certificate a child does not exist in the eyes of the law and is therefore vulnerable to many forms of abuse and neglect impacting on their health status. Without a death certificate a family is left unable to inherit what is rightfully theirs, and without data on the cause of death governments are unable to develop appropriate health policies. Without marriage registration, underage marriage can go on unnoticed and unaddressed, leaving young girls and boys vulnerable to a life of disadvantage. 15 million girls are married before the age of 18 every year.

The intersection between health information systems and CRVS has the potential to harness the benefits of interoperability and data exchange to meet the ever evolving needs of curating patient information. Effective civil registration systems not only contribute to the accurate identification of patients for continuity but also form the foundation of a "life record" of all major events in an individual's life. Integrated health services and civil registration solutions means that:

- With more women being encouraged to facility-based births, civil registration systems are informed about birth events in a more timeous manner and may be able to provide in-facility registration services
- Linking to well implemented health workflows such as immunisation and other field programmes provide valuable data sources for inputs of vital event registrations that would otherwise not be identified
- Death registration is able to be fed in to the civil registration systems though autopsy and verbal autopsy processes and systems

OpenCRVS linkages to the health sector allow a symbiotic relationship where each service feeds into the other providing timeous, accurate and up to date information.

The digitisation of CRVS systems using modern technologies has the potential to extend registration coverage, simplify administrative processes and share data between systems, all at a lower cost. Many developing countries are making very significant investments to digitise their CRVS systems. However, there is a lack of affordable and effective CRVS systems in low resource environments.

An open source, standards-based and interoperable CRVS system could have a transformative impact on birth and death registration in low resource settings by increasing the reach and efficiency of CRVS systems, as well as integrating CRVS processes, such as birth registration with health services, such as immunisation.

The OpenCRVS prototype already showcases the full birth registration process, from the point of birth notification through to the formal registration and certification of the birth as well as an innovative performance management dashboard. In addition, it supports a proof of concept workflow to show how a birth notification message from a third party mobile application (e.g. an immunisation app) can be sent to OpenCRVS and used by CR staff for follow up purposes. Two example use cases are elaborated below:

1. The use case for family birth registration in Bangladesh

This use case illustrates how this digital intervention can be integrated into the existing community healthcare worker programme in Bangladesh to improve birth registration rates. The scenario describes how a family member uses a mobile phone to send an SMS to a free number via USSD to notify a birth within the family. This information is relayed to the health worker who schedules a visit to the new mother and child and is able to register the details of the birth whilst providing health services. This data is sent to both the health information system AND to the civil registration system, where a CR agent is able to validate the data and register the birth. The family is notified via SMS when the registration is complete and the child's birth registration number and National ID number are provided. The details of where and when to collect the birth certificate are also sent to the family, who are now able to make one visit to the Civil Registration office, instead of multiple visits, and collect the child's birth certificate.

Please see more details about the user personas represented in this birth registration use case in the attached PDF document.

The technical use case illustrates the enormous potential for interoperability between the health service, the national ID and civil registration domains as a core feature of an e-government framework.

2. ***The use case for the notification of a live birth via an immunisation event.***

This demonstrates the enormous potential for improving birth registration rates by piggybacking on the back of existing mHealth digital interventions and utilising the same data collected by field workers as an input to the civil registration system. It also showcases the adaptation of existing health data standards for use in a related domain.

The scenario describes how a young woman with a new baby, living in a remote area, is visited by an immunisation healthcare worker to administer the infant's scheduled immunisations. The healthcare worker gives the baby the immunisations and captures this immunisation event details in a mobile application. Once the healthcare worker has a mobile connection, this data is sent to the immunisation system AND a sub-set of this data is sent as a birth event notification to OpenCRVS. This alerts staff at the local civil registration office to a birth in the community, which can then be followed up by the CR field worker to ensure that the birth is registered and that the young woman receives a birth certificate for her child.

The technical interoperability use case demonstrates how a mobile immunisation app can send birth notification data to OpenCRVS using a FHIR-based standard, IHE's MHD (Mobile Access to Health). Incoming notification messages are routed via the OpenHIM. This provides authentication and authorisation services and stores a copy of the transaction in the MongoDB audit repository. The notification messages in the form of an MHD transaction are stored in the HEARTH FHIR repository as a FHIR resource bundle. This data is accessed by the OpenCRVS core and displayed as an incoming notification in the front-end.

Our goal is to supplement existing funding to extend this interoperability work further. The overarching goal of the broader initiative is to develop a full production-ready first version of OpenCRVS with interoperability support, including an improved DevOps process, full quality assurance testing and user and technical documentation. This focuses on hardening and extending the existing birth registration workflow from the point of birth notification through to registration and certification, including a management dashboard to monitor the performance of CR staff and some initial vital statistics birth reports, based on UN guidelines. This workflow is expected to form the basis for the first implementation planned for Bangladesh.

This proposal specifically seeks to fund the interoperability aspects of the OpenCRVS solution and showcase the impact that this would have on both the health and CR domains. The main objectives for this proposal are :

- To extend the existing prototype workflow to use infant immunisation data as a source of birth notification by connecting to an existing real-world immunisation mobile application. This would include identifying a suitable tool and collaborating with partners to test the data exchange.
- To support the identification workflow i.e. develop a proof of concept to show integration with a national ID system to provide the unique person identifier for new registrations and to verify existing person ID's.

Digital Health Technologies

OpenCRVS is designed as to be an open source system supporting the digitisation of common processes for civil registration and vital statistics (CRVS), particularly those found in low resource countries. The aims of this initiative are to provide a software platform that is:

- Freely available under an appropriate OSI license with no ties to software vendors.
- Interoperable with health, National ID and other eGov systems.
- A true foundational register on which to build and base ID all e-government systems.
- Fully data enabled for performance management and fast decision making.
- Designed with the people it serves, and evolve with their needs and capacities.
- Safe and secure, protecting the people and data that it uses
- Facilitates the creation of a digital crvs community

Using an agile development methodology allows us to continuously design, development and test with civil registrars, citizens and other users to ensure that the system meets their needs and delivers value in short, iterative time cycles. The OpenCRVS prototype has been demonstrated at various meetings, including the ESCAP Regional Steering Group meeting for CRVS in Asia Pacific in Bangkok in Oct 2017 and at the African Conference of Ministers responsible for Civil Registration in Nouakchott in December 2017, with positive feedback received from many countries.

OpenCRVS is being designed in line with the Principles for Digital Development, which describe nine guidelines to integrate established best practices into technology-enabled programmes.

The principles underlying OpenCRVS also reflects the vision of the "3-Opens":

- Open Architecture: a principle that enforces component based design where each part is clearly outlined and its functionality is understood within the whole. This allows OpenCRVS to operate within existing ecosystems and to effectively engage with other systems and tools.
- Open Standards: the solution not only employs United Nations standards for CRVS but also internationally-recognised open standards (adapted from the health domain) that govern how data is exchanged within each of the components of the system, and interfaces to share data with external components and systems. These interoperability standards are vital in operating in the wider identity management ecosystem.
- Open Source: in support of its vision, the OpenCRVS core software product will boast an open license that will govern the access and management of the global good and common tool; ensuring that it remains accessible to the countries and peoples it intends to serve. OpenCRVS will be paired with the emerging social / global-good license and support model to bolster the sustainability and ongoing support for the core global good.

This proposal seeks to provide initial support for the establishment of an organisational home for the core OpenCRVS software and community, independent of country-implementations, where the product can be managed according to best practice guidelines on a sustainable basis. This work includes:

- Adoption and adaptation of existing health data and interoperability standards for CRVS concepts and work processes. This will have the advantage of reusing existing work from the health sector and tightly integrating CRVS and health business processes, extending to full interoperability, in future.
- Further development of new features and elaboration of the CRVS workflows and architecture patterns for OpenHIE.
- Further development of the OpenCRVS micro-services functionality
- Further development of a generalised set of documented functional requirements and technical system specifications relating to the interoperability aspects
- Development of a set of Quality Assurance and Quality Control documentation, including test plans, test cases and general testing guidelines for the interoperability use cases

Conntributing to the development of a set of user manuals and implementation guides, including installation, operations and system monitoring guides.
- All OpenCRVS product documentation to be produced under a Creative Commons license for adaption and re-use.

OpenCRVS is designed around a component-based architecture and based on the OpenHIE principles. The components are:

- The OpenHIM as the interoperability layer
- HEARTH as the FHIR server that serves as the person-centric longitudinal record store and master person index
- A workflow engine at the core that uses a microservices approach to manage the configuration and business rules that determine the system interactions
- A User Interface built using React

Technologies used include NodeJS and MongoDB (as the database for both the OpenHIM's audit logs and HEARTH's datastore), React and Redux.

Use of standards

Work done to date has included the development of CRVS data definitions according to the UN Principles and Recommendations for a Vital Statistics System Revision 3 (2014). The data definitions for the Live Birth event have been mapped to the FHIR Resource Types and this has formed the basis for the development of the immunisation birth notification workflow.

The immunisation birth notification workflow uses the MHD profile and the OpenHIM and HEARTH already support a range of health data exchange standards including the following IHE profiles: ATNA, mCSD, PIXm, PDQm, MHD.

Community Feedback

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

The creation of an "Open" product and a global CRVS good, brings with it the creation of a community of developers, contributors and implementers. As OpenCRVS will be developed in an agile, iterative way, contributions from a community that learns, contributes and evolves knowledge on the needs and requirements for digital CRVS systems, will channel this into a constantly improving global CRVS good. The Technical Advisory Group "TAG" will be made of a number of global experts from different areas of expertise including CRVS, child protection, policy and health. As part of the broader project, we will engage individual leaders in the health field and health networks such as AeHin. Global advisors and regional expert review groups convened through the Africa and Asia- Pacific regional CRVS core groups, will be able to access the OpenCRVS core product remotely and provide continuous feedback on features and code for agile development and improvement.

For the wider CRVS community, benefits include:

- An expanded knowledge base of CRVS.
- Fresh thinkers with whom to work with to help solve CRVS challenges.
- Cross-sector knowledge that may influence improvement in CRVS service delivery

- Closer interaction between experts in the health and CRVS domains
- Sustainability – a community to own, maintain and evolve the OpenCRVS product over time.

The aim of the digital health community for OpenCRVS is to use the knowledge and experience of those designing, developing and implementing OpenCRVS and similar technologies in low resource setting to define 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 OpenCRVS
- Hosting regular community calls

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 collectathons.

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).

A self-assessment on the Global Good Maturity Model

SEE OpenCRVS maturity model here :

https://docs.google.com/spreadsheets/d/1PR0Y1hBQOZdH0WMt5JDHoAXMUgGDawRnwkxzETFUXVw/edit#gid=249752520

The current rating for all four core indicators is low as this project is still at the prototyping stage. We believe that this investment will significantly improve the maturity ratings as described below, in all 3 areas but particularly around the community support and software. The average rating is currently 1.16 : we believe this can be increased to an average rating of 5.33.

Before Investment

After Investment

Global Good Maturity

Country Utilisation and Country Strategy

Advocacy and promotion of the OpenCRVS tool as part of the broader CRVS strengthening initiative is an ongoing activity.

Digital Health Interventions

OpenCRVS is designed to be as configurable as possible while still being a coherent product. This allows for OpenCRVS to meet the requirements of individual countries while maintaining its integrity as a system that follows good practice in CRVS as laid out by the United Nations principles for CRVS.

Source Code Accessibility

As the system is still in the early phases of development the repository is still closed but our intent is to make the code available under an appropriate OSI license (most likely BSD-3 clause but this is still to be confirmed) as soon as the project is at a stage where it it would benefit from community engagement. Supporting documentation will also be made available via a public wiki. The underlying architectural principles and reference artifacts such as business and system requirements, business process models and data definitions based on the UN guidelines are already publicly available on www.crvs-dgb.org .

Funding and Revenue

We understand that a sound strategy for core project funding is critical for long term sustainability for an open source project. Our strategy includes:

- Upfront investment will be required to develop a functioning core tool that can be used to pilot in select implementation countries. Beyond this, grants will be sought to develop key functional components of the tool or specific use cases that benefactors and donors are interested in exploring. The existence of the OpenCRVS tool will also catalyse innovations in CRVS which will unearth new and game-changing use cases for social good.
- A Social Licence (or Global-Good Licence) is 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. This contribution supports the open source tool and the community surrounding it.
- As countries engage with the OpenCRVS project and implementations are requested, the OpenCRVS project will work with implementers to align their needs with the product roadmap and vice versa. The project will leverage implementation grants to continue development of the core product and associated implementation materials. Implementers will also be encouraged to join the growing OpenCRVS community to continue active curatorship beyond the scope of their implementation.
- The OpenCRVS project is an innovative and game-changing initiative which seeks to operate in a wider ecosystem of eGovernment service

delivery and commercial opportunity. The project will engage with public and private partners who could benefit from OpenCRVS as a foundation on which they can build their services, and offer packages that will benefit both vendor and project.

Developing the Community

Community Engagement and Governance

A strategy and plan needs to be developed to initiate the OpenCRVS community and to start to put in place the processes and platforms to operationalise this.

Software roadmap and User documentation

We already have a well-developed set of functional and non-functional requirements gathered from extensive engagement and implementation experience in a number of different countries, including Ghana, Kenya, and Bangladesh. These artifacts, together with the overall enterprise architecture, were included as outputs of the CRVS-DGB guidebook project. There is an existing product backlog and a basic software roadmap and the goal therefore is to maintain and update the requirements documentation and the roadmap and backlog as part of the agile development process, specifically around the interoperability use cases.

Multilingual Support

There is currently no support for a multilingual system and ideally the underlying approach and framework should be researched and designed as part of the underlying system at this point.

Developing the Software

The focus of this funding is primarily to extend the interoperability use cases identified as high priority, and also contribute to the development of the overall software solution to get it to a production-ready state.

The bulk of the resource allocation for this project is aimed at:

1. The introduction of a robust quality assurance and quality control process

2. The improvement of the agile development and DevOps process and alignment across partner teams

3. The development of interoperability use cases using health data exchange standards and based on the OpenHIE architecture and workflows

Technical documentation

There already exists a draft technical specification that needs to be developed in more detail and updated as the software design and codebase is updated. All artifacts are already available on a private project wiki and this needs to be transitioned to a public wiki.

Software productisation

A plan will be developed for appropriate deployment packaging, in conjunction with an set of installation guides and qualification protocols, and time scheduled for this prior to the first implementation.

Work plan, Project Deliverables & Schedule

See WORKPLAN here that describes the planned high-level activities, timelines, deliverables and roles responsible for delivery. PLEASE NOTE that this proposal does not include Plan International resources as these are funded under a seaparate funding stream. The overall programme and product management, UX design and full QA will be Plan activities: Jembi activities are shown in the workplan centre on the

technical architecture, interoperability development, DevOps, community engagement and internal project management and liaison with the Plan programme and product managers.

https://docs.google.com/spreadsheets/d/1YrrX9-S2NA0-R6tEUByzZAmIZfyvqP5c1GNORclSdCQ/edit#gid=1591612357

Community Support

Activities

The main product and community management activities planned under this proposal are:

- Ensuring that quality assurance and quality control processes that are implemented are also integrated into a contributor development process
- Making test plans and testing guidelines available to the community for use in validating the installation and setup of OpenCRVS and for testing the interoperability use cases
- Ensuring that the related user and implementer documentation and training materials are up to date, easy to understand and practically focused.

Deliverables

- An updated set of functional requirements specifications (including interoperability use cases and business & technical workflows) made available under a Creative Commons license. The software roadmap and product backlog will be available on JIRA and the project wiki.
- An updated and improved set of interoperability testing guidelines and test plans made available on the 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 under a Creative Commons license.

Software Maturity

Activities

- To develop and implement a robust quality assurance and quality control processes further and fully integrate this within our current agile development and continuous integration process
- To harden and test the birth notification interoperability use case with at least one real-world immunisation application
- To develop and test the identification notification use case
- To develop and test the identification verification use case
- To perform integration testing
- In addition the Jembi technical team will contribute the development of the following features and functions to get OpenCRVS to a production-ready state:
  - Live birth registration workflow from birth notification to certification
  - performance management dashboard
  - a prioritised set of vital statistics reports for birth to a production-ready state

Deliverables

- The first release of OpenCRVS that includes the fully documented and tested interoperability use cases described above. This release will be publically available under an open source license
- An updated set of technical specifications made available under a Creative Commons license.

Budget Narrative

Please see the full detailed budget in the Excel spreadsheet:

digital_square_budget_opencrvs_with_detail_narratives.xlsx

PLEASE NOTE that this proposal does NOT include Plan International resources as these are funded under a seaparate funding stream. The overall programme and product management, UX design and full QA will be Plan activities: Jembi activities and staff as described in the budget will focus on the technical architecture, interoperability development, DevOps, community engagement and internal project management. This includes liaison with the Plan programme and product managers.

Total Budget USD 353 037. This budget includes:
The Executive Management team consists of:

- Executive Director - Chris Seebregts (13 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 (13 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 (22.10 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 22.10 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 (52 days) Overall responsibility for the program, overseeing all activities, resourcing, budgeting, reporting, quality control and community engagement.
- Project Officer - (26 days). Supports the program manager with planning and activities management. Responsible for working with team on coordination of calls and general communications. Provides general logistics, reporting and monitoring the day to day administration of Jembi.

Product Management and Technical Development:

- The Technical Lead – Ryan Crichton (78 days) has a background in health information exchange, interoperability and data exchange standards. Will set technical direction for the Jembi development team and liaise with Product Manager and overall Solution Architect to ensure the architecture and interoperability work is well aligned with the OpenCRVS solution and the principles of OpenHIE. Responsible for architecture documentation and technical specifications for the interoperability use cases.
- The Product Manager – Linda Taylor (78 days) Responsible for the overall coordination and delivery of the Jembi technical development activities including requirements analysis, documentation and functional testing for the interoperability work-stream and backend development. Will liaise directly with the overall OpenCRVS Product Manager to ensure the different technical teams are working in

alignment to ensure the overall product requirements and quality standards are met.

The product team is made up as follows:

- Senior developer (At 100% FTE = 260 days) Responsible for writing and testing software code and producing technical documentation.
- Two Mid-level developers (1 at 100% FTE = 260 days and 1 at 50% FTE = 130 days).Responsible for writing and testing software code and producing technical documentation.
- Software Development Manager – (18.2 days) Responsible for the overall management of the Engineering team, including Software Development Lifecycle and recruitment.

In addition the travel budget includes:

Two international trips for two Jembi technical team members to travel to the UK to participate in a Ways of Working workshop with the Plan International team and other members of the consortium to ensure knowledge sharing and agreement on best practice guidelines for the technical development and community contributions process.

Two local trips within South Africa for key technical team members to travel to Jembi's head office in Cape Town to participate in planning sessions and technical team meetings

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[i] http://www.who.int/mediacentre/factsheets/fs324/en/

[ii] https://unstats.un.org/unsd/demographic/crvs/Global_CRVS_Docs/news/CRVS_and_the_SDGs_2016.pdf

[iii]http://apai-crvs.org/sites/default/files/public/COM4_Nouak%20Decl_8Dec2017_English.pdf

[iv] https://www.jembi.org/jembi-signs-mou-mozambique-ministry-justice/

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Supporting Documents: OpenCRVS birth registration use case personas
OpenCRVS proposal in downloadable PDF format